8.17 ACCIDENTS, MALFUNCTIONS AND UNPLANNED EVENTS

Accidents, Malfunctions and Unplanned Events refers to events or upset conditions that are not part of any activity or normal operation of the Project as has been planned by SML. Even with the best planning and the implementation of preventative measures, the potential exists for accidents, malfunctions or unplanned events to occur during any Project phase, and if they occur, for adverse environmental effects to result if these events are not addressed or responded to in an environmentally appropriate manner. Many accidents, malfunctions and unplanned events are, however, preventable and can be readily addressed or prevented by good planning, design, emergency response planning, and mitigation. By identifying and assessing the potential for these events to occur, SML can also identify and put in place prevention and response procedures to minimize or eliminate the potential for significant adverse environmental effects, should an accidental event occur.

As was described in Chapters 2 and 3, the Project is being designed, and will be constructed and operated, according to best practice for health, safety, and environmental protection to minimize the potential environmental effects that could result from the Project, as well as those that could result from accidents, malfunctions or unplanned events. Prevention and mitigation will be accomplished by the following general principles:

- use best management practices and technology for carrying out the Project while controlling permitted/allowable releases to the environment and consequent environmental effects;
- incorporate safety and reliability by design, and application of principles and practices of process and mine safety management;
- develop and apply procedures and training aimed at safe operation of the facilities that prevent or avoid the potential upsets that might lead to accidents, malfunctions or unplanned events; and
- implement effective emergency preparedness and response.

Chapter 3 provided a discussion of the features of the Project that will accomplish the safe, reliable, and environmentally responsible implementation of the Project, as well as how it will be carefully constructed, operated, and ultimately decommissioned in a manner that minimizes the potential for Accidents, Malfunctions and Unplanned Events to occur. The Project design, mitigation, and response procedures implemented as part of the planning stage of the Project and as adapted throughout the Project life are intended to minimize the potential for accidents, malfunctions and unplanned events to occur, and with their development and implementation, the potential for such events to occur will be greatly reduced. In the unlikely event of an accident, malfunction or unplanned event, emergency response plans and corrective action procedures will be implemented to minimize the resulting environmental effects. The Project will have safety measures built in to mitigate or manage potential upsets, should they occur. Employees will be trained in operational procedures and environmental emergency response procedures, including safety measures to prevent and respond to Accidents, Malfunctions and Unplanned Events. Preparedness and response measures are described below and in the Environmental and Social Management System (ESMS) for the Project (Appendix D).

8.17.1 Methodology

In this chapter, the potential accidents, malfunctions and unplanned events that, although unlikely, could reasonably be possible to occur during any phase of the Project and result in adverse environmental effects are described, discussed, and assessed. The focus of the assessment is on credible accidents or scenarios, namely those that although unlikely can reasonably be contemplated to possibly occur and for which the resulting adverse residual environmental effects could potentially be significant. Credible accidents and scenarios were identified based on knowledge of the Project and past professional experience of SML, the Project designers and engineers, and of the EIA Study Team with similar types of projects and Project activities. While not all potential accidents, malfunctions or unplanned events can reasonably be reviewed or assessed, scenarios have been selected to conservatively represent higher consequence events that would tend to address the consequences of less likely and/or lower consequence credible accidents and scenarios.

Accidents, Malfunctions and Unplanned Events identified as credible were evaluated in isolation, as the likelihood of a series of accidental events triggered by natural events occurring in combination with each other is very low (*e.g.,* extreme weather coincident with an extreme seismic event). It is not reasonable, nor possible, to assess the occurrence of a series of accidental events occurring in series or in parallel, particularly if the focus is on the environmental effects themselves rather than the mechanism by which the accident and associated environmental effects may occur. These possible events, on their own, generally have a low probability of occurrence and thus their environmental effects are of low likelihood. They have an even lower probability or likelihood of occurring together—thus their combination is not considered credible, nor of any measurable likelihood of occurrence. Likewise, the assessment of cumulative environmental effects of Accidents, Malfunctions and Unplanned Events in combination with the planned Project activities, as well as any overlap of such Accidents, Malfunctions or Unplanned Events with other projects or activities that have been or will be carried out, is not a credible or reasonably likely outcome—these highly unlikely scenarios have thus not been assessed herein.

The methodology for the environmental effects assessment of Accidents, Malfunctions and Unplanned Events that meets the requirements of the Final Guidelines (NBENV 2009) and Terms of Reference (Stantec 2012a) was discussed in Section 5.7 of this EIA Report. Following identification of credible accidents and scenarios, a preliminary screening was conducted on these credible accidents, malfunctions and unplanned events to determine if and how the accident and/or scenario is likely to interact with each identified valued environmental component (VEC) (Table 5.7.1). Interactions between the accidents and scenarios and VECs were ranked as 0, 1, or 2, using the same general criteria as for Project-VEC interactions (Section 5.4.1). For these credible accidents, the selected scenarios represented worst-case; for example, an off-site trucking accident resulting in a spill getting into a watercourse. The screening and ranking of interactions is based on these worst-case scenarios. A ranking of 0 indicates that there will be no substantive interaction between the accident and the associated VEC. A ranking of 1 indicates that an interaction may occur with the VEC; however, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices. Finally, a ranking of 2 indicates that an interaction with the VEC may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. The rationale for a ranking of 0 and 1 for each VEC for each

scenario is explained, in the same manner as was considered in the assessment of Project environmental effects for each VEC.

Interactions ranked as 2 are considered further and in more detail in the EIA, focusing on the environmental effects of the event and/or scenario rather than on the mechanism or cause by which it could occur. The mechanisms are discussed and preventative measures are presented; however, the assessment focusses on the potential environmental effects if the accident, malfunction or unplanned event did occur and what would be the responses to minimize that environmental effect. For this reason, while some accidents have multiple mechanisms, the assessment is based on the interaction with the VEC and resulting effect and end consequence of the accident, malfunction or unplanned event, not the mechanism by which it occurred. For instance, a vehicle collision could result in property damage and personal injury, but it could also result in a hazardous material spill (in the case of an accident involving a fuel truck) which may result in the uncontained release of these materials to watercourses. It could also result in increased risk of fire, which could spread to surrounding forests. In this case, the vehicle collision, release of hazardous materials, and the fire are assessed separately. This is because the environmental effects of a hazardous material spill will be the same regardless of the cause of a spill; the same is true for a fire, or any other accidental event for that matter. The environmental effects will be the same (or at least similar) regardless of how the fire or other accidental event is started. With mitigation, residual environmental effects are assessed, and a determination of significance of the Project-related environmental effects is made. If the residual environmental effects are rated not significant, then no further action is required. If a significant adverse residual environmental effect is predicted and likely to occur, the capacity of renewable resources likely to be significantly affected by the Project is determined, as required by *CEAA* and the Final Guidelines.

8.17.2 Selection of Accidents, Malfunctions and Unplanned Events

The Terms of Reference (Stantec 2012a) require that the *"environmental effects of credible accidents, malfunctions and unplanned events of the Project during each applicable Project phase will be assessed"* in the environmental impact assessment (EIA).

To accomplish this requirement, a list of potential accidents, malfunctions and unplanned events was created by the EIA Study Team in consultation with SML and its engineering team based on its knowledge of the Project as conceived during the feasibility study, and based on experience with other mines. This listing was then reviewed by various technical experts on the Project Team (*e.g.,* biologists, planners, design engineers, geotechnical engineers, and other scientists, engineers and professionals), and subsequently refined to only include events that were considered to be credible, *i.e.,* those that although unlikely can reasonably be contemplated to possibly occur and for which the resulting adverse residual environmental effects could potentially be significant. Environmental effects of those credible accidents, malfunctions or unplanned events on each applicable VEC were assessed, and a determination of significance was made in consideration of the various significance criteria previously defined for each VEC. The accidents, malfunctions or unplanned events that were considered to be non-credible and the rationale why they are considered non-credible are discussed, but their environmental effects are not evaluated further as they are not considered possible, and thus more than not likely to occur.

Based on these considerations, the potential accidents, malfunctions and unplanned events that were considered by the Study Team for the Sisson Project are:

- Loss of Containment from Tailings Storage Facility (TSF);
- Erosion and Sediment Control Failure;
- Pipeline Leak;
- On-Site Hazardous Materials Spill;
- Release of Off-Specification Effluent from the Water Treatment Plant;
- Failure of a Water Management Pond;
- Failure of a Water Management Pond Pump;
- Off-Site Trucking Accident;
- Vehicle Collision;
- Uncontrolled Explosion; and
- Fire.

8.17.2.1 Non-Credible Accidents, Malfunctions and Unplanned Events

Of the potential accidents, malfunctions or unplanned events listed above, three such events – Loss of Containment from TSF, Failure of a Water Management Pond, and Uncontrolled Explosion – were considered by the Study Team to be non-credible, and were thus not considered further in the assessment for the reasons described below.

8.17.2.1.1 Loss of Containment from Tailings Storage Facility (TSF)

A loss of containment from a TSF is defined as a significant failure of a TSF embankment leading to the release of large quantities of mine contact water and/or tailings into the receiving environment. As considered by Knight Piésold as experts in mine design, geotechnical engineering, and mine waste and water management, this scenario was not considered to be credible in consideration of the design basis. Their analysis follows.

The process of conducting site investigations, design, review, Construction, Operation, Closure, and monitoring of a TSF in Canada is well established under guidelines developed by the Canadian Dam Association (CDA) and by the International Commission on Large Dams (ICOLD). The Canadian Dam Association Guidelines specify that qualified third-party engineering firms conduct site investigations, develop designs, monitor construction, and inspect ongoing operations to ensure that the appropriate standards are met. For the Project, these include the following:

- design for geotechnical stability for the most significant earthquake loading relating to the largest applicable seismic event (known as the Maximum Design Earthquake);

- design for safe containment of all rainfall and run-off resulting from the Inflow Design Flood (IDF) at all times during Operation and for attenuation and safe passage of the IDF after Closure;
- a Failure Mode Analysis by qualified independent specialists to ensure that the TSF embankment design and operating plan adequately address any and all potential failure causes and mechanisms;
- quality assurance and inspections by the design engineers during initial and ongoing Construction of the TSF;
- monitoring and inspections during Operation (including a five-year review under the Canadian Dam Association Guidelines conducted by a qualified geotechnical engineer) to assess TSF performance and to identify any conditions that differ from those assumed during the design; and
- scheduled, ongoing inspections and audits of the facility by qualified geotechnical engineers during Operation and after Closure.

In New Brunswick, the approval to construct and operate a TSF is provided by the New Brunswick Department of Environment and Local Government (NBDELG) under the *Clean Environment Act,* through their Approvals to Construct and Approvals to Operate. Meeting the Canadian Dam Association Guidelines are the minimum conditions of these approvals. The approvals apply not only to the design and construction of a TSF starter dam and initial embankment, but also to subsequent "raises" of an embankment and include third-party inspections throughout the life of a project. The design, review, Construction, Operation, Closure, and monitoring of the TSF to meet or exceed these performance measures are described in Chapter 3 (Project Description), specifically in Sections 3.2.4.4, 3.3.5, 3.4.1.1, and 3.4.2.3.

With the application of these standards and rigorous construction methods to ensure the structural integrity of the TSF embankments and components, the implementation of adaptive management measures as necessary over the life of the mine, and the legislated regulatory oversight, the possibility of a structural failure of a TSF embankment is so unlikely that it cannot reasonably be considered a credible accident or malfunction, and is thus not considered further in this EIA Report.

Notwithstanding this conclusion, and in response to requests from governments, the public and First Nations, SML prepared further information about the highly unlikely loss of TSF containment as responses to five basic questions:

1. How might the TSF embankment fail?
2. How likely is a TSF embankment failure?
3. What would be the environmental effects of a TSF embankment failure and their significance?
4. What mitigation measures will be employed to avoid a TSF embankment failure?
5. What emergency response procedures will be implemented in the unlikely event of a TSF embankment failure?

This further information is provided in Appendix G to this Final EIA Report. It indicates that the environmental effects of such a major failure of containment in the Sisson Project TSF embankment would be substantive and significant, especially for Aquatic Environment, but they are extremely unlikely to occur, with an annual probability of occurrence of 1-in-1 million to 1-in-10 million.

8.17.2.1.2 Failure of a Water Management Pond

A failure of a water management pond is defined as a significant failure of one of the embankments of these ponds, or of the liner placed at the bottom of it, that leads to the release of large quantities of mine contact water and/or seepage into the receiving environment. As considered by Knight Piésold as experts in geotechnical engineering and mine waste and water management, this scenario was not considered to be credible in consideration of the design basis. Their analysis follows.

The Project will incorporate several Water Management Ponds at low points around the TSF embankments in order to effectively capture any drainage of water through the embankments and run-off from the outer face of the embankments. These facilities will be excavated and constructed into the natural topography using native rock material and other geotechnically stable materials, and will be lined with a suitable geosynthetic material to minimize the potential for seepage losses. Ponds will be inspected periodically to ensure their structural integrity. They will be kept relatively dry and at reasonable operating levels by periodic pumping of collected water back into the TSF.

With these measures, and other than from unlikely human error, there is no mechanism by which there could be breach or failure of these ponds. The geosynthetic liner at the bottom of these water management ponds has high structural integrity and effectively prevents the permeation of liquids. Therefore, an accident scenario involving a structural Failure of a Waste Management Pond itself is not a credible scenario, and will not be assessed further in this EIA Report. However, a failure of a pump used to manage the water levels within these ponds is assessed in Section 8.17.3.5 of this EIA Report.

8.17.2.1.3 Uncontrolled Explosion

An uncontrolled explosion is defined as an unmanaged or uncontrolled detonation of explosives, or inadvertently combined emulsion constituents, or detonators associated with blasting of the open pit or quarry, or the detonation of explosives resulting in property damage from fly rock or higher-than-standard-practice vibration levels. As considered by Moose Mountain Technical Services as experts in open pit design and pit optimization, this scenario was not considered to be credible in consideration of normal industry practice and the design basis for the Project. Their analysis follows.

While blasting will be a regular part of Project activities during Operation (and to a lesser extent during Construction), the risk of an uncontrolled explosion is greatly reduced by current technology and the legal requirement to follow strict operating procedures. Drilling will be conducted using track-mounted drill rigs. Explosives will be pumped into the boreholes using industry certified explosive delivery trucks, the holes stemmed, and the charges will be detonated in a sequential manner. All of this will be done by qualified and certified blasting personnel. Blasting during Operation will occur a few times a week according to strict clearance procedures. Explosives will be supplied by a distributer who is certified under Canadian regulations, and the method of supply is to not mix the constituent chemicals until they are pumped into the blast hole in the pit. As opposed to older dynamite cartridges which were manufactured and shipped to the user, insensitive emulsion explosives will be transported and stored

on-site. The licensed explosives supplier will be responsible for the final mixing of the emulsion explosives prior upon delivery directly to the blast holes.

An on-site explosives magazine will provide for storage of blasting accessories and explosives. This magazine will be in compliance with the *Explosives Act* and Regulations. Transporting explosives will be regulated by *Explosives Regulations* under the *Explosives Act*, *Transportation of Dangerous Goods Regulations* and the Canada Motor Vehicle Safety Standards. A Blasting Plan will also be developed and followed and will specifically address health and safety. The new *Explosives Regulations* require a fire safety plan and key control plan to be in place before an application for a magazine licence is submitted and the applicant must include in the application a declaration that these plans have been prepared. Additionally, a security plan must be prepared for every magazine storing type E (blasting) explosives.

Therefore, the potential for an uncontrolled explosion would be limited to a malfunction or accident in relation to a planned blasting activity (*i.e.,* an early detonation or unplanned detonation in the pit). As all explosives will be handled by a licenced blasting contractor who will be highly trained in the safe handling, storage, and use of explosives, this accident scenario is not credible.

8.17.2.2 Credible Accidents, Malfunctions and Unplanned Events

The credible accidents, malfunctions and unplanned events assessed for the Project are summarized in Table 8.17.1. Detailed descriptions of credible accidents, malfunctions and unplanned events including scenarios, and environmental effects assessment of each of these events on various VECs, are provided in the sections that follow the table.

Table 8.17.1 Credible Accidents, Malfunctions and Unplanned Events and Scenarios

Accident / Malfunction / Unplanned Event	Description of Scenario	Description of Potential Environmental Effects	VECs Potentially Affected
Erosion and Sediment Control Failure	A failure of Project-related erosion and sedimentation control devices that will be implemented as key mitigation to avoid or minimize environmental effects due to erosion and sedimentation during Construction and Operation of the Project. The failure of the coffer dams to be constructed to manage sediment during Construction is also included.	An accidental release of sediment or sediment-laden water may adversely affect a watercourse or wetland or other receiving environment outside of the Project construction zone. Failure of the pumps for water management or the coffer dam itself could result in a large release of sediment laden water into Bird or Sisson brooks.	• Water Resources. • Aquatic Environment. • Vegetated Environment. • Wetland Environment. • Public Health and Safety. • Land and Resource Use. • Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons.
Pipeline Leak	Leakage from the pipeline(s) carrying tailings from the ore processing plant to the TSF and/or the reclaim pipeline carrying water from the TSF for use in the ore processing plant.	A spill of tailings or reclaim water onto the Project Development Area (PDA) could adversely affect surface and groundwater resources.	• Water Resources.
On-Site Hazardous Material Spill	A spill of petroleum products (*e.g.,* gasoline or diesel), process chemicals (*e.g.,* reagents), or concentrate/APT within the PDA. This accident could result from equipment spills, spills from vehicles, on-site trucking accident, or tank leak or rupture that occurs within the PDA, with potential to affect land or water within the PDA or outside the PDA if not addressed in a timely manner. Spills resulting from off-site trucking accidents (including diesel spills) are discussed under "Off-Site Trucking Accident."	A large spill may affect groundwater and soil, and surface water contamination may occur, thereby potentially adversely affecting the quality of groundwater, fish and fish habitat, and wetland habitat, and result in the ingestion/uptake of contaminants by wildlife and thus limiting access to these resources by the public and First Nations.	• Atmospheric Environment. • Water Resources.
Release of Off-Specification Effluent from Water Treatment Plant	The release of effluent that exceeds the *Metal Mining Effluent Regulations (MMER)* or provincial effluent discharge standards as defined by approvals or permits. May result from overloading of the Water Treatment Plant.	A release of off-specification effluent could adversely affect downstream surface waters (*i.e.,* Napadogan Brook and eventually the Nashwaak River) and associated fish and fish habitat. This could result in the short-term ingestion/uptake of contaminants by fish, wildlife, the public or First Nations. Downstream groundwater, soil, or wetlands could also be adversely affected.	• Water Resources. • Aquatic Environment. • Terrestrial Environment. • Vegetated Environment. • Wetland Environment. • Public Health and Safety. • Land and Resource Use. • Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons.

Table 8.17.1 Credible Accidents, Malfunctions and Unplanned Events and Scenarios

Accident / Malfunction / Unplanned Event	Description of Scenario	Description of Potential Environmental Effects	VECs Potentially Affected
Failure of a Water Management Pond Pump	The accident is based on a failure of a pump that could cause a Water Management Pond to overflow its embankments. It is assumed that this overflow condition would last a maximum of 12 hours before the problem is identified, and repair or replacement of the pump could occur.	Based on site drainage, an overflow of the water management ponds could potentially contaminate Sisson or Bird Brooks and downstream surface water (*i.e.,* Napadogan Brook) and associated fish and fish habitat. This could result in the short-term ingestion/uptake of contaminants by fish, wildlife, or the public or First Nations. Downstream groundwater, soil, or wetlands could also be adversely affected.	• Water Resources. • Aquatic Environment. • Terrestrial Environment. • Vegetated Environment. • Wetland Environment. • Public Health and Safety. • Land and Resource Use. • Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons.
Off-Site Trucking Accident	A Project-related accident involving a truck carrying gasoline or diesel fuel for use on-site, or reagents used in the ore processing, or a spill of concentrate or APT being transported off-site to receiving locations. A spill of fuel, reagents concentrate, or APT on external access roads beyond the PDA could spread onto land and/or enter an adjacent water body. Fires that may result from an off-site trucking accident are assessed in the “Fire” section.	An off-site trucking accident could result in a spill of the material (*e.g.,* diesel fuel or reagents) being transported. This spilled material could adversely affect water quality in any watercourses in proximity to the spill, the terrestrial environment, and wetlands, and could affect the ability of the public and First Nations to use roads.	• Atmospheric Environment. • Water Resources. • Aquatic Environment. • Terrestrial Environment. • Vegetated Environment. • Wetland Environment. • Public Health and Safety. • Land and Resource Use. • Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons. • Transportation.
Vehicle Collision	A Project-related vehicle accident on road transportation networks outside the PDA, without a spill. Includes vehicle to vehicle collision, pedestrian strike, and wildlife strike. Accidents involving spills are addressed under “On-Site Hazardous Material Spill” or “Off-Site Trucking Accident.” Collisions resulting in fires are assessed under “Fire”.	A vehicle collision could adversely affect wildlife, members of the public or First Nations, including pedestrians, using Project access roads.	• Terrestrial Environment. • Public Health and Safety. • Community Services and Infrastructure. • Transportation.

Table 8.17.1 Credible Accidents, Malfunctions and Unplanned Events and Scenarios

Accident / Malfunction / Unplanned Event	Description of Scenario	Description of Potential Environmental Effects	VECs Potentially Affected
Fire	A fire occurring as a result of Project activities. A fire could occur within the processing facility, or due to a fuel spill, that may spread outside of the PDA or from an off-site vehicle accident. A fire arising from other causes and potentially affecting the Project is assessed as an Effect of the Environment on the Project (Section 8.16).	A fire could release emissions to the atmosphere, affect forest adjacent to the PDA, endanger wildlife, and affect the ability of the public and First Nations to use forest areas surrounding the PDA.	• Atmospheric Environment. • Water Resources. • Aquatic Environment. • Terrestrial Environment. • Vegetated Environment. • Wetland Environment. • Public Health and Safety. • Labour and Economy. • Community Services and Infrastructure. • Land and Resource Use. • Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons. • Transportation.

8.17.3 Environmental Effects Assessment

8.17.3.1 Erosion and Sediment Control Failure

In order to prevent the potential adverse environmental effects of accidental erosion and sedimentation events, erosion and sediment control measures are a key management feature used during Construction and Operation. These measures will be in place to minimize the potential for erodible soils exposed during Construction and Operation activities from eroding and for silt-laden water to enter watercourses or wetlands and affect water and wetland quality. Typical erosion and sediment control measures include but are not limited to the use of geotextile fabric, straw, hydroseeding, silt fences, straw bale barriers, diversion berms, and sediment traps.

During Construction, coffer dams will be installed on Bird and Sisson brooks, upstream of the location of the TSF starter dams, to collect and divert run-off around the starter dam construction sites. The coffer dams will establish low-energy settling ponds to allow suspended sediments to settle out of the water before it is pumped to a point downstream of the construction site and into the residual brook segments.

The potential exists for a failure of erosion and sediment control measures to occur by essentially two means: either the measures implemented are insufficient for the circumstances (*e.g.*, they fail during a heavy precipitation event), or as a result of improper construction arising from human error. Failure of Project-related erosion and sedimentation control measures could result in sediment adversely affecting downstream water quality.

8.17.3.1.1 Description of Scenario

Despite best efforts, a failure of some erosion and sediment control systems may arise. The key to minimizing such events is to identify when failures occur and implement a response immediately upon detection of the failure. Though the failure of erosion and sedimentation control measures can occur, such a failure usually occurs at a small, localized scale, and is readily addressed through an environmental inspection program. Such a failure may result in small quantities of sediment reaching a watercourse or wetland over short periods of time.

A variety of measures will be in place to prevent erosion of erodible soils exposed during construction activities and to control sediment laden run off waters from the PDA. To reduce the likelihood of erosion or a sediment control failure, protection measures will be followed as described in the Emergency Preparedness and Response Plan (EPRP). Erosion and sediment control measures will be monitored on a regular basis, particularly before and after heavy precipitation events. Exposed soils will be protected from erosion to the extent practical with the use of a variety of methods such as geotechnical fabrics.

The settling pond within the coffer dam will be monitored regularly and maintained in a functioning condition. Routine inspection and maintenance of the pump and pump generator will be implemented to minimize the potential for failure of this process. The on-site storage of replacement parts and fuel for these pumps will minimize the duration of any pump failure and therefore the magnitude of a pump failure event. The existing monitoring programs that will be in place for water quality and wetlands

would also be effective in understanding short- and long-term environmental effects of such events and identifying the need for additional mitigation if required.

This text following focuses on the response measures to be put in place in the event that there is a failure of the erosion and sediment control measures.

Unlike the typical erosion and sedimentation control measures, the coffer dam and settling pond are designed to manage water and suspended sediment generated over a large area. During the approximately three month time period between when a coffer dam is installed and when a TSF starter dam is completed, the potential exists for a failure of the coffer dam, the settling pond pump, or pump generator. Once a TSF starter dam is constructed and begins impounding water, operation of the coffer dam will no longer be needed, thereby eliminating the potential for this type of accident to occur.

A small-scale and short-term release of sediment-laden water could occur if the settling pond pump fails or if the pump generator malfunctions. A failure of a coffer dam could result in a large and sustained release of sediment-laden water into Bird or Sisson Brook, the magnitude and duration being dependent on the nature of the failure.

8.17.3.1.2 Environmental Effects Assessment

The potential interactions between Erosion and Sediment Control Failure and the VECs selected for this EIA are presented in Table 8.17.2.

Table 8.17.2 Potential Interactions between VECs and Erosion and Sediment Control Failure

Valued Environmental Component (VEC)	Erosion and Sediment Control Failure
Atmospheric Environment	0
Acoustic Environment	0
Water Resources	1
Aquatic Environment	2
Terrestrial Environment	0
Vegetated Environment	1
Wetland Environment	1
Public Health and Safety	1
Labour and Economy	0
Community Services and Infrastructure	0
Land and Resource Use	1
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	1
Heritage Resources	0
Transportation	0

Notes:
Interactions between Accidents/Scenarios and the respective VECs were ranked as follows:

0 No substantive interaction. The environmental effects are rated not significant and are not considered further in this report.

1 Interaction may occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices.

2 Interaction may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EIA.

No substantive interactions are anticipated between an Erosion and Sediment Control Failure and Atmospheric Environment, Acoustic Environment, Terrestrial Environment, Labour and Economy, Community Services and Infrastructure, Heritage Resources, and Transportation. There will be no measurable release of contaminants into the Atmospheric Environment, nor any change to the Acoustic Environment, from such an event. The Terrestrial Environment will not be adversely affected as any erosion would not be sufficient to adversely affect wildlife species on the scale that a significant environmental effect on the Terrestrial Environment could occur. Given the location of the Project away from existing communities, Labour and Economy or Community Services and Infrastructure will not be affected. As potential adverse environmental effects from malfunction of erosion and sediment control measures will take place within the PDA, there will be no interaction with Heritage Resources or Transportation. Therefore, potential environmental effects of Erosion and Sediment Control Failure on these VECs are ranked as 0 in Table 8.17.2; they are rated not significant with a high level of confidence, and are not discussed further.

Interactions of an Erosion and Sediment Control Failure with Water Resources, the Vegetated Environment, the Wetland Environment, Public Health and Safety, Land and Resource Use, and Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons have been ranked as 1 in Table 8.17.2. Interaction with Water Resources has been ranked as 1 in Table 8.17.2 as any changes in surface water quality as a result of an unplanned sediment release are anticipated to be short-term and reversible. Their environmental effects are rated not significant with a high level of confidence, and they are not discussed further.

Based on current information, it is possible that cabin owners may be accessing surface water for use as drinking water downstream of Sisson Brook. A release of silt-laden water could temporarily affect drinking water quality with the watercourse, downstream of the event. Prior to Construction, surface water users and user locations in the area will be identified to allow SML to inform any potentially affected users in a timely manner. If required, SML will provide an alternate drinking water source (such as bottled water) or post known surface water collection sites until parameters return to acceptable levels. The water quality monitoring program to be developed and implemented during normal operating conditions would detect any exceedances of drinking water guidelines arising from such an event. As these exceedances would be temporary and measures will be in place to monitor water quality and notify potential users and provide alternate drinking water source if required, the potential for this event to affect Public Health and Safety can be effectively mitigated.

Under normal flow conditions, a release of sediment-laden water is not likely to impinge on the Vegetated Environment or on riparian wetlands and as silt would likely flush downstream rapidly and be quickly diluted. Any potential exposure of terrestrial vegetation to water high in total suspended sediments (TSS) will be geographically limited to vegetation in the immediate vicinity of the watercourse. There could be localized die-off of individual plants, but this would be localized and reversible.

A significant sedimentation event such as from the failure of a coffer dam or pumping mechanisms into Bird or Sisson Brooks and the West Branch Napadogan Brook may temporarily affect access for recreational fishers and First Nations in the watercourse during the event. However, such as event would be temporary and flowing water from unaffected portions of West Branch Napadogan Brook would flush and dilute most of the sediment within a reasonably short time, such as a few days. In the

case of a very heavy sedimentation event, residual sediment and silt on the bottom of the brook would be flushed out during the next spring's freshet. Thus, adverse environmental effects to the watercourse would be temporary and any recreational or traditional fishing activities could resume soon after the water has cleared.

For all VECs for which the interactions were ranked as 0 or 1 in Table 8.17.2, the environmental effects of an Erosion and Sediment Control Failure during all phases are rated not significant, with a high level of confidence.

Interactions with the Aquatic Environment have been ranked as 2 in Table 8.17.2 and are discussed below.

8.17.3.1.2.1 Aquatic Environment

A failure of a pump, pump generator or coffer dam may result in moderate to large quantities of sediment-laden water spilling over or around the coffer dam and directly entering into the residual section of Bird or Sisson Brook such that short-term CCME FAL Guidelines for TSS are exceeded. It is unlikely that these failures would cause CCME FAL Guidelines for TSS to be exceeded in the long-term as repairs or refueling would occur quickly. A moderate amount of sedimentation could occur within the slower reaches of brooks.

Successful development of eggs of stream salmonids require suitable levels of dissolved oxygen. Oxygen concentration in the stream substrates is related to the permeability of the gravel, and therefore highly impacted by the amount of depositing fine sediments (Louhi *et al.* 2008). Empirical studies have shown that fine sediment infiltration is critically important for egg survival (Chapman 1988). The egg survival is linked to the particle size and amount of the accumulating fine sediments, but the largest effects can be expected for infiltrating sediments that are less than 2 mm and when the accumulation exceeds as little as 1.5% of the volume of substrates (Louhi *et al*. 2008). Therefore, failure of erosion and sediment control measures, and a subsequent release of fine sediment material would have the potential to negatively and directly affect the incubation of eggs if the accident occurred between October and June, or indirectly affect the quality of spawning habitat between June and October. However, such a failure would be short-term and the areas affected would be flushed clean from other unaffected upstream portions of the West Branch Napadogan Brook that would dilute potential environmental effects of sedimentation to help restore the watercourse habitat.

The only scenario that would result in a substantial release of sediment into the watercourse would be a major failure of a coffer dam. The coffer dam will be constructed in such a manner that catastrophic failure is highly unlikely. This dam will be made of highly unerodible rock material such that any overtopping of the outflow location will not trigger a major erosion and failure of the dam structure. If the pumps or associated generators were to shut down this would be temporary (*e.g.,* a few hours) as these facilities will be inspected daily. Given there would be some freeboard in the coffer dam, and that a temporary shutdown of the pumps would not result in the immediate release of sediment laden water, a release arising from a pump failure would be short in duration as defective pumps would be repaired or replaced immediately upon detection. Such a release could exceed short-term CCME FAL Guidelines for TSS, but these environmental effects would be short-term.

Any areas subject to erosion will be repaired immediately following detection through routine inspection and monitoring. Due to the flowing nature of the watercourses, the flowing water will clean the stream naturally and pumping of silt laden water from watercourses will not be warranted due to the potential to affect aquatic species on the watercourse.

8.17.3.1.3 Determination of Significance

Due to response mitigation to an erosion or sedimentation event and the watercourse's and aquatic species natural ability to survive such events, it is not anticipated that an erosion and sediment control failure will permanently alter the habitat of the receiving environments or affect long-term survival of aquatic species. It is also not anticipated that there will be direct mortality of any species such that long-term survival will be threatened, and no species listed as "Extirpated", "Endangered" or "Threatened" under Schedule 1 of the *Species at Risk Act* (*SARA*) (hereinafter referred to as "*SARA*-listed species") will be adversely affected such that the *Species at Risk Act* will be contravened.

With respect to fish habitat, a residual environmental effect on the Aquatic Environment is defined as one that results in an unmitigated or uncompensated (*i.e.,* non-offset) net loss of fish habitat as defined under the *Fisheries Act*. A number of measures as described above will be in place to prevent or minimize erosion or sedimentation. In the event of the failure of any of these measures, the potential adverse environmental effects to aquatic habitat will be of low magnitude and temporary. Further, such a failure would be detected within a relatively short timeframe and would be reported, in particular as is the case for downstream users of the water for potable water, and thus further reduce their potential adverse environmental effects. Further, should any environmental effects occur, they will be mitigated and/or authorized and offset within the *Fisheries Act* regulatory framework.

Despite the planned prevention, mitigation and response measures, as described above, an Erosion and Sediment Control Failure could occur. However, in consideration of the significance criteria for the Aquatic Environment, the potential environmental effects of an Erosion and Sediment Control Failure on the Aquatic Environment during all phases are rated not significant, with a high level of confidence.

8.17.3.2 Pipeline Leak

For this EIA, a "pipeline" refers to the pipelines that will be used to transfer tailings from the ore processing plant to the TSF, and the reclaim pipeline that will carry impounded water from the TSF to the ore processing plant for reuse in the process. A Pipeline Leak includes a leak from or rupture of either of these pipelines. A pipeline rupture could result in a spill of tailings or reclaim water onto the PDA until such time as the rupture is repaired. Theoretically, the worst case scenario would be the leak of the entire contents of the tailings pipeline (about 800 m^3 of tailings slurry). However, due to the placement of pumps and valves along the pipelines, the release of this entire volume of material is highly unlikely and would anyway be into the TSF. A leak from the reclaim pipeline would result in the loss of reclaim water at an assumed rate of 10 L/hr onto the PDA, until the leak was detected and repaired. Note that even in the event of a leak or rupture of a pipeline, the spilled material would remain confined within the perimeter of the TSF.

8.17.3.2.1 Description of Scenarios

The credible scenarios for a Pipeline Leak range from a small leak over an extended period of time that eludes normal detection mechanisms (*i.e.,* via instrumentation or inspection), to a structural failure of a portion of the pipeline that leads to the release of its contents. All leaks would remain confined to the TSF as the various mine contact water collection systems and ditching would remain in operation and effective at avoiding an off-site release from such occurrences. A leak from these pipelines could occur as a result of a rupture in the pipeline from a structural failure of the pipeline itself, or as a result of a strike to the pipeline (*e.g.,* by machinery or a vehicle).

During the Operation of the mine, tailings slurry will be distributed within the TSF in pipelines situated such that any accidental release of tailings will flow back into the TSF. The pipelines will be located in well developed areas of the PDA within collection channels, such that there is essentially no potential for any leaked tailings or reclaim water to leave the PDA. Ditches, collection channels, berms and emergency tailings containment ponds will be installed to capture and contain tailings in the event of a pipeline leak for the portion of the tailings pipeline not within the TSF. Similarly, the portion of the reclaim pipeline that is not contained by the embankment walls is located on a knoll by the ore processing plant and also within a containment channel. Any leaks from this pipeline will be captured in the collection channel will be redirected into the TSF.

The tailings delivery and reclaim systems will be routinely inspected. As both the tailings pipeline and the reclaim pipeline will be constructed and placed on the surface of the ground, leaks from these pipelines will be readily detectable. Pressure in the pipelines will be monitored through instrumentation linked to the mine's control room, and any measurable drop in pipeline pressure will result in operators immediately investigating of the cause in the pressure drop and, as appropriate, immediately closing the valves or shutting off pumps on the pipeline in order to limit the amount of any spill.

The site layout will be such that an accidental event such as equipment impacting one of the pipelines and causing a leak will be minimized. Pipelines will be located away from staff vehicular and operational mining equipment, such that vehicles and heavy equipment would not operate in proximity to these pipelines, and the mine contact water collection systems will ensure that any leak will flow back into the TSF.

8.17.3.2.2 Environmental Effects Assessment

The potential interactions between a Pipeline Leak and the VECs selected for this EIA are presented in Table 8.17.3.

Table 8.17.3 Potential Interactions between VECs and Pipeline Leak

Valued Environmental Component (VEC)	Pipeline Leak
Atmospheric Environment	0
Acoustic Environment	0
Water Resources	1
Aquatic Environment	0
Terrestrial Environment	0
Vegetated Environment	0
Wetland Environment	0

Table 8.17.3 Potential Interactions between VECs and Pipeline Leak

Valued Environmental Component (VEC)	Pipeline Leak
Public Health and Safety	0
Labour and Economy	0
Community Services and Infrastructure	0
Land and Resource Use	0
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	0
Heritage Resources	0
Transportation	0

Notes:
Interactions between Accidents/Scenarios and the respective VECs were ranked as follows:
0 No substantive interaction. The environmental effects are rated not significant and are not considered further in this report.
1 Interaction may occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices.
2 Interaction may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EIA.

It is not anticipated that there will be any substantive interaction between a Pipeline Leak and any of the VECs, with the possible exception of Water Resources. The design of the TSF and location of both the tailings pipeline and water reclaim pipeline are such that a leak or rupture in either the tailings pipeline or reclaim pipeline resulting in a release to the environment (outside of the PDA) is virtually impossible. Thus, no biota (*i.e.,* plants, animals, fish) will be affected by a pipeline leak, no aspect of the Atmospheric Environment will be affected, and there will be no change to the Acoustic Environment. There will be no danger to Public Health and Safety as the general public will not be permitted within the PDA for safety reasons, and Project workers will be appropriately trained and equipped with proper personal protective equipment to avoid any concerns for their safety. A pipeline leak would not affect the local labour force nor the economy, and no heritage resources will be present in the areas that may be affected by a pipeline leak. As stated, members of the public and First Nations will not be permitted within the mine facility during mining operations and thus there will be no environmental effect to the use of land or resources as a result of a pipeline leak, and no interaction with Transportation. The interaction with these VECs has therefore been ranked as 0 in Table 8.17.3, their environmental effects during all phases are rated not significant with a high level of confidence, and they are not discussed further.

A Pipeline Leak from a pipeline carrying reclaimed water or tailings from the TSF could potentially interact with Water Resources if not fully contained, and this interaction is therefore ranked as 1 in Table 8.17.3. Should a leak occur, escaped tailings slurry or reclaim water would flow into the TSF, or be intercepted by drainage ditches and/or collection ponds where it can be recovered and placed back in the TSF.

There are no known groundwater users within the Local Assessment Area (LAA) for Water Resources, although it is anticipated that some camps may use groundwater as a potable supply. The nearest known groundwater users within the Regional Assessment Area (RAA) are located in Napadogan, approximately 9 km northeast of the PDA. Surface water users within the LAA are limited to several Crown-lease camps located near Napadogan Brook below its confluence with Sisson Brook (to be confirmed prior to Operation as outlined in Section 8.4). It is unlikely that the environmental effects of a Pipeline Leak would affect these users, and it is thus highly unlikely that a significant environmental effect would occur to Water Resources.

8.17.3.2.3 Determination of Significance

Due to the design of the TSF and location of the pipelines, and monitoring in place, the leak or rupture of a tailings pipeline or water reclaim pipeline is not predicted to cause a change to surface water or groundwater quality. There will be no degradation of water quality that exceeds the Health Canada Guidelines for Canadian Drinking Water Quality (Health Canada 2012); likewise, there will be no reduction in surface or groundwater quantity, groundwater discharge, or surface water quantity arising from such an event, and no change that will affect groundwater aquifers.

Thus, in consideration of the nature of the interactions and the planned implementation of known and proven mitigation, the potential environmental effects of a Pipeline Leak on Water Resources during all phases is rated not significant, with a high level of confidence.

8.17.3.3 On-Site Hazardous Material Spill

An On-Site Hazardous Material Spill is a spill of materials associated with the Project that is considered to be hazardous due to its inherent physical or chemical properties, or because of its toxicity, flammability, corrosiveness, or explosiveness. Given the surface water collection and storage methods in place within the PDA to manage mine contact water, such a spill would likely remain confined to the PDA and would not be likely to migrate beyond the boundaries of the PDA if the spill is quickly contained and cleaned up. Examples of an On-Site Hazardous Material Spill are spills of petroleum products (*e.g.,* gasoline or diesel), process chemicals (*e.g.,* reagents), concentrate, ammonium paratungstate (APT), or explosives. Such a spill could arise from equipment leakage, a trucking accident on-site, a spill from a ruptured fuel storage tank or a spill within the ore processing plant, with potential to affect land or water within the Project site or outside of the Project site if not addressed in a timely manner. The assessment for this potential accident focuses on the mitigation to address potential adverse environmental effects in the event of a spill, not on mitigation related to the mechanism by which the accident happens; the assessment of the environmental effects of a spill is based on the response measures and mitigation in the event that a spill does occur. Preventative measures, best management practices, and standard operating procedures as discussed throughout this EIA Report will be in place to minimize the potential for the accidents to happen and to avoid or minimize their environmental effects, should they occur.

A spill that could occur on transportation routes to and from the PDA is assessed under the Off-Site Trucking Accident scenario discussed in Section 8.17.3.6. A Fire caused by a hazardous material spill or other causes is assessed in Section 8.17.3.8.

8.17.3.3.1 Description of Scenarios

There are several situations that could result in an On-Site Hazardous Material Spill. Relatively small spills of petroleum products may occur during Construction or Operation during refueling of or leaks from machinery. Tanks used to store various hazardous materials such as fuel may leak. An accident involving a vehicle transporting a hazardous material within the PDA could result in a spill, or there could be a spill of material within the ore processing plant.

Refueling spills or leaks from equipment usually involve volumes of material less than a few litres. These spills are typically highly localized and readily cleaned up by on-site crews using standard equipment and materials. Mitigation measures will be in place to prevent these spills from occurring including regular maintenance and inspection of equipment, use of drip trays, training of staff in the proper use of fueling equipment, implementation of safe procedures for this activity, and use of designated areas for refueling which are at least 30 m from any watercourse or wetland. Spill kits will be maintained on-site and employees will be trained in their use. Contingency and emergency response procedures will be documented in the ESMS, and employees will be trained in the safe response and reporting procedures.

An on-site trucking accident could result in an unplanned release of processed concentrate, APT, explosives, or diesel or reagents on internal site roads within the PDA.

During Operation, there will be several large (*e.g.,* up to 45,000 litre) petroleum storage tanks within the site, all equipped with secondary containment (*e.g.,* double-walled steel tanks with built-in containment). The exact number, configuration, and location of tanks will be developed as part of detailed design and using commercially available tank systems. Large leaks from storage tanks could occur as a result of structural failure of the tank or as a result of an accidental impact to a tank from a vehicle, for example. A spill of the entire contents of the fuel storage tank that escapes the secondary containment measures is assumed as a worst case scenario for this accident, in itself a low likelihood scenario.

The following measures will be in place to reduce or eliminate the potential for a major release arising from an on-site hazardous material spill:

- the storage of liquid hazardous materials within buildings, in secure and contained areas;
- the provision of impermeable containment berms (or other forms of secondary containment);
- placement of protective barriers as appropriate;
- siting of such facilities in locations that represent a relatively low risk and afford an opportunity for containment during emergency response;
- provision of alarms on secondary containment measures;
- careful implementation of fuel transfer operations; and
- provision of an emergency response plan for the immediate isolation and clean-up of a release.

Reagents, feedstocks, and other raw materials used by the Project are well known and their handling, storage, management and disposal are well understood. All materials brought onto the PDA will be reviewed to determine if they have any hazardous properties and will be transported, stored, handled and used in accordance with their material safety data sheets (MSDS) and manufacturers recommendations as well as occupational health and safety legislation (*e.g.,* WHMIS).

In the unlikely event of an on-site hazardous material spill that escapes the secondary containment, the preferential spill path of the spilled material will be towards the TSF (along with other surface run-off collected within the PDA). If not contained and cleaned up in the vicinity of the spill, the free product would collect in drainage ditches, where it could be similarly contained, and otherwise flow to the TSF, or to the Water Management Ponds and pumped into the TSF. Federal and provincial regulatory guidance regarding storage tank design, and fueling and fuel transfer facility planning will be incorporated into the design of these systems to ensure that the fuel storage and transfer facilities reduces the probability of accidents and malfunctions. Guidance documents such as the CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products (CCME 2003) will be followed. Specifically, the Code of Practice indicates that above-ground petroleum storage tanks must have:

- corrosion protection;
- secondary containment;
- leak detection;
- overfill protection (alarm);
- containment sumps; and
- piping in accordance with Part 5 of the Code.

These facilities will also comply with the New Brunswick *Petroleum Product Storage and Handling Regulation – Clean Environment Act*. Further, these tanks will be constructed and placed in such a way that fuel spilled from such a tank will be contained within a bermed area and/or the ground around the tank will be contoured such that free product will not flow away from the site of the spill and into the surrounding environment; it will remain at or near the spill location for clean-up or otherwise be collected in the site drainage system and, if not contained there, ultimately the TSF.

A number of reagents will be used in ore processing. These reagents, described in Chapter 3, will be stored on-site in containers within the ore processing plant, in accordance with the WHMIS requirements. Spills of these reagents could occur during the transportation or handling of these materials on-site or during their use in the ore processing plant. A spill could adversely affect people working within the ore processing plant and those in proximity to transportation equipment. Based on the current project design, SML does not anticipate that there will be any substances regulated under the *Environmental Emergency Regulations* under the *Canadian Environmental Protection Act* that are stored at quantities above the specified thresholds defined the regulation, however this will be reviewed during the detailed design and permitting phases of the Project. Regardless, SML will develop an overall Emergency Preparedness and Response Plan (EPRP) in order to effectively manage the hazardous materials that will be stored on-site. Section 30 of the *Metal Mining Effluent Regulations* (*MMER*) requires that an emergency response plan be completed and must be available for review by Environment Canada. The EPRP developed by SML will meet the emergency response plan requirements of *MMER*, and will describe measures taken to prevent any unplanned releases and to mitigate the effects of such a release should it occur.

The *MMER* specify that an emergency response plan must include the following:

- Identification of accidental spills that can reasonably be expected to occur and the potential damage or danger that could result (*i.e.,* a site risk analysis);
- A description of the measures to be used to prevent, prepare for, and respond to an accidental release of a deleterious substance;
- A list of the individuals who are to implement the emergency response plan and a description of their roles and responsibilities;
- The identification of the emergency response training required for each of the individuals listed above;
- A list of the emergency response equipment included as part of the plan, and the equipment's location; and
- Alerting and notification procedures including the measures to be taken to notify members of the public who may be adversely affected by the accidental event.

SML will comply with all requirements related to emergency response planning and will have an EPRP in place prior to initiation of Project activities.

8.17.3.3.2 Environmental Effects Assessment

The potential interactions between On-Site Hazardous Material Spill and the VECs selected for this EIA are presented in Table 8.17.4.

Table 8.17.4 Potential Interactions between VECs and On-Site Hazardous Material Spill

Valued Environmental Component (VEC)	On-Site Hazardous Material Spill
Atmospheric Environment	1
Acoustic Environment	0
Water Resources	2
Aquatic Environment	0
Terrestrial Environment	0
Vegetated Environment	0
Wetland Environment	0
Public Health and Safety	0
Labour and Economy	0
Community Services and Infrastructure	0
Land and Resource Use	0
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	0
Heritage Resources	0
Transportation	0

Notes:
Interactions between Accidents/Scenarios and the respective VECs were ranked as follows:
0 No substantive interaction. The environmental effects are rated not significant and are not considered further in this report.
1 Interaction may occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices.
2 Interaction may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EIA.

It is not anticipated that there will be any substantive interaction between an On-Site Hazardous Material Spill and the Acoustic Environment, Aquatic Environment, Terrestrial Environment, Vegetated Environment, Wetland Environment, Public Health and Safety, Labour and Economy, Community Services and Infrastructure, Land and Resource Use, Heritage Resources, or Transportation. This accident scenario pertains to accidents within the developed area of the mine facility, and thus confined to the PDA. All spilled material will be contained within the PDA and/or the processing buildings and thus no spilled material will leave the developed portion of the mine; therefore, there will be no opportunity to interact with the surrounding natural environment with the possible exception of groundwater resources which are considered for further assessment below. There will be no measurable increase in noise levels as a result of a spill and no interaction between and spill and any watercourse around the perimeter of the mine facility. As stated about any spilled material will be confined to the developed portion of the facility, there will be no interaction with the natural environment surrounding the mine, such as the Terrestrial, Vegetated, or Wetland Environments. Hunters, fishers, and other resource users, as well as First Nations persons, will not be permitted on the PDA for safety reasons. Thus an on-site spill will not interact with members of the public or First Nations. There will be no interaction with local Labour and Economy will not be adverse affected, Community Services and Infrastructure will not be affected, and Heritage Resources or the Transportation network will not be affected as a result of an on-site spill of hazardous material. The interactions with these VECs have therefore been ranked as 0 in Table 8.17.4, their environmental effects during all phases are rated not significant with a high level of confidence, and they are not discussed further.

Interactions between an On-Site Hazardous Material Spill and the Atmospheric Environment have been ranked as 1 in Table 8.17.4. For the Atmospheric Environment, an accidental event that exposed fuel to the open air would release volatile organic compounds (VOCs). Clean-up of the spill would employ hauling trucks and earth moving equipment which would release particulate matter and combustion gases through fuel consumption, and dust emissions from the clean-up activities. Changes in the air quality due to a spill will be local in geographic extent, affecting only the immediate vicinity. Pollutant emissions from the clean-up will be sporadic in frequency and short in duration and likely not be detectable above emissions from other Project activities involving the use of heavy equipment. Any minor adverse environmental effects on air quality will cease once the clean-up is complete. Contaminant emissions are expected to be within all pertinent standards and guidelines and no significant residual environmental effects are predicted.

Based on the mitigation and response mechanisms and procedures, the potential environmental effects of an On-Site Hazardous Material Spill on the VECs ranked as 0 or 1 in Table 8.17.4 for all phases of the Project are rated not significant. There is a high level of confidence in this prediction.

Interactions between an On-Site Hazardous Material Spill and Water Resources are ranked as 2 in Table 8.17.4 and the potential environmental effects of these interactions are further evaluated below.

8.17.3.3.2.1 Water Resources

An On-Site Hazardous Material Spill has the potential to result in a change in the quality of groundwater resources if spill response is not implemented in a timely fashion. Surface water resources are not likely to be affected by an On-Site Hazardous Material Spill due to the mine contact water collection systems in place within the PDA which offer many opportunities for containment and clean-up to

minimize the risk of spills affecting the recycled process water and to enhance the likelihood of containment and clean-up through emergency response procedures.

The only material that will be stored with the mine facility in any significant quantity will be diesel fuel. If not quickly and effectively cleaned up, a major spill of diesel fuel due to a rupture in the storage tank could result in the movement of free hydrocarbons into the subsurface, thereby affecting the quality of the underlying groundwater. The presence of floating hydrocarbons on the water table, and dissolved hydrocarbon constituents within the groundwater, can result in a persistent anoxic groundwater condition (*e.g.,* dissolved oxygen is consumed by micro-organisms degrading the hydrocarbon), which can indirectly result in the dissolution of otherwise poorly soluble metals such as iron, manganese and other metals from the host aquifer. When hydrocarbon-affected groundwater is intercepted by a water well, complaints of odour, iron fouling, or vapours can render the well unusable. Similarly, when hydrocarbon-affected groundwater discharges into the surface water environment, the aquatic habitat can become affected by metals, reduced dissolved oxygen and discolouration. However, due to design specifications, land contouring, and the engineered drainage collection systems on-site, a spill of diesel sufficiently large enough to contaminate groundwater to the point that it gets into any aquatic habitat is not anticipated.

If an On-Site Hazardous Material Spill were to move into the groundwater, the dominant gradient for groundwater flow would be towards the open pit due to the pit's depth below the surface. Water from the open pit will be collected, and if it were contaminated with materials such as diesel fuel, treatment options will be evaluated and implemented as appropriate.

While it is possible for an On-Site Hazardous Material Spill to occur, a number of prevention and mitigation measures will be in place to prevent such a spill from happening or to minimize the environmental effects. These include the following measures.

- Persons responsible for managing spill response efforts, including their authority, role and contact details will be identified in the emergency response plan.
- An appropriate number of staff will be trained in the handling of emergency response and spill scenarios.
- Diagrams of the surrounding layout, topography, evacuation paths and drainage flow paths, ground and surface water resources, sensitive ecological and protected areas will be developed and included as part of the EPRP.
- Quantities of oil that could be released, with predicted flow path, and flow rate will be documented.
- All fuel and service vehicles will carry a minimum of 10 kg of commercial sorbent materials, suitable for use on both soil and water. These materials will be applied to contain and recover spilled material.
- Vehicle equipment will be inspected for leaks prior to arrival on-site and on a regular basis during Construction and Operation.

- Locations with the potential for a spill of a significant volume of fuel will be graded to flow towards the surface water collection system where it could be safely collected and would not enter the surrounding natural environment.

- Roadside ditches within the property with regularly spaced culverts will also help to contain spills as the culverts could be blocked to stop the spread of spilled materials.

- All fuel storage and distribution infrastructure will be constructed to modern engineering standards and will be approved under provincial legislation requirements.

- Storage of liquid petroleum, and refueling of machinery, will not occur within 30 m of any watercourse or wetland.

- The incorporation of road design features for Project roads within the PDA (such as speed limits and passing bays).

- An EPRP will be developed and included as part of the ESMS. The response plan will outline procedures for containing and cleaning up spills in a safe and efficient manner, and associated federal and provincial reporting requirements. Spill response kits will be available at the Project-site during all phases of the Project to minimize any potential adverse environmental effects.

- Measures for spill containment and spill emergency response and environmental protection will be in place before any potentially hazardous materials are brought on-site. These will be outlined in the EPRP.

- All bulk explosives spills must be dealt with quickly for safety and environmental reasons. Product must be recovered quickly by means of a non-sparking shovel and brooms. Spills management will use recommended best practice for clean-up of any spills for the chemicals involved with commercial explosives.

In the unlikely event of a spill of any material, emergency containment and recovery procedures developed in the EPRP will include:

- immediate containment and recovery of spill material using a variety of equipment including booms, barriers, sand bags, skimmers, and natural and synthetic sorbent materials;

- containment measures will immediately be initiated to limit the spread of the spill;

- any nearby drainage (non-watercourse) culverts will be blocked to limit spill migration if required;

- if the spill source is from a leaking fuel truck, the tanker will be pumped dry and transferred into another tanker or other appropriate and secure container(s) and the leak will be repaired immediately;

- excavation and removal of hydrocarbon saturated soil for temporary storage, and eventual permanent treatment/disposal;

- interception and removal of hydrocarbon entrapped within the fractured bedrock using recovery wells and immiscible scavenger methods;
- repair of an secondary containment breach;
- conduct post-spill response investigation to evaluate the performance of spill prevention measures;
- collect post-response samples of soil and water for testing; and
- any equipment cleaning that is required as a result of a leak or spill on the equipment will be implemented in a confined area where the wash water can be collected for proper disposal.

8.17.3.3.3 Determination of Significance

Given the limited nature of most spills that could occur and the design of the Project that will incorporate measures to prevent the off-site migration of surface run-off including spilled material, the potential for an On-Site Hazardous Material Spill to adversely affect the surrounding environment is highly unlikely. The mine and its facilities will be inherently designed, constructed and operated to prevent spills and to manage and control any spilled material. It is not anticipated that there will be any degradation of water quality that exceeds the Health Canada Guidelines for Canadian Drinking Water Quality (Health Canada 2012). Similarly, no reduction in surface or groundwater quantity, groundwater recharge or discharge, surface water quantity, or degradation of physical or chemical characteristics of an aquifer or stream to the extent that it will adversely affect sustainable surface water flow or aquatic life are expected.

Based on the nature of the Project, the spill response actions that will be implemented if a spill occurs, the low potential for a significant spill to occur, and in consideration of the planned and effective mitigation to reduce environmental effects, the potential environmental effects of an On-Site Hazardous Material Spill on Water Resources during all Project phases are rated not significant. There is a high level of confidence in this prediction.

8.17.3.4 Release of Off-Specification Effluent from Water Treatment Plant

During Operation, any mine contact water will be collected and stored in the TSF until it is used in the ore processing plant as process water. Starting at about Year 8 of Operation, it will be necessary to release contact water that is surplus to Project needs, and it will be treated in a Water Treatment Plant to ensure it meets discharge standards prior to being released to the receiving environment.

A Release of Off-Specification Effluent from the Water Treatment Plant (WTP) consists of the release of waste water, or effluent, from the PDA into the receiving environment that exceeds *MMER* or other effluent quality requirements as defined by approvals or permits to be issued for the Project. This event considers a release of the excess water that, though treated or normally meeting effluent standards, does not meet quality requirements prior to being released to the receiving environment. This situation may result from a mechanical or instrument failure in the Water Treatment Plant, power failure, or other means.

8.17.3.4.1 Description of Scenario

For the purposes of this scenario, it is assumed that there is a release of up to 685 m^3/h of off-specification effluent into the environment over a 12-hour period. This quantity represents the average WTP discharge rate modelled to predict downstream water quality, as discussed in Section 7.6. With WTP equipment and water quality monitoring in place, any release of off-specification effluent would be detected within a 12-hour period, and corrective action would be initiated such that the release of off-specification effluent for a longer period of time is not believed to be a credible scenario. As the treatment plant is intended to remove excess trace metals in the reclaim water, it is also assumed that the release of off-specification effluent could contain metals in concentrations exceeding permitted levels.

As effluent from the Water Treatment Plant will be discharged into the residual segment of Sisson Brook, in the unlikely event of a release of off-specification effluent, there is the potential for contamination of downstream surface waters (*i.e.,* West Branch Napadogan Brook) and associated fish and fish habitat. This could consequently result in the ingestion/uptake of contaminants by fish, wildlife, or the public. This release is not expected to interact with downstream groundwater, but could interact with downstream wetlands and vegetation. There is a possibility that some recreational cabin owners may be accessing drinking water from Napadogan Brook, downstream of the Water Treatment Plant, and therefore, any off-specification effluent release would also be a concern for public health and safety.

All effluent released from the Project will be monitored to verify that it meets *MMER* or other effluent quality requirements as defined by the approvals or permits to be issued for the Project. In the event that contaminant limits above the permitted levels are indicated, the Water Treatment Plant will be temporarily shut down until repairs to the facility can be implemented and/or changes to the treatment process can be implemented in order to meet the permitted levels for effluent release. No further effluent will be released into the environment until the contaminant levels meet the required standards.

8.17.3.4.2 Environmental Effects Assessment

The potential interactions between a Release of Off-Specification Effluent from Water Treatment Plant and the VECs selected for this EIA are presented in Table 8.17.5.

Table 8.17.5 Potential Interactions between VECs and Release of Off-Specification Effluent from Water Treatment Plant

Valued Environmental Component (VEC)	Release of Off-Specification Effluent from Water Treatment Plant
Atmospheric Environment	0
Acoustic Environment	0
Water Resources	2
Aquatic Environment	2
Terrestrial Environment	1
Vegetated Environment	1
Wetland Environment	1
Public Health and Safety	1
Labour and Economy	0

Table 8.17.5 Potential Interactions between VECs and Release of Off-Specification Effluent from Water Treatment Plant

Valued Environmental Component (VEC)	Release of Off-Specification Effluent from Water Treatment Plant
Community Services and Infrastructure	0
Land and Resource Use	1
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	1
Heritage Resources	0
Transportation	0

Notes:
Interactions between Accidents/Scenarios and the respective VECs were ranked as follows:
0 No substantive interaction. The environmental effects are rated not significant and are not considered further in this report.
1 Interaction may occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices.
2 Interaction may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EIA.

It is not anticipated that there will be any substantive interaction between a Release of Off-Specification Effluent from Water Treatment Plant and the Atmospheric Environment, Acoustic Environment, Labour and Economy, Community Services and Infrastructure, Heritage Resources, and Transportation. Such a release would not affect the local Atmospheric Environment nor result in a change to the Acoustic Environment. There would be no substantive environmental effect to the local labour markets, the economy, or to local services and infrastructure. There would be no adverse environmental effects to Heritage Resources, or any changes to Transportation. As such, the interactions of Release of Off-Specification Effluent from the Water Treatment Plant with these VECs are ranked as 0 in Table 8.17.5, their environmental effects during all phases are rated not significant with a high level of confidence, and they are not discussed further.

Interactions between a Release of Off-Specification Effluent from the Water Treatment Plant and the Terrestrial, Vegetated, and Wetland Environments have been ranked as 1 in Table 8.17.5. Under normal watercourse flow conditions, an off-specification release is not likely to impinge on riparian wetlands as contaminants will likely flush downstream and be quickly diluted such that contaminant uptake in wetlands will be limited in extent and duration. Similarly, during normal watercourse flow conditions, water treatment effluent of any specification will not enter the Terrestrial or Vegetated Environments. If an off-specification release were to occur during especially high flow periods, it is possible that this effluent may spill the banks of the watercourse and enter these environments. If this were to occur, however, the effluent would be diluted because of the high watercourse flow, and the effluent would quickly wash downstream and be further diluted. Residual off-specification effluent that may be left on land in flooded areas after the receding of the water would be geographically limited to areas in the immediate vicinity of the watercourse. Depending on toxicity of the effluent for specific plant species, there could be localized mortality of individual plants, but this environmental effect would be localized and reversible, and no plant Species at Risk (SAR) or Species of Conservation Concern (SOCC) are known to be located in the area downstream of the water treatment plant.

Interactions between a Release of Off-Specification Effluent from the Water Treatment Plant and Public Health and Safety have been ranked as 1 in Table 8.17.5 because there is potential for contaminants to bioaccumulate in large fish, such as trout or semi-aquatic furbearers or waterfowl, which could then be consumed by humans. An off-specification discharge would move rapidly downstream and would

eventually dilute to background levels. Because of the temporary nature of this discharge, it is unlikely to increase the risk of bioaccumulation. The planned monitoring program for Operation would also be effective in detecting any changes that may affect public health and safety. If necessary, warning and public advisories will be posted and broadcasted to potential resource users. The area downstream of Sisson Brook that may be affected is not heavily used for hunting, trapping and fishing and there are alternative locations that could be accessed should a restriction of resource use be required as a result of the Project. Again, with monitoring and notification procedures in place, this malfunction is unlikely to result in residual adverse environmental effects to Public Health and Safety.

Interactions between a Release of Off-Specification Effluent from the Water Treatment Plant and Land and Resource Use and Current Use of Land and Resource for Traditional Purposes by Aboriginal Persons have also been ranked as 1 in Table 8.17.5 as there is potential for an off-specification release to temporarily limit the use of an affected area for various activities including fishing, hunting or other recreational or traditional uses. This could be because access to an area may be physically restricted or because of possible contamination of watercourses or biota. These potential interactions would be temporary in nature and limited geographically. The potential environmental effects would not result in a long-term, non-compensated loss of available land and resources currently used for recreational or traditional purposes.

Based on the mitigation and response mechanisms and procedures, the potential environmental effects of a Release of Off-Specification Effluent from the Water Treatment Plant on the VECs ranked as 0 or 1 in Table 8.17.5 for all phases of the Project are rated not significant, with a high level of confidence.

The interactions with Water Resources and the Aquatic Environment have been ranked as 2 in Table 8.17.5, and are further assessed below.

8.17.3.4.2.1 Water Resources

For this EIA, it is assumed that cabin owners along Napadogan Brook near the PDA may be using surface water as a potable water resource downstream of Sisson Brook and that therefore any off-specification release could result in a temporary degradation of the quality of this water. Prior to Construction, surface water users in the area will be identified to allow SML to inform any potentially affected users in a timely manner. If required, SML will provide an alternative drinking water source (such as bottled water) until parameters return to acceptable levels.

The water quality monitoring program to be developed and implemented during normal operating conditions would also be used to detect any exceedances in drinking water guidelines arising from this upset condition. As these exceedances would be temporary and measures will be in place to monitor water quality, notify potential users and provide alternate drinking water source if required, the potential for this event to affect public health and safety can be effectively mitigated. Any known publicly accessed water resource use location on potentially affected watercourses will be identified and can be posted in the case of a release event.

All effluent released from the mine will be monitored to verify that it meets *MMER* or other effluent quality requirements as defined by approvals or permits for the Project. In the event that contaminant limits above the permitted levels are indicated, the water treatment plant will be temporarily shut down until repairs to the facility can be implemented and/or changes to the treatment process can be

implemented in order to meet the permitted levels for effluent release. No further effluent will be released into the environment until the contaminant levels meet the required standards.

As a result of the response measures to be put in place, there will be no degradation of water quality that exceeds Health Canada Guidelines for Canadian Drinking Water Quality (Health Canada 2012), no reduction in surface or groundwater quantity, no reduction in groundwater discharge, no reduction in surface water quantity, and no degradation of physical or chemical characteristics of an aquifer or stream to the extent that it will adversely affect sustainable surface water flow or aquatic life.

Based on the information provided above, the planned prevention and mitigation, and considering the significance criteria for Water Resources, the residual environmental effects of Release of Off-Specification Effluent from Water Treatment Plant on Water Resources are not expected to be significant.

8.17.3.4.2.2 Aquatic Environment

Any accidental releases of off-specification effluent will be short-term (*i.e.,* 12 hours maximum) and while there may be some uptake from various aquatic species, this short-term exposure is not anticipated to exceed the significance criteria for the Aquatic Environment. Continual flushing following the event with clean water will dilute and carry contaminated sediments downstream away from higher productivity upstream habitat. Any contaminated sediment that remains will likely be flushed in the freshet the following spring such that it is anticipated there will be no significant long-term environmental effects. Water monitoring programs, including water and sediment sampling and testing, will be implemented to demonstrate that the effluent is not continually bioccumulating and that the natural flush and contaminant degradation has restored the habitat affected by the accidental event.

Due to the response procedures and mitigation, it is not anticipated that a release of off-specification effluent from the water treatment plant will permanently alter the habitat of the receiving environments or affect long-term survival of aquatic species. It is also not anticipated that there will be direct mortality to any species such that long-term survival will be threatened, and no *SARA* listed species will be adversely affected such that the *Species at Risk Act* will be contravened.

Based on the information provided above, the planned prevention and mitigation measures, as well as the monitoring and follow-up program, and considering the thresholds for the significance criteria for the Aquatic Environment, the potential residual environmental effects of Off-Specification Effluent Release on the Aquatic Environment are not expected to be significant.

8.17.3.4.3 Determination of Significance

Based on the mitigation and response measures described above, it is not anticipated that the Release of Off-Specification Effluent from Water Treatment Plant will adversely affect Water Resources or the Aquatic Environment to an extent that significant adverse residual environmental effects would occur on a sustained and prolonged basis.

With the ability to carry out monitoring to detect any changes in effluent quality, and with actions taken upon discovery to return effluent quality to within accepted discharge standards, and in consideration of planned mitigation and response procedures, the residual environmental effects of a Release of

Off-Specification Effluent from Water Treatment Plant on Water Resources and the Aquatic Environment during all phases are rated not significant, with a high level of confidence.

8.17.3.5 Failure of Water Management Pond Pump

Water management ponds are structures designed to collect run-off from the TSF embankments and seepage water from within and under the embankments, and to pump it back into the TSF. These ponds, located strategically at topographically low points surrounding the TSF, will be constructed of geotechnically stable materials and using a geosynthetic liner and will meet relevant design and regulatory standards.

The water levels in the management ponds will be maintained using appropriate level controls and alarms, and visually monitored by site personnel. The pumps and pipelines used to pump water back to the TSF will be sized to remove the inflow volume resulting from the 1-in-10-year design flood event within 10 days. Once the water level within the management pond reaches a certain level within the pond the water will be pumped back into the TSF to maintain an appropriate water level. They will normally be kept fairly dry. As described previously, the failure of the water management ponds themselves is not a credible accident and is not considered further in this assessment.

8.17.3.5.1 Description of Scenario

A Failure of Water Management Pond Pump involves the failure of the pump used to control the water level within the pond. Should a pump fail to activate when the water passes a certain elevation within the pond, the pond could overflow and untreated run-off could enter adjacent watercourses. This scenario considers the remote possibility that a pump fails and that failure goes undetected and/or the failure takes place in conjunction with an extreme precipitation event that results in the overflow of the water management ponds and a consequent release of untreated run-off to the environment. For this EIA, the worst case scenario assumes that this overflow condition would occur for a maximum of 12 hours; beyond that, elevated water levels within these ponds would be detected through routine visual inspection. With spare pumps maintained on-site and with immediate repair or replacement prior to the overflow conditions within the pond, a greater duration is not believed to be credible.

A number of mitigation measures will be in place to prevent such a pump failure from resulting in an overflow of the ponds. These include:

- the design of the ponds to store inflow volume resulting from a 1-in-10-year design flood event within 10 days, and will maintain sufficient freeboard to allow time for repairs to the pump, should it fail;
- level control instrumentation and level alarms will monitor water levels within the water management ponds to prevent overflow, and regular visual inspection of the ponds by site personnel, particularly preceding and following large precipitation events;
- regular inspection and maintenance of pumps to minimize the potential for unanticipated failure;
- maintain replacement pumps on-site to allow timely replacement in the event of a mechanical failure;

- provision of emergency generators on-site to power necessary equipment in the event of a longer-term power outage; and

- prior to any forecasted extreme precipitation event, checking and further reduction of water levels in the ponds prior to the event if deemed necessary.

With these mitigation measures in place, it is unlikely that a pump failure would take place, and hence unlikely there would be an uncontrolled release to the environment.

Based on topographic conditions, untreated water would likely flow into residual segments downstream, creating the potential for contamination of downstream surface waters (*e.g.,* the West Branch Napadogan Brook).

8.17.3.5.2 Environmental Effects Assessment

The potential interactions between Failure of Water Management Pond Pump and the VECs selected for this EIA are presented in Table 8.17.6.

Table 8.17.6 Potential Interactions between VECs and Failure of Water Management Pond Pump

Valued Environmental Component (VEC)	Failure of Water Management Pond Pump
Atmospheric Environment	0
Acoustic Environment	0
Water Resources	2
Aquatic Environment	2
Terrestrial Environment	1
Vegetated Environment	1
Wetland Environment	1
Public Health and Safety	1
Labour and Economy	0
Community Services and Infrastructure	0
Land and Resource Use	1
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	1
Heritage Resources	0
Transportation	0

Notes:
Interactions between Accidents/Scenarios and the respective VECs were ranked as follows:
0 No substantive interaction. The environmental effects are rated not significant and are not considered further in this report.
1 Interaction may occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices.
2 Interaction may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EIA.

The release of untreated water as a result of a water management pond pump failure would be similar in terms of environmental effects as an off-specification effluent discharge. Both upset events may result in a release of untreated water into downstream watercourses. This will be a concern for surface water quality, fish habitat quality and any biota that may interact with contaminated water sources or be exposed to contaminants through uptake in the food chain. This malfunction is not anticipated to interact with the Atmospheric Environment or the Acoustic Environment as there will be no change to

air quality or noise levels as a result of a pump failure. There will be no interaction with Labour and Economy, nor will Community Services and Infrastructure be affected. There will be no interaction with Heritage Resources, and no change to the Transportation network. Therefore, the interactions of a Failure of Water Management Pond Pump with these VECs are ranked as 0 in Table 8.17.6, their environmental effects during all phases are rated not significant with a high level of confidence, and they are not discussed further.

Interactions of a Failure of Water Management Pond Pump with the Terrestrial Environment would mainly be a concern for semi-aquatic species such as beaver, otter and muskrat and waterfowl species using contaminated watercourses as part of their habitat and have been ranked as 1 in Table 8.17.6. As this release would be over a maximum 12-hour period, the potential exposure of terrestrial wildlife to contamination would be limited. Contaminated waters would flush downstream and eventually be diluted to background levels. While there is potential for environmental effects on a few individuals, the species most likely to be exposed are all at stable population levels within the LAA. As the environmental effects will be localized and short-term, the residual environmental effects on the Terrestrial Environment are predicted to be not significant.

Interactions of a Failure of Water Management Pond Pump with the Vegetated Environment and Wetland Environment have also been ranked as 1 in Table 8.17.6. In the unlikely event of a failure of a pump leads to an overflow condition, the resulting spill is not likely to impinge on riparian wetlands and, as these contaminants will likely flush downstream rapidly and be quickly diluted, any potential exposure of terrestrial vegetation to contaminants will be geographically limited to vegetation in the immediate vicinity of the watercourse. There could be localized mortality of individual plants, but this environmental effect would be localized and of low frequency, and there are no known SAR or SOCC that could be affected. If the release were to occur during flood conditions, it is possible for contaminated water to impinge on riparian wetlands well downstream of the release, but these wetlands are not known to support herpetile SAR, and any birds present in the wetlands would be expected to not remain present at those locations following a release. No direct physical loss of wetlands would result from this accidental event. As wetland monitoring will be conducted in the lower Sisson Brook watershed during Operation, this program could be adjusted if needed to monitor any affected wetland areas for adverse environmental effects. Given the limited potential for environmental effects both geographically and temporally, the residual adverse environmental to the Vegetated Environment and Wetland Environment are not expected to be significant.

Interactions between a Failure of Water Management Pond Pump and Public Health and Safety have been ranked as 1 in Table 8.17.6 because there is potential for contaminants arising from an accidental release caused by such a failure to bioaccumulate in fish (such as trout) or semi-aquatic furbearers or waterfowl, which could then be consumed by humans. An untreated discharge would move rapidly downstream and would eventually dilute to background levels. Because of the temporary nature of this release (*i.e.,* less than 12 hours), it is unlikely to increase the risk of bioaccumulation. The planned monitoring program for Operation would also be effective in detecting any changes that may affect public health and safety. This malfunction is unlikely to result in significant adverse environmental effects to Public Health and Safety.

Interactions of a Failure of Water Management Pond Pump with Land and Resource Use have been ranked as 1 in Table 8.17.6. This is because such an event could temporarily limit the use of an affected area for various activities including fishing or hunting or other recreational use and/or traditional purposes due to the potential for contamination of the watercourse and the fish species therein. Members of the public may be temporarily restricted from fishing or other resources uses in the area affected by such an event. Access to land and resources in adjacent areas would not be restricted, and the potential environmental effects as a result of this accident scenario would be short-term and limited spatially.

Interactions of a Failure of Water Management Pond Pump with Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons have been ranked as 1 in Table 8.17.6. First Nations people use the land for various traditional purposes, including fishing, hunting, and collection of vegetation for food and medicine. Similar to the access to this area by non-Aboriginal persons, this potential interaction is ranked as 1 since any restrictions to fishing or gathering activities in or along affected watercourses would be temporary in nature and limited geographically. The potential environmental effects would not result in a long-term, non-compensated loss of available land and resources currently used by Aboriginal persons for traditional purposes.

Based on the relatively short-term nature of any adverse environmental effects, and the limited geographic nature of these adverse environmental effects for the interaction ranked as 0 or 1 in Table 8.17.6 and in consideration of the significance criteria for each of these VECs, the potential environmental effects of a Failure of Water Management Pond Pump on these VECs during all phases are rated not significant, with a high level of confidence.

Interactions of a Failure of Water Management Pond Pump and Water Resources and the Aquatic Environment have been ranked as 2 in Table 8.17.6 and are assessed below.

8.17.3.5.2.1 Water Resources

It is possible that cabin owners may be accessing surface water for drinking purposes downstream of Sisson Brook and therefore any untreated effluent release could result in temporary contamination of surface water until the discharge has flushed downstream and become diluted to background levels. Prior to Construction, surface water users in the area will be identified to allow SML to inform any potentially affected users in a timely manner. If required, SML will provide an alternative drinking water source (*e.g.*, bottled water) until parameters return to acceptable levels.

The water quality monitoring program to be developed and implemented during normal operating conditions would also be used to detect any exceedances in drinking water guidelines during this upset condition. As these exceedances would be temporary and measures will be in place to monitor water quality, notify potential users and provide alternate drinking water source if required, the potential for this event to affect Water Resources can be effectively mitigated.

Based on the protective mitigation and response measures to be implemented, it is anticipated that there will be no degradation of water quality that exceeds Health Canada Guidelines for Canadian Drinking Water Quality (Health Canada 2012) on a sustained basis, no reduction in surface or groundwater quantity, no reduction in groundwater discharge, no reduction in surface water quantity,

and no degradation of physical or chemical characteristics of an aquifer or stream to the extent that it will adversely affect sustainable surface water flow or aquatic life.

Based on the information provided above, the planned prevention and mitigation, the potential environmental effects of a Failure of a Water Management Pond Pump on Water Resources during all Project phases are not expected to be significant.

8.17.3.5.2.2 Aquatic Environment

In the unlikely event of a Failure of a Water Management Pond Pump, there is the potential for contaminants to be carried into downstream watercourses and affect fish and fish habitat. This could consequently result in the ingestion/uptake of contaminants by fish.

Any accidental overflow condition of the water management pond will be short-term (*i.e.,* 12 hours maximum) and while there may be some uptake from various aquatic species, this short-term exposure is not anticipated to cause a significant adverse environmental effect to the Aquatic Environment. Continual flushing following the event with clean water will carry contaminated sediments downstream away from higher productivity upstream habitat. Any contaminated sediment that remains will likely be flushed in the freshet the following spring such that it is anticipated there will be no significant long-term effects. Water monitoring programs, including water and sediment sampling and testing will be implemented to demonstrate that the effluent is not continually bioaccumulating and that the natural flushing has restored the habitat affected by the event.

Due to the response mitigation in the case of the Failure of a Water Management Pond Pump, it is not anticipated that such a failure will permanently alter the habitat of the receiving environments or affect long-term survival of aquatic species. It is also not anticipated that there will be direct mortality to any species such that long-term survival will be threatened, and no *SARA* listed species will be adversely affected such that the *Species at Risk Act* will be contravened

Based on the information provided above, the planned prevention and mitigation measures, as well as the monitoring and follow-up program, the potential environmental effects of the Failure of Water Management Pond Pump on the Aquatic Environment during all phases are not expected to be significant.

8.17.3.5.3 Determination of Significance

Based on the mitigation and response measures described above, it is not anticipated that a Failure of a Water Management Pond Pump will adversely affect Water Resources or the Aquatic Environment to an extent that significant adverse residual environmental effects would occur on a sustained and prolonged basis.

With the ability to carry out monitoring to detect any changes in effluent quality and with actions taken upon discovery to replace or repair defective pumps, and in consideration of planned mitigation and response procedures, the residual environmental effects of a Failure of a Water Management Pond Pump on Water Resources and the Aquatic Environment during all phases are rated not significant, with a high level of confidence.

8.17.3.6 Off-Site Trucking Accident

An Off-Site Trucking Accident is defined as a vehicle accident resulting in the spill of materials associated with the Project during the Construction or Operation phase that occurs on roads beyond the PDA, including provincial highways and existing forest resource roads that will be used to access the Project site. It includes a spill of petroleum products (*e.g.,* gasoline or diesel), chemicals (*e.g.,* reagents), and/or concentrate or APT outside of the Project site. An Off-Site Trucking Accident resulting in a spill of these materials has the potential to affect both land and water.

Diesel fuels will be transported to the Project site in tanker trucks for use by on-site equipment that does not leave the mine site, and all motorized vehicles have their own fuel tanks that could be ruptured in the event of an accident. Reagents (process chemicals) will be shipped to the mine site via transport trucks in accordance with the *Transportation of Dangerous Goods Act*.

Following processing, the molybdenum concentrate will be packaged in 1 m^3 tote bags and APT will be packaged in sealed drums. These containers will be loaded onto trucks for transportation to the nearby railway siding at Napadogan, approximately 12 km from the PDA, and then transported by rail to markets. Based on the anticipated production rates, there will be about 10 trucks per week transporting these products to the railway siding.

The environmental assessment of spills of any of these materials that could occur within the Project site is found under the On-Site Hazardous Materials Spill scenario discussed earlier. The environmental effects of any fire resulting from an off-site trucking accident are addressed later in this Chapter.

8.17.3.6.1 Description of Scenarios

The types of accidents for an Off-Site Trucking Accident as a result of the Project include the following.

- An accident involving a petroleum tanker truck resulting in damage to the tank and release of diesel fuel to the environment. Large tanker trucks can have capacities of up to 45,000 L, depending on road weight restrictions, and in a worst-case (though unlikely) scenario, a full tanker load of petroleum could be released into the environment. Further, vehicles used to haul material to and from the Project site have their own fuel tanks that could be ruptured in an accident.

- An accident involving the spill of chemicals or reagents to the environment. A number of reagents will be used in ore processing. A spill of reagents could occur during the transportation of these materials off-site. Typical reagents for this type of processing include lime, frother, sulphide collector (PAX), depressant (NaCl), sodium hydroxide (NaOH), and sodium carbonate (Na_2CO_3). These materials come in pre-packaged containers of known quantity.

- An accident involving a truck carrying processed concentrate or APT off-site to receiving locations could result in a release of concentrate or APT into land or water.

For the purposes of this assessment, the mechanisms causing the accident are not considered; only the resulting spill is considered.

In the unlikely event of a spill of any such materials, soil and water contamination may occur, thereby potentially adversely affecting the quality of groundwater, water quality in any watercourses in proximity to the spill, fish and fish habitat, wetland habitat, and resulting in the ingestion/uptake of contaminants by wildlife. Air quality can also be affected in the immediate vicinity of the site. A spill into a watercourse could affect the public's ability to safely access that watercourse. If a spill were to adversely affect any aquatic or terrestrial resources, it could, by extension affect the ability of First Nations to access these resources in proximity to the spill, and could temporarily affect others from using the affected roads until the clean-up activities have been completed.

While this assessment focuses on the emergency response and other post-spill mitigation, it must be considered that various measures are in place to prevent such accidents from happening in the first place. Such measures include:

- purchasing reagents from reliable suppliers who use well qualified and experienced transport contractors;
- imposing speed limits on non-regulated access roads;
- provide communication along access roads such that emergency response personnel and equipment can be notified and mobilized in a timely fashion;
- engaging only reputable shipping contractors and shipping companies that have sound emergency procedures in place throughout the handling chain and regularly audit their performance;
- requiring all containers (drums/barrels) loaded onto trucks to be blocked or tied down with hardware adequate to prevent the load from shifting on the vehicle;
- requiring that no person drives or operates a vehicle carrying a load unless the load is properly secured;
- requiring that all drivers be trained in emergency response and that the transport vehicles carry appropriate spill containment and neutralizing agents and are trained in their use as appropriate;
- clearly defining all shipping routes, and identifying all critical areas such as sources of community drinking water;
- consulting with regional officials along the transportation route to ensure that they are aware of the associated risks;
- assisting community leaders within the Project area in the development of local EPRP and training local people;

- having a designated coordinator to ensure that the public and local authorities are notified in a timely fashion with appropriate and accurate information should a spill occur; and
- addressing off-site chemical and/or fuel spills in the ESMS.

8.17.3.6.2 Environmental Effects Assessment

The potential interactions between Off-Site Trucking Accident and the VECs selected for this EIA are presented in Table 8.17.7.

Table 8.17.7 Potential Interactions between VECs and an Off-Site Trucking Accident

Valued Environmental Component (VEC)	Off-Site Trucking Accident
Atmospheric Environment	1
Acoustic Environment	0
Water Resources	2
Aquatic Environment	2
Terrestrial Environment	1
Vegetated Environment	1
Wetland Environment	2
Public Health and Safety	1
Labour and Economy	0
Community Services and Infrastructure	0
Land and Resource Use	1
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	1
Heritage Resources	0
Transportation	1

Notes:
Interactions between Accidents/Scenarios and the respective VECs were ranked as follows:
0 No substantive interaction. The environmental effects are rated not significant and are not considered further in this report
1 Interaction may occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices.
2 Interaction may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EIA.

As noted in Table 8.17.7, there will not be any substantive interaction between an Off-Site Trucking Accident and the Acoustic Environment, Labour and Economy, Community Services and Infrastructure, and Heritage Resources as the features of the environment included in these VECs would not be affected by a spill as described above. There will be no increase in noise as a result of such an accident, no adverse change to the labour force or the local economy, no adverse environmental effects to local services of infrastructure, and no interaction with heritage resources. Therefore, interactions with these VECs have been ranked as 0 in Table 8.17.7, their environmental effects during all phases are rated not significant with a high level of confidence, and they are not discussed further.

Interactions between an Off-Site Trucking Accident and Atmospheric Environment, Terrestrial Environment, Vegetated Environment, Land and Resource Use, Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons, and Transportation have been ranked as 1 in Table 8.17.7. This is because the potential adverse environmental effects resulting from a spill and these components of the environment would not result in a significant environmental effect even without mitigation, or the interaction would clearly not be significant due to application of codified practices, as discussed next.

For the Atmospheric Environment, an accidental event that exposed fuel to the open air would release volatile organic compounds (VOCs). Clean-up of the spill would employ hauling trucks and earth moving equipment which would release particulate matter and combustion gases through fuel consumption, and dust emissions from the clean-up activities. Changes in air quality due to a spill will be localized in geographic extent, affecting only the immediate vicinity. Emissions from the clean-up will be sporadic in frequency and short in duration. The likelihood of a spill is low, and the environmental effects on air quality will cease once the clean-up is complete. Emissions are expected to be within all pertinent standards and guidelines, and no significant environmental effects are predicted.

For the Terrestrial Environment and Vegetated Environment, the environmental effects of hazardous materials spills tend to be limited in terms of geographic extent and potential for damage to/loss of terrestrial vegetation and/or wildlife. This is particularly true for a spill of solid material, such as concentrate or APT. Liquid spills will soak into the ground, possibly reaching groundwater or flow overland into surface watercourses, where environmental effects for aquatic and semi-aquatic biota can result. While a spill can result in ingestion/uptake of contaminants by wildlife, the scope of this potential is limited. Most terrestrial wildlife would avoid the area due to human presence during clean-up activity. A release of petroleum products from a land-based spill has the capacity to chemically burn vegetation and to disrupt nutrient cycling processes. Effects vary depending on length of exposure, time of year (dormancy) and the characteristics of the plant species affected; however, the spill response plan will lessen environmental effects and the geographic extent of the potentially affected area. Spill isolation and clean-up activities would be initiated as soon as the spill was reported and due to the volume of material envisioned for a spill the spatial extent of such a scenario would be limited Soil and vegetation affected by a spill can be remediated through standard response and clean-up procedures such that long-term or significant environmental effects are not anticipated.

Interactions between an Off-Site Trucking Accident and Public Health and Safety have been ranked as 1 as a hazardous materials spill could result in contamination of biota outside the PDA, health risks to members of the public exposed to the spill and could potentially contaminate drinking water. If a spill were to occur, access to the area would be restricted until clean-up activities were completed, in particular if there were any concerns regarding public exposure. Clean-up activities should restore the area to acceptable conditions. With proper control of access to the spill location and the immediately implementation of clean-up measures, an Off-Site Trucking Accident is unlikely to result in adverse environmental effects on Public Health and Safety. The other potential interaction with Public Health and Safety is related to effects of a spill on drinking water and users. This is discussed under Water Resources below.

Interactions between an Off-Site Trucking Accident and both the Land and Resource Use and the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons VECs have also been ranked as 1 as there is potential for a spill to temporarily limit the use of an affected area for various activities including fishing or hunting or other recreational or traditional use. This could be because the area is temporarily physically off-limits to the public to allow for clean-up activities to safely take place or because of possible contamination of watercourses or biota. Such restrictions would be temporary in nature and limited geographically. The potential environmental effects would not result in a long-term loss of available land and resources currently used by the public and/or Aboriginal persons for traditional purposes.

Interaction between an Off-Site Trucking Accident and Transportation was ranked as 1 in Table 8.17.7. There is potential for an Off-Site Trucking Accident to present some limited danger to the public driving on those highways as well as result in delays to traffic. However, the environmental effects of an Off-Site Trucking Accident would only be short-term and very limited in area, and any disruptions in traffic flow as a spill is cleaned and debris removed from the scene of the accident will be temporary. Transportation of hazardous materials will be conducted in compliance with the federal *Transportation of Dangerous Goods Act*.

Based on the mitigation and response mechanisms and procedures, the potential environmental effects of an Off-Site Trucking Accident on the VECs ranked as 0 or 1 in Table 8.17.7 for all phases of the Project are rated not significant, with a high level of confidence.

Interactions with an Off-Site Trucking Accident are ranked as 2 in Table 8.17.7 for the Aquatic Environment, Water Resources, and Wetland Environment, and these interactions are further evaluated below.

8.17.3.6.2.1 Water Resources

Depending on quantity and timing of response, spills of hazardous liquid materials arising from an Off-Site Trucking Accident may migrate into groundwater or surface water resources. If such resources are used for drinking water, then these sources could become contaminated. This is particularly the case for petroleum products.

A major release of petroleum products could result in the movement of free hydrocarbons across the surface towards receiving waters and drainage features, as well as movement of free hydrocarbons into the sub-surface, thereby affecting the quality of the underlying groundwater. In addition to the potential risks of fire and explosion from the free product and associated vapours, the presence of floating hydrocarbon on the water table, and dissolved hydrocarbon constituents within the groundwater can result in a persistent anoxic groundwater condition (*e.g.,* dissolved oxygen is consumed by micro-organisms degrading the hydrocarbon), which can indirectly result in the dissolution of otherwise poorly soluble metals such as iron, manganese and other metals from the host aquifer. When hydrocarbon-affected groundwater is intercepted by a water supply well, complaints of odour, iron fouling, or vapours can render the well unusable. Similarly, when hydrocarbon-affected groundwater discharges into the surface water environment, the aquatic habitat can become affected by metals, reduced dissolved oxygen and discolouration. In the event of a spill, the fuel would be expected to penetrate porous sediments quickly, but will also be flushed downstream by watercourses such that clean-up of river banks is usually not needed. Most light petroleum products are readily and completely degraded by naturally-occurring microbes within one to two months (United States Coast Guard 2005). Due to the relatively minor amounts of fuel contemplated in the accident scenario, potential adverse environmental effects from a petroleum product would be limited in extent and would be temporary, and with immediate clean-up, should not represent a significant environmental effect.

A spill of reagents or concentrate could also affect surface or groundwater should the spill occur in or immediately adjacent to a watercourse or during a heavy precipitation event that allowed solids to be dissolved or washed into watercourses. However, the materials being transported will be in sealed containers of limited quantity (*i.e.,* a few drums or bags or containers per shipment), therefore any potential adverse environmental effects would be limited in extent and temporary in duration.

Should any spill occur with the potential of contaminating ground or surface drinking water resources or contaminating surface water used by the public for recreational purposes such as swimming, a public notification would be issued by provincial authorities. If required, alternative drinking water (*i.e.,* bottled water) would be supplied to affected users, and monitoring of water quality would be conducted until such time as water quality returns to pre-spill conditions and known publicly-accessed water sources could be posted as non-potable.

With a single release event into environment, such as the scenarios described, environmental effects on water quality will be short-term, as contaminants are flushed downstream and become diluted. Contamination of groundwater could be longer-term, but mitigation would be in place to provide alternative drinking water sources, such as drilling a new well or providing bottled water. Based on the prevention and response procedures in place, it is not anticipated that there will be any degradation of water quality that exceeds Health Canada Guidelines for Canadian Drinking Water Quality (Health Canada 2012), any reduction in surface or groundwater quantity, any reduction in groundwater discharge or reduction in surface water quantity, or any degradation of physical or chemical characteristics of an aquifer or stream to the extent that it will adversely affect sustainable surface water flow or aquatic life. Therefore, the residual environmental effects to Water Resources from an Off-Site Trucking Accident during all phases are predicted to be not significant.

8.17.3.6.2.2 Aquatic Environment

As with Water Resources above, a spill of petroleum products, reagents or concentrates into a watercourse may result in a change in surface water quality and fish habitat quality and quantity, and may result in direct mortality to fish. Hazardous materials that could be released to the environment due to an Off-Site Trucking Accident could temporarily degrade water quality and consequently affect fish habitat quality. A fuel spill near a stream crossing would have negative consequences, but with implementation of effective spill response measures, adverse environmental effects can be mitigated.

The range of potential environmental effects from a hazardous materials spill is broad as there are many factors to be considered. The magnitude and geographic extent of the environmental effects would depend on the toxicity of the material spilled and the quantity spilled. Spills into watercourse tributaries adjacent to roads could migrate downstream in the case of large spills. Refined fuels, such as diesel and gasoline, while toxic to aquatic organisms, also evaporate or disperse rapidly into the water column. Stream discharge also influences the effects of a spill. Smaller streams can be more susceptible than larger streams and spills that occur during periods of low discharge can be more damaging. The season of occurrence of a spill can also affect the rate of recovery of invertebrates.

Lytle and Peckarsky (2001) studied the effects of a diesel fuel spill of 26,500 L in a small trout stream in New York. Within 24 hours, the spill resulted in a fish kill estimated at 92% of total fish abundance of rainbow trout (*Oncorhyncus mykiss*), white sucker (*Catostomus commersoni*), blacknose dace (*Rhinichthys atratulus*), and darters (*Etheostoma* spp.). The study found that invertebrate densities at

three locations below the spill site was significantly lower than reference sites and only returned to similar densities a year after the spill. The authors concluded that the diesel fuel spill significantly reduced the density of invertebrates (by 90%) and taxonomic richness (by 50%) at least 5.0 km downstream, with density recovering within a year. Species diversity continued to be low 15 months after the spill, suggesting that a longer period was required for full recovery.

Although the magnitude of the environmental effect of a spill depends on a number of factors, it would likely be localized. In all but one of the accident scenarios (*i.e.,* diesel fuel spill), the quantity of spilled material will be relatively low, thus minimizing the potential for spilled material to spread beyond the immediate accident site. Further to this, the only situation where spilled material would be transported away from the spill site is if the spill happened to take place directly at a watercourse crossing, of which there are only a few along the PSA and SSA routes. Materials that are transported in large quantities (diesel fuel, for example) will be in double-walled containers, which will minimize the potential for a spill of a large quantity of material. Spill response procedures will be described in the ESMS and all spills will be immediately reported for emergency response.

The environmental effects of a spill to surface water quality (fish habitat quality) would likely be reversible as the high spring flows and high bed load transport will effectively flush the system during the spring and during any heavy rain/high flow event following a spill. The reversibility of the environmental effects directly on fish populations will depend on the fish species involved and proportion of watershed affected. It is anticipated that in the highly unlikely event of a large diesel spill into a watercourse, resident fish populations would re-establish within the affected area within one to two years.

While it is extremely unlikely for an Off-Site trucking Accident to result in a large spill, should a release of concentrates, reagents, or petroleum products occur, the following mitigation and response measures will be in place to minimize the adverse environmental effects on the aquatic environment.

- Containment measures will immediately be initiated to limit the spread of the spill, minimize environmental effects on the surrounding environment (*e.g.,* wetlands and watercourses) or other areas of environmental concern, and prevent damage to property.

- Should a spill occur in a watercourse a fuel containment/absorbent boom will be deployed to contain the plume and begin collecting the fuel from the surface of the water until other spill response personnel arrive on-site.

- In the case of a spill of a large quantity of liquid, any nearby drainage (non-watercourse) culverts will be blocked to limit spill migration, if required.

- If clean-up of a petroleum product on equipment is required as a result of a leak or spill, equipment or machinery will be cleaned at least 30 m from watercourses or wetlands, and any natural materials affected by the spill or clean-up (*e.g.,* leaves) will also be collected.

- If any containers are damaged during an accident, the material contained within them will be transported to another undamaged container before transport resumes. For example, if the spill is from a damaged fuel truck, the tanker will be pumped dry and transferred into another tanker or other appropriate and secure container(s). All leaks will be repaired immediately.

Water sampling will also be conducted to monitor the movement of the spilled material and its potential to cause an adverse effect. After clean-up, all collected fuel or other hazardous material will be stored, or disposed of safely in accordance with applicable regulations.

While it is possible for an Off-Site Vehicle Accident to cause a release of hazardous materials into the Aquatic Environment, mitigation measures will be in place to both prevent spills and respond quickly to minimize their environmental effects, should they occur. Even if a spill were to occur, for a significant environmental effect to occur it would need to occur at a location proximal to a watercourse that harbours a sensitive species during a sensitive life stage (such as Atlantic salmon during spawning)—a combination of events which is not likely to occur. As such, while the environmental effects of an Off-Site Trucking Accident on the Aquatic Environment during all phases could potentially be rated significant and adverse, they are highly unlikely to occur for the reasons described above. Based on existing knowledge, if such an event were to occur, fish and invertebrate populations would likely recover from a spill within one to two years depending on the size, location and timing of the spill, hence the adverse environmental effects would be localized and reversible. Should such environmental effects occur, SML would take corrective action to mitigate the environmental effect including compensation, if required, within the overall framework of the *Fisheries Act.* Consequently any residual environmental effects would be not significant.

8.17.3.6.2.3 Wetland Environment

In the unlikely event of a spill from a fuel truck, the release of petroleum products has the potential to affect vegetation in wetland or riparian ecosystems. GeoNB-mapped wetlands are located throughout the RAA, and many of these wetlands appear to be associated with watercourses, but there are no provincially significant wetlands along the PSA or SSA routes. Contamination can adversely affect the quality of wetland habitat, and result in the ingestion/uptake of contaminants by wildlife and waterfowl. The magnitude and extent of the effects on wetlands vary depending on a number of factors including oil type or other hazardous material spilled, extent of contamination of vegetation and sediments, the speed of natural removal, species sensitivity, time of year of the spill, and damages associated with clean-up activities. In general, spills of such materials during the dormant winter season have the lowest effect, whereas spills affecting vegetation during the summer growing season will have longer lasting effects. Annuals are generally less resistant than perennial species.

For any spill as a result of an Off-Site Trucking Accident, emergency response and clean-up procedures would be initiated immediately upon discovery. For clean-up of affected wetlands, the measures to be employed will be selected based on the nature and extent of the wetlands affected, type of material spilled, and time of year. Several options exist for wetland clean-up, including: no response (in some cases, the clean-up activity itself can cause greater damage to a wetland than allowing spilled material to naturally degrade); vacuum or pumping of larger volumes of hydrocarbons; low-pressure flushing; sediment removal; cutting vegetation; and/or bioremediation. The use of surfactant booms within the wetland will be determined on a case-by-case basis depending whether or not there is the potential for contaminated water flowing out of the wetland into a watercourse. Post-clean-up monitoring will be undertaken following spill response if deemed necessary by regulating agencies, and compensation for loss of wetland habitat may be undertaken if a spill results in the loss of wetland area or function as a result of a spill.

Based on the significance criteria for the Wetland Environment that requires authorization for any net loss of wetland function, a net loss of wetland function as a result of an accidental spill due to an Off-Site Trucking Accident would, by its nature, not be an authorized event, and as such any resulting loss of wetland function (however unlikely to occur) could be considered a significant environmental effect. However, for this to occur, the Off-Site Trucking Accident would need to occur near a wetland, with residual environmental effects leading to an unauthorized net loss of wetland function—a combination of factors which is not likely to occur. Further, SML would be required to compensate for any such environmental effect that results in the net loss of wetland function, no matter how unlikely, and as such, the environmental effects would not be significant and are highly unlikely.

The mitigation and response procedures to be employed, the generally reversible nature of the environmental effects on wetlands which would recover relatively quickly from such an event (*e.g.,* from immediate recovery, to within one to three years), and the low likelihood of occurrence together would thus be expected to result in a not significant environmental effect. The significance criteria for the Wetland Environment define a significant environmental effect as one that results in the unauthorized loss of wetland function. However, in such an event, the loss of wetland function arising from the accident would be authorized by regulatory authorities in order for mitigation, clean-up and restoration to occur, and SML would compensate for any unlikely adverse environmental effects to the wetland environment within the policy framework of New Brunswick such that the environmental effects are authorized, compensated, and thus not significant. Therefore, with authorization for adverse environmental effects on the Wetland Environment and associated compensation by SML in the event of such an accident, the environmental effects of an Off-Site Trucking Accident on the Wetland Environment during all phases of the Project are rated not significant.

With the mitigation measures in place to prevent accidental spills and to respond to spills should they occur, the likelihood of a large spill affecting large areas of wetlands is considered very low.

8.17.3.6.3 Determination of Significance

For Water Resources, with the prevention and response procedures in place, it is not anticipated that there will be any degradation of water quality or quantity that would cause a sustained environmental effect that could be considered significant. The residual environmental effects to Water Resources from an Off-Site Trucking Accident during all phases are thus rated not significant, with a high level of confidence.

For the Aquatic Environment and the Wetland Environment, based on the mitigation and response procedures to be employed, the generally reversible nature of the environmental effects, and the low likelihood of significant environmental effects occurring, the environmental effects of an Off-Site Trucking Accident on the Aquatic Environment and the Wetland Environment during all phases of the Project are rated not significant, and are unlikely to occur. There is a moderate level of confidence in these predictions.

8.17.3.7 Vehicle Collision

A Vehicle Collision is defined as a Project-related vehicle accident occurring on the road transportation network leading to or from the Project site. A vehicle collision would pose a danger to the public, workers traveling to and from the Project site, and wildlife crossing or otherwise using access roads to

the Project site. Though existing rail infrastructure and port facilities will be used for the Project, these facilities will remain unchanged from their current state, the Project will not result in additional rail or shipping traffic to transport the mine reagents or products, and no new rail infrastructure is required or planned to facilitate its use by the Project. Therefore, assessments of rail infrastructure and port facilities are not considered in this EIA Report.

The environmental effects of any hazardous materials spills resulting from a vehicle collision are not addressed in this section, but rather in Section 8.17.3.6 (Off-Site Trucking Accident) and Section 8.17.3.3 (On-Site Hazardous Material Spill). A Fire resulting from a vehicle collision is assessed in Section 8.17.3.8.

As discussed in Section 8.15, SML is committed to maintaining safe travel routes within the LAA and a number of traffic safety measures will be in place to reduce the potential for vehicle collisions to occur. These include, but are not limited to, the following.

- The construction of the site access road, internal site roads, and the realignment of a portion of the Fire Road to accommodate Project facilities will be designed to applicable standards and adhere to best-practices for the construction of forest roads.
- In consultation with NBDNR and the Crown Timber License holder, bushes will be cleared along roadsides to improve sight distance at the intersection approaches of the PSA and SSA routes at provincial highways.
- In consultation with NBDNR and the Crown Timber License holder(s), the roadway and roadside warning signs will be maintained to reduce traffic safety risks along the forest roads that are part of the PSA and SSA routes.
- A traffic plan will be developed for the Project to specifically identify roadway hazards along the PSA and SSA routes, and will include communications and best practices training, and a monitoring and reporting program.
- Drivers will be required to adhere to posted speed limits.
- Drivers will be required to yield to wildlife and will not be permitted to chase or harass wildlife.

8.17.3.7.1 Description of Scenarios

The Project will generate vehicle traffic during all phases as a result of the movement of equipment, supplies, materials, and personnel to and from the Project site. The most noticeable change in vehicle traffic will take place during Construction, when site preparation and physical construction of Project-related infrastructure will require specialized equipment, materials, and supplies, and personnel to be transported on a daily basis to the Project site. In addition to the bus and passenger vehicle transportation of personnel to and from site during the Construction phase, there will be several trucks per day transporting materials, supplies, and equipment to and from the Project site on these roads. Traffic to and from the site will continue during the Operation and Decommissioning, Reclamation and Closure phases, but to a lesser extent than during Construction. As increased traffic volumes have the potential to increase the likelihood of accidents or collisions, the Final Guidelines (NBENV 2009)

require an assessment of Project-related environmental effects on accident rates and risk of accidental spill as a result of increased traffic volumes.

An increase in traffic is expected during the Project; however, since most workers will be bussed to the Project site during Construction, or will be driving their own vehicles, the Project is not anticipated to cause an increase in pedestrian traffic along roads and highways within the LAA. The Project site is located within a rural forested area that will be accessed using public highways, as well as forest resource roads linking public highways to the Project site. The forest resource roads cross forested land, supporting large terrestrial wildlife, including deer, moose and bear, as well as small terrestrial animals. Evidence of recreational land use is present throughout much of the LAA. There are no municipal, provincial or federal parks or other public recreational areas within the LAA. However, forest roads and trails are used informally for snowmobiling, ATV use, and hiking, although there are no formally managed, groomed trails. Additionally, recreational fishing (particularly for brook trout) occurs seasonally on various watercourses within and surrounding the LAA. The LAA is used for hunting a variety of game, including deer, moose, and black bear, and trapping also occurs in the LAA. The hunters and trappers using the LAA generally are residents of the surrounding communities, though some tourists also use the area, especially through the services of local guides and outfitters.

Given these conditions, there is potential for a number of vehicle accident scenarios to occur during any phase of the Project, including single vehicle, multiple vehicle, wildlife strikes, or pedestrian strikes, with resulting environmental effect on Transportation, Public Health and Safety, and the Terrestrial Environment.

8.17.3.7.2 Environmental Effects Assessment

The potential interactions between a Vehicle Collision and the VECs selected for this EIA are presented in Table 8.17.8.

Table 8.17.8 Potential Interactions between VECs and a Vehicle Collision

Valued Environmental Component (VEC)	Vehicle Collision
Atmospheric Environment	0
Acoustic Environment	0
Water Resources	0
Aquatic Environment	0
Terrestrial Environment	2
Vegetated Environment	0
Wetland Environment	0
Public Health and Safety	2
Labour and Economy	0
Community Services and Infrastructure	1
Land and Resource Use	0
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	0
Heritage Resources	0
Transportation	2

Notes:
Interactions between Accidents/Scenarios and the respective VECs were ranked as follows:
0 No substantive interaction. The environmental effects are rated not significant and are not considered further in this report
1 Interaction may occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices.
2 Interaction may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EIA.

As noted in Table 8.17.8, there will be no substantive interaction between a Vehicle Collision and many of the VECs, and thus these interactions have been ranked as 0 in Table 8.17.8. A Vehicle Collision will not result on any interaction with the Atmospheric Environment or the in any chance to the Acoustic Environment. Water Resources will not be affected nor will any features of the Aquatic Environment, the Vegetated Environment, or the Wetland Environment. A Vehicle Collision will not affect Labour or the Economy, Land and Resource Use, the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons, or any Heritage Resources, their environmental effects during all phases are rated not significant with a high level of confidence, and they are not discussed further.

The interaction with Community Services and Infrastructure is ranked as 1 in Table 8.17.8. A vehicle collision would likely result in a call to 911 and the use of emergency response services. As a vehicle collision is unlikely to result in any large-scale event, response should be well within the capacity of local emergency response services. A vehicle collision would also be a single event that would rarely occur and therefore any strain on community services would be short-term and sporadic and unlikely to result in any significant residual environmental effects. Based on the capacity of the existing services, the potential environmental effects of a Vehicle Collision on Community Services and Infrastructure during all phases are ranked as 1 and are rated not significant, with a high level of confidence.

Interactions with a Vehicle Accident are ranked as 2 for the Terrestrial Environment, Public Health and Safety, and Transportation and these interactions are further evaluated below. Due to the overlapping nature of the environmental effects and the mitigation, potential environmental effects to Public Health and Safety and Transportation are assessed together.

8.17.3.7.2.1 Terrestrial Environment

As the Project access roads cross forested areas in a highly rural setting, it is likely that large and small mammals will traverse roads within the LAA at various times, and it is likely that over the course of the Project, collisions between these animals and Project vehicles may occur. With respect to large mammals, vehicle collisions with moose and deer occur throughout their ranges. Bears are also susceptible to vehicle collisions because they travel long distances in search of optimal foraging sites, and roads are easy corridors to follow when terrain is blocked or difficult to traverse. Bears are naturally curious and may approach a food source (*e.g.,* berries) if danger is not imminent; thus, they may not avoid roadways. With the exception of Canada lynx, the mammal populations known to occur in the LAA are secure, and any occasional strike resulting in injury or mortality to an individual of these secure species will not result in measurable changes to the population. Canada lynx tracks were detected within the LAA and lynx may occur along roadsides, although this species is likely to occur in low numbers and therefore the potential for vehicle collision is limited and considered a rare event. Should it occur, is it not likely to substantially reduce the long-term survivability of this population within New Brunswick.

There is one listed herpetile SOCC with potential to occur in the LAA, which is the wood turtle, although none were observed in the LAA by field staff during any of the surveys for the Project (Stantec 2012f; 2013). While increased mortality on roads is a recognized threat to this population, the potential for this species to occur within the LAA is considered low, and therefore the potential for collisions with it is also considered low.

A search of the Atlantic Canada Conservation Data Centre (AC CDC), Maritime Breeding Bird Atlas (MBBA), and Breeding Bird Survey (BBS) databases revealed records of eight bird SAR, three species of bat SAR, and eight bird SOCC near the LAA (Sections 8.6.2.5 and 8.6.2.6). None of the species that may occur within the LAA are considered particularly vulnerable to vehicle strikes and increased activity on the access roads would likely deter use of roadside habitat, further limiting the potential for collisions. A strike, should it occur, would likely involve only a single bird and therefore is not likely to substantially reduce the long-term survivability of these populations within New Brunswick.

Any wildlife strikes or near-strikes will be reported by drivers (with species, if known, and approximate location) to SML and a log will be maintained. If necessary, further mitigation will be implemented, such as posting of deer or moose crossing signs.

As described above, injury or mortality to wildlife as a result of vehicle collisions is not predicted to substantially reduce the long-term survivability of any population within New Brunswick. Based on the significance criteria for the Terrestrial Environment VEC, a vehicle collision that resulted in mortality of a SAR species would be considered significant, but it is highly unlikely to occur. For SOCC or non-listed (secure) species, the residual environmental effect of a Vehicle Collision on the Terrestrial Environment will not be significant.

8.17.3.7.2.2 Public Health and Safety, and Transportation

As discussed above, the Final Guidelines (NBENV 2009) require an assessment of Project-related environmental effects on accident rates, which is distinct from the assessment of potential environmental effects of a vehicle collision. Both are assessed further below. Note that the assessment of accident rates is taken wholly from the Sisson Project Road Transportation Study (exp Services Inc. 2013a).

Accident Rates

As detailed in exp Services Inc. (2013a), average annual vehicle collision rates and collision severity breakdowns along the provincial highway route segments of the PSA and SSA routes during the five-year period of 2006 to 2010 are presented in Table 8.17.9.

Table 8.17.9 Existing Collision Rates along Provincial Highway Routes (2006 – 2010)

Location			Total	Collisions by Severity			Collision Rate (Col / MVK)			
			Average Annual Collisions	% PDO	% Injury	% Fatal	Total	PDO	Injury	Fatal
Roadway Segment	a. Route 8	Fredericton City Limits to Route 107	19.4	81%	17%	2%	0.568	0.462	0.094	0.012
	b. Route 104	PSA route to Route 105	15.2	72%	28%	0%	0.824	0.596	0.228	0
	c. Route 104	PSA route to Route 130	6.2	74%	26%	0%	0.652	0.484	0.168	0
	d. Route 107	Route 8 to SSA route	5.6	68%	32%	0%	0.412	0.28	0.133	0
	e. Route 107	SSA route to Route 105	11.2	70%	28%	2%	0.577	0.402	0.165	0.01

Table 8.17.9 Existing Collision Rates along Provincial Highway Routes (2006 – 2010)

Location			Total	Collisions by Severity			Collision Rate (Col / MVK)			
			Average Annual Collisions	% PDO	% Injury	% Fatal	Total	PDO	Injury	Fatal
	f. Route 105	Route 620 to Route 104	22.2	80%	20%	0%	0.697	0.559	0.138	0
	g. Route 105	Route 2 to Route 605	7.2	92%	8%	0%	1.038	0.951	0.086	0
	h. Route 105	Route 107 to Route 130	4.6	91%	9%	0%	0.482	0.44	0.042	0
	i. Route 130	Route 105 to Route 104	9.7	83%	17%	0%	0.587	0.486	0.101	0
	j. Route 605	Route 105 to AV Nackawic Mill Entrance	1.0	100%	0%	0%	0.564	0.564	0	0
	k. Route 605	AV Nackawic Mill Entrance to Route 104	1.8	56%	44%	0%	0.796	0.442	0.354	0
	l. Route 610	Route 105 to Route 104	1.0	100%	0%	0%	0.65	0.65	0	0
	m. Route 617	Route 104 to Route 620	2.8	71%	29%	0%	0.824	0.588	0.235	0
	n. Route 620	Route 105 to Route 107	19.2	76%	23%	1%	0.956	0.727	0.219	0.01

Notes:
1) Col/MVK is the average number of collisions per million vehicle-kilometres (Col/MVK).
2) The collision severity categories are: collisions that involve Property Damage Only (PDO); collisions that involve injuries to one or more persons (Injury); and collisions that involve one or more fatalities (Fatal).

Source: exp Services Inc. (2013a), calculated from NBDOT collision report files, 2006 - 2010.

The provincial average collision rate for undivided arterial highways is 0.843 collisions per million vehicle-kilometres (Col/MVK). The existing collision rate for the segment of Route 148 (the former section of Route 8 before the opening of the Marysville Bypass in Summer 2014) between Fredericton and Route 107 was 0.568 Col/MVK. There are no statistics available yet for the Marysville Bypass, a new section of Route 8 between Marysville and Route 107, as this highway has only recently opened.

The province-wide average of all collector highways, such as Route 107, Route 105 and Route 104, is 1.24 Col/MVK. The collision rates for the segments of the provincial collector highway routes within the RAA (Route 104, Route 105, Route 107, and Route 130) ranged from 0.410 to 1.038 Col/MVK. The collision rates for the segments of the Route 605, Route 610, Route 617, and Route 620 within the RAA ranged from 0.564 Col/MVK to 0.956 Col/MVK.

The vehicle collision rates of the provincial highways that lead to the Project site are all below the provincial average rates for rural two-lane arterial, collector, and local highways. This indicates that there are no abnormally high vehicle safety risk areas along the provincial highways that lead to the Project site.

The Project will generate additional traffic during the Construction and Operation phase that will travel over the provincial highways that lead to the Project site. However, the additional traffic volumes will be a small percentage of the existing traffic. The mix of trucks and passenger vehicles that will comprise the additional traffic is not unlike the existing traffic mix within the Project area, and typical of vehicles

travelling on New Brunswick highways on a daily basis. Since no changes are planned to the provincial highways, there is no expectation that the collision rates, or the severity of collisions, will change as a result of the Project.

There are no collision data available for forest resource roads (such as the Napadogan Road, Fire Road, and Four Mile Brook Road) that lead to the Project site as part of the PSA and SSA routes. Stop signs and stop warning signs are posted at the approaches of these forest roads to the provincial highways. Although the traffic volumes on these forest roads are very low, the risk of collision may be higher along these hilly and winding roads than a properly designed public highway. The generally narrow widths of many of these roads at times requires stoppage of one vehicle to allow the other passage, particularly at single-lane bridges, but these traffic patterns are generally well known and understood by drivers using these routes, and while the Project may add additional traffic on these roads, it is expected that these existing practices will be followed and the added traffic will not exacerbate the use of these roads. To reduce the potential traffic safety risks, the forest industry currently requires the use of CB radio systems for communicating vehicle locations among drivers using the forest roads, and these practices will be maintained by the Project to the extent practicable. Where not practical, a Traffic Plan combined with worker education will be implemented to ensure that Project employees are well versed in dealing with the safety hazards on these roads, and safe travelling practices that are in place are expected to be effective and widely understood by Project employees..

The traffic generated by the Project will be exposed to the same potential safety risks as experienced by the existing forest industry users of the forest roads. It is expected that compliance with the safety standards and best practices set by the forest industry, by the Project truckers, bus drivers and workers that will travel to the Project site along these forest roads, will be sufficient to retain safety risks at or below existing levels.

Effects of a Vehicle Collision

A vehicle collision, defined herein as a collision between two vehicles or pedestrian strike, can result in property damage, injury to people involved, and in extreme cases, mortality. Traffic flow may be interrupted temporarily after a collision as emergency crews respond to the accident and any debris resulting from the accident is cleared. In the unlikely event that a vehicle collision and/or pedestrian strike occurs, parties on-site would contact 911 emergency services as necessary to respond to any injuries or fatalities. As with any other vehicle collision that might occur along the provincial highway system, it is unlikely that any vehicle collision scenario would exceed the capacity of area emergency response services. In addition, for any Project-related accidents, emergency preparedness and response procedures that will be defined in the ESMS will be implemented immediately.

Mitigation

A number of mitigation measures will also be in place to reduce the potential for vehicle collisions, including but not limited to the following.

- Off-site parking lots will be provided in the Nackawic and Napadogan areas as construction workers are bussed to the Project site during the Construction phase. This will reduce

passenger vehicle traffic on the public and forest roads that form part of the PSA and SSA routes to the site.

- To reduce the potential traffic safety risks, the forest industry currently requires the use of CB radio systems for communicating vehicle locations among drivers using the forest roads. SML would continue with this practice in vehicles it controls. Warning signs requiring the use of CB radios are posted at entry points to the forest roads from the provincial highways.
- Stop signs and stop warning signs are posted at the approaches of these forest roads to the provincial highways.
- The realignment of the Fire Road will widen the travelling surface to allow for continuous two-way passing traffic.
- In consultation with the NBDNR and the Crown Timber License holder(s), bushes will be cleared along roadsides to improve sight distance at the intersection approaches of the PSA and SSA routes at provincial highways.
- In consultation with NBDNR and the Crown Timber License holder(s), the roadway and roadside warning signs will be maintained to reduce traffic safety risks along the forest roads that are part of the PSA and SSA routes.
- Signage advising motorists of construction activities in the area and traffic pattern changes will be posted at regular intervals on the forest roads in accordance with current safety and construction standards and best practices for the construction of forest roads.
- The physical construction of the site access road and internal site roads, in and of itself, will not result in increased traffic levels travelling on the PSA or SSA routes, although it will facilitate the safe and effective movement of vehicles through the LAA.
- The development and application of a Traffic Plan to specifically identify roadway hazards along the PSA and SSA routes, and that includes a communications and best practices training, monitoring and reporting program, will reduce traffic safety risks along these roads.

With the mitigation measures in place, the risk of vehicle collision by a Project-related vehicle should be no higher than for any other vehicles accessing these roads. In particular, the mitigation measures in place for the forest resource roads leading to the Project site, including refurbishment and maintenance and consultation with NBDNR and the Crown Timber License holder(s), should help maintain or improve vehicle safety. The realignment of Fire Road as part of the Project will result in this new forest resource road being two lanes (compared to one lane currently), thereby improving traffic safety on this realigned section of Fire Road. Other existing forest resource roads, including the portion of Fire Road that is not realigned as a result of the Project, will remain either as one-or two-lane roads as they are currently, though they may be upgraded as part of ongoing maintenance of those roads. SML will have an employee safety system in place that will require employees to report events, accidents and near misses and to put corrective action in place as needed to respond to any trends. This would also apply to Project transportation activities. All vehicles used by SML or its sub-contractors will be required to have appropriate registration and insurance, and to follow safe driving rules and requirements of

legislation as defined in the *Motor Vehicle Act*. While the potential environmental effects of a vehicle collision could be severe for the parties involved (*i.e.,* property damage, severe injury or death to individuals involved), should one occur, any delays or impairment to traffic as a result of any collisions would be temporary and typical of any accident response scenario.

8.17.3.7.3 Determination of Significance

The Project will not result in a decrease in a Level of Service to existing roads nor will it degrade the road network. There are no features of the Project that would be expected to increase accident rates on any road leading to the Project site. The Project traffic is modest in comparison to existing traffic levels on public highways, and is not expected to increase accident rates on these highways. Though traffic rates on forest resource roads will increase as a result of the Project in comparison to current levels, improved maintenance, planned improvements, and frequent communication with NBDNR, the Crown timber license holder(s) and other users are expected to maintain or reduce the potential for accidents to occur on these forest roads.

With respect to the Terrestrial Environment, injury or mortality to wildlife as a result of vehicle collisions is not predicted to substantially reduce the long-term survivability of any population within New Brunswick. Though a vehicle collision resulting in mortality of a SAR species would be considered significant, such an event is unlikely to occur. For SOCC and non-listed (secure) species, any occasional strike resulting in injury or mortality to an individual of these secure species will not result in measurable changes to the population. As such, the potential environmental effects of a Vehicle Collision on the Terrestrial Environment for SAR species during all phases are rated significant, but are highly unlikely to occur—the capacity of renewable resources will not be affected by the Project in this regard, given the low likelihood of occurrence. The potential environmental effects of a Vehicle Collision on the Terrestrial Environment for all other terrestrial species or habitats during all phases are rated not significant. There is a high level of confidence in these predictions.

With respect to Transportation, a significant adverse residual environmental effect on Transportation is defined as one where Project-related traffic results in an increase in the rate of vehicle collisions as a result of the Project where mitigation was not implemented or for which damage was not compensated. As described above, there is no predicted increase in the rate of accidents as a result of Project-related traffic. In consideration of the Project needs relating to Transportation and planned mitigation, the potential environmental effects of a Vehicle Collision on Transportation during all phases of the Project are rated not significant. There is a high level of confidence in this prediction.

With respect to Public Health and Safety, any Vehicle Collision that results in serious injury or death as a result of the Project would be considered significant, however based on the information presented in the Transportation Study (exp Services Inc. 2013a), the Project is not anticipated to result in an increase in accident rates, and hence the number of accidents involving people are not expected to increase either, much less those potentially involving fatalities. Therefore, while such an accident would be considered significant under the Public Health and Safety VEC, it is not likely to occur as there is no predicted increase in the rate of accidents as a result of Project related traffic. Therefore, on balance and considering the low likelihood of a serious Vehicle Collision causing mortality of an individual, the potential environmental effects of a Vehicle Collision on Public Health and Safety during all phases of the Project are rated not significant. If a fatality occurred, the environmental effects would be considered significant, but this is highly unlikely to occur—the capacity of renewable resources will

not be affected by the Project in this regard, given the low likelihood of occurrence. There is a high level of confidence in this prediction.

Overall, the potential environmental effects of a Vehicle Collision on all VECs during all phases of the Project are rated not significant, with a high level of confidence, except for the environmental effects of a Vehicle Collision causing mortality of a SAR or a person, which are rated significant but highly unlikely to occur. There is a high level of confidence in these predictions.

8.17.3.8 Fire

A Fire is defined as a Project-caused fire occurring as a result of an accident associated with the activities of the Project due to an equipment malfunction, human carelessness, or vehicle accident. The immediate concern in the event of a Fire would be for human health and safety; additional concerns include habitat loss, direct mortality to wildlife, and loss or damage of property. A Fire could also remove riparian vegetation near watercourses and could temporarily elevate water temperature and increase sedimentation. The emissions from a Fire would likely consist mainly of smoke (particulate matter) and several combustion gases (*e.g.,* CO_2, CO, NO_x, SO_2, and other products of incomplete combustion). Depending on its size and environmental conditions at the time of the fire, a large Fire could result in air contaminant levels greater than the ambient air quality standard over distances of several kilometres.

Fires arising from non-Project causes such as lightning strikes or off-site forest fires due to any undefined cause, and potentially affecting the Project, are assessed as an Effect of the Environment on the Project in Section 8.16.

8.17.3.8.1 Description of Scenario

The scenarios for this accident include a fire within the ore processing plant, a fire resulting from a fuel spill that could spread outside of the PDA, or a fire arising from an off-site vehicle accident. A fire in the ore processing plant may occur as a result of failure in control technology or equipment failure or breakage. A fire may also occur as a result of fuel transfer operations during Construction or Operation.

Mitigation, prevention and response measures will be in place to reduce the potential risk of a fire and to minimize the environmental effects of a fire should one occur. This will include:

- maintaining equipment in good working order through regular inspection, repair and maintenance (*e.g.,* power saw mufflers and vehicle exhaust systems);
- training personnel in proper procedures related to fuel transfers and handling and disposal of hazardous materials;
- maintaining proper vigilance when working with power equipment in forested areas;
- no burning of vegetated debris will be permitted during any phase of the Project;

- following precautions in accordance with the *Forest Fires Act* (*i.e.,* no smoking while moving through forest, do not throw away burning substances, no accumulation of flammable debris allowed to accumulate in proximity to forest, railways or highways, all reasonable attempts made to extinguish any fires that might start, and avoiding careless behavior in relation to fire);
- having on-site fire-fighting equipment and water supplies available at the Project site and in good working order;
- training personnel in fire prevention and response, including fire drills;
- no camp fires will be permitted by Construction crews;
- all Project-related vehicles and heavy equipment on-site that are controlled by SML will have a fire extinguisher;
- co-ordinating fire response with local fire-fighting resources; and
- development of fire response procedures in the ESMS.

The fire response procedures as part of the ESMS will outline procedures for fire prevention, response and reporting; workers will receive appropriate training. In the unlikely event of a large fire, local emergency response and fire-fighting capability will be called to respond to reduce the severity and extent of damage and to protect the safety of workers.

A fire occurring in the ore processing plant would likely be contained within the building. Project facilities will be designed and located to minimize the potential for fires, including situating buildings in cleared areas to minimize the spread of fire. Project facilities will contain a sprinkler system and be equipped with fire extinguishers. A sufficient water supply to be used for fire-fighting (should the need arise) would be developed as part of the fresh water supply for the Project. Enclosed conveyor galleries for the ore conveying system will contain fire suppression piping. The Emergency Response Team on-site will respond as well as contacting local fire departments as needed.

For a fire caused by fuel transfer that spreads from within the PDA to outside the PDA or a fire that starts on one of the forest roads due to a vehicle accident, the Emergency Response Team will respond to any fire, and immediately coordinate response with local fire departments and NBDNR as needed.

8.17.3.8.2 Environmental Effects Assessment

The potential interactions between a Fire and the VECs selected for this EIA are presented in Table 8.17.10.

Table 8.17.10 Potential Interactions between VECs and a Fire

Valued Environmental Component (VEC)	Fire
Atmospheric Environment	1
Acoustic Environment	0
Water Resources	1
Aquatic Environment	1
Terrestrial Environment	2
Vegetated Environment	2
Wetland Environment	1
Public Health and Safety	2
Labour and Economy	1
Community Services and Infrastructure	1
Land and Resource Use	1
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	1
Heritage Resources	0
Transportation	1

Notes:
Interactions between Accidents/Scenarios and the respective VECs were ranked as follows:
0 No substantive interaction. The environmental effects are rated not significant and are not considered further in this report
1 Interaction may occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices.
2 Interaction may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EIA.

A fire that gets out of control or a forest fire will interact to some extent with all VECs, with the exception of the Acoustic Environment and Heritage Resources. There would be no anticipated change to noise or vibration levels and any human receptors. Therefore, the interaction between a Fire and the Acoustic Environment is ranked as 0 in Table 8.17.10. Similarly, no interaction between Heritage Resources and a Fire is anticipated. Any significant heritage resources in the LAA are sub-surface (archaeological) and would not be directly affected by a forest fire. Further to this, multiple forest fires have occurred naturally overtime throughout New Brunswick and this is taken into consideration in the interpretation and dating of archaeological sites. In addition, organic preservation is very poor in archaeological contexts in New Brunswick due to the highly acidic soils hence it is rare to encounter wooden or non-calcined bone artifacts in an archaeological site unless there is some other factor to counter the acidity. Therefore, for archaeological sites, the only remaining artifacts are stone tools which would not be affected by the relatively low temperature of a forest fire. In addition, due to the extensive clear-cutting that has occurred throughout New Brunswick, there is virtually no “original” landscape to be destroyed by a Project-related Fire. Thus, the interaction between a Fire and Heritage Resources has been ranked as 0 in Table 8.17.10. The environmental effects of a Fire on the Acoustic Environment and Heritage Resources during all phases of the Project are rated not significant with a high level of confidence, and they are not discussed further.

The interactions between a Fire and the Atmospheric Environment, Water Resources, Aquatic Environment, Wetland Environment, Labour and Economy, Community Services and Infrastructure, Land and Resource Use, Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons, and Transportation have been ranked as 1 in Table 8.17.10. This is because the interaction would not result in a significant effect even without mitigation, or the interaction would clearly not be significant due to application of codified practices, as discussed below.

There is a potential interaction between the Atmospheric Environment and a Fire. Any fire, whether associated with fuel release or from burning of other organic matter (*e.g.,* vegetation) would be a source of particulate matter, CO, SO_2, NO_x, and VOCs. In case of a fire following a fuel transportation accident scenario, all efforts would be made to extinguish the fire as rapidly as possible in order to prevent releases to the Atmospheric Environment. The burning of fuel oil would be expected to result in short-term environmental effects only in close proximity to the fire, provided that measures are put in place to stop the fire as rapidly as possible in order to minimize the extent of the smoke plume. As a fire would be a temporary source of emissions and the Atmospheric Environment would be expected to return to pre-fire conditions shortly after the fire is extinguished, no significant environmental effects are predicted.

For Water Resources, a fire is unlikely to affect groundwater quality, but groundwater quantity could be affected for a short period of time as water is sourced for fighting the fire. While there could be a minor and temporary change in shallow groundwater chemistry due to recharge through in burned over areas, the long-term environmental effect is judged to be negligible. However, forest fires can change surface water quantity and quality. As the burning of the forest cover and scorching of the forest floor will remove the interception capacity of the forest surface and temporarily eliminate the potential for transpiration. A fire could affect the forest water balance by increasing overland flows and reducing evapotranspiration, and the deposition of volatile organic compounds, ash and other burning residuals may affect local water quality. Natural regrowth or planned reforestation will reverse the water quantity and quality effects. If a fire were to occur, any environmental effects on surface water quality would be localized, short-term and reversible, and measures will be in place to monitor water quality, notify potential users and provide alternate drinking water source if required. Water quality would not be expected to exceed the Health Canada Guidelines for Canadian Drinking Water Quality (Health Canada 2012) on a sustained basis, and any disruption to water quantity (*e.g.,* from use in suppressing the fire) would be temporary Therefore, it is not anticipated that a Fire would result in significant environmental effects to Water Resources.

A Fire may affect the Aquatic Environment from surface run-off containing impurities associated with the fire itself, or from the extraction of surface water used to control the fire. Run-off from fire water could enter the Aquatic Environment and potentially cause harmful alteration to fish habitat in adjacent watercourses due to increases in suspended particulate matter (*e.g.,* ash or sediment) with minor traces of hydrocarbon possible. The run-off water within the PDA would be contained on-site by the mine contact water collection system and treated in the water treatment plant before being released. Fire suppressing materials and equipment will kept on-site to manage small fires originating from these sources, and therefore these types of fires are not expected to spread outside of the PDA. However, in the event that a large fire does occur in proximity to Atlantic salmon-bearing waters, spawning success or habitat could be adversely affected. Regardless of the cause or location, fires are temporary in nature and do not typically spread over large extents. The resulting environmental effects of a fire on the Aquatic Environment would likely be localized in extent and primarily relating to temporary increases in suspended particulate matter. These environmental effects would not be expected to persist in the Aquatic Environment for more than a season, typically being flushed out over time or during the first large precipitation event following the fire. Therefore, most fires are not anticipated to result in a significant environmental effect on the Aquatic Environment. In the unlikely event of a large fire occurring in an Atlantic salmon-bearing watershed during the Atlantic salmon spawning season, or when Atlantic salmon eggs are deposited in the substrate, the potentially resulting spawning avoidance

or egg mortality could have significant environmental effects on Atlantic salmon productivity, but this combination of events is not likely to occur. Any fire that might occur would most likely be quickly extinguished as precautions will be taken in accordance with the *Forest Fires Act* and the fire prevention and response procedures through the ESMS (*e.g.,* fire-fighting equipment will be kept and maintained on-site and workers will be trained in emergency response procedures). As such, in consideration of the planned prevention, mitigation and response measures, a Fire is not likely to result in a significant environmental effect on the Aquatic Environment.

For the Wetland Environment, the potential for damage to/loss of wetland function is limited as typically only forested wetlands would be vulnerable to fire occurring off-site. In the unlikely event of a forest fire, in all but extreme cases, the tree cover could be damaged but the soil and water would most likely remain intact. Graminoid dominated wetlands can burn under dry conditions, but the severity of these fires would be low due to mitigation and response measures put in place, and the resilience of these wetland types would be high as the wet soil and duff layer would typically remain intact.

For Labour and Economy, a large forest fire could affect local labour and the economy by destroying forests used for harvesting and other activities important for local employment. Depending on the severity of the fire, a burned forest could take several decades to return to a condition where forest harvesting could resume to current levels. However, various measures described earlier in this section are in place to prevent or minimize the adverse environmental effects of a large forest fire. It is unlikely that a forest fire will originate from the Project site and any fire that might occur would most likely be quickly extinguished as precautions will be taken in accordance with the *Forest Fires Act* and the fire prevention and response procedures through the ESMS (*e.g.,* fire-fighting equipment will be kept and maintained on-site and workers will be trained in emergency response procedures). Even if a fire were to occur and damage forest land, it is unlikely that the geographic extent of such loss would adversely affect forest harvesting and management activities in a manner that would cause a significant adverse environmental effect to Labour and Economy.

Community Services and Infrastructure could be affected if a significant fire developed on-site or if a forest fire spread from the PDA and required the support and assistance of local fire fighting and emergency response personnel. However, local and regional fire-fighting services are intended and staffed for this purpose and should be able provide the necessary service in the unlikely event of a significant fire. Should it be needed, other neighbouring fire-fighting services can be called in to assist until the fire is under control.

Due to the overlapping environmental effects and mitigation, the Land and Resource Use VEC and the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons VEC are assessed together. A Fire could temporarily limit the use of an affected area for various activities including fishing or hunting or other recreational use both by members of the general public as well as for Aboriginal persons in carrying out their traditional activities. While the extent and duration of any fire would depend on response efforts and meteorological conditions, a forest fire has the potential to alter the landscape and deplete forest and brush cover, thereby reducing or eliminating the distribution of flora and fauna currently harvested. It could also reduce the ability to travel on the land and could result in loss of cabins. If a forest fire were large, it could possibly affect a large number of users and activities. Although areas within the LAA are used recreationally by members of the public and for traditional uses by Aboriginal persons, in the unlikely event of a fire spreading outside of the PDA, areas adjacent to

affected areas would still be available for use where activities will not be discontinued. While a fire that spread to forested areas would be expected to change land use in the burned over areas possibly for several decades, this environmental effect would be geographically limited to the directly-affected areas. Fire is a natural part of the forest landscape, and over time, the environmental effects of a fire would reverse. Some land use activities such as berry-picking are compatible with regenerating forests.

Transportation could be temporarily affected if a forest fire caused roads to be temporarily closed due to public health and safety risks. Any such closures would be short-term and would not cause any longer-term residual environmental effects on roads or motorists in the area.

Based on the mitigation and response mechanisms and procedures, the potential environmental effects of a Fire on the VECs ranked as 0 or 1 in Table 8.17.10 for all phases of the Project are rated not significant with a high level of confidence, and will not be considered further in this assessment.

Interactions with a Fire are ranked as 2 for the Terrestrial Environment, Vegetated Environment, and Public Health and Safety. These interactions are further evaluated below.

8.17.3.8.2.1 Terrestrial Environment

A Project-caused Fire has the potential to affect terrestrial populations by changing terrestrial habitats and/or populations of wildlife that are important in a socioeconomic or environmental context, including SAR or SOCC. A fire that is allowed to burn uncontrollably would modify wildlife habitat, potentially resulting in direct mortality to wildlife populations especially during the breeding season, and possibly influencing the sustained presence of wildlife populations or communities. The resultant clearing of habitat may result in adverse environmental effects such as the loss of breeding, nesting, rearing, or other habitat for birds and other wildlife species. Depending on the timing of this scenario, it can result in the direct loss of individuals that are slow moving or not mobile, such as young birds and other wildlife that are unable to leave a nest or den. Fragmentation of habitat is a potential issue for some species which regularly move around in a landscape, exploiting resources that are seasonally available and other species that require large home ranges.

Although the environmental effects of a forest fire could be significant, it is unlikely that habitat loss or mortality (either direct or indirect) would result in a population-level environmental effect. No significant habitat loss is anticipated as most species will move into adjacent areas and any habitat loss would be reversible over the longer term. Activities such as handling and storage of fuel and other hazardous materials are regulated by law and the Project will comply with all applicable standards and regulations, guidelines, and reference documents. As appropriate, mitigation measures identified herein will be incorporated in the ESMS. It is unlikely that a forest fire will originate from the Project site and any fire that might occur would most likely be quickly extinguished as precautions will be taken in accordance with the *Forest Fires Act* and the fire prevention and response procedures through the ESMS (*e.g.,* fire-fighting equipment will be kept and maintained on-site and workers will be trained in emergency response procedures).

Based on the information provided above, the planned prevention, mitigation and response measures, and considering the significance criteria for residual environmental effects for the Terrestrial Environment, the potential environmental effects of a Fire on the Terrestrial Environment during all

Project phases are rated not significant. There is a high level of confidence in this prediction. Mortality of a SAR as a result of a Fire would be considered a significant environmental effect, but the likelihood of such an event to occur is low and consequently the environmental effect is unlikely to occur.

8.17.3.8.2.2 Vegetated Environment

A Fire could result in potential environmental effects on the Vegetated Environment from the partial or complete removal of vascular plants from an area of variable size. For a fire adjacent to the PDA, this would most likely be restricted to Crown lands in licenses 8 or 9, but in the case of a large fire or a fire associated with the new 138 kV transmission line further south, the fire could potentially affect vegetation on private land. The likelihood and environmental effects of a forest fire are highly variable, depending on factors such as wind, forest structure and composition, precipitation, topography, fine fuel moisture. Fires can spread through tree tops, leaving ground vegetation largely intact, while some severe fires can destroy all vegetation as well as the organic material in the soil. In such cases, there are often long delays before the vegetation community can regenerate. However, the environmental effects of fire are temporary and the Central Uplands Ecoregion has evolved with fire as a major disturbance regime and the vegetation community has a natural resilience to forest fire. For example, black spruce (*Picea mariana*), which dominates the valley floors within the LAA, is specially adapted to fires, having semi-serotinous cones which allows this species to take advantage of high temperatures from fire to open the cones and release large amounts of seed within a short window of time. The results of field surveys revealed that there are few rare plant species in the area relative to many comparably sized areas in other parts of the province. It is likely that there are few rare species present in the immediate area as well, so the risk of a fire having a detrimental effect on a rare or endangered species in or near the LAA is also low. It is unlikely that a forest fire will originate from the Project site and any fire that might occur would most likely be quickly extinguished as precautions will be taken in accordance with the *Forest Fires Act* and the fire prevention and response procedures through the ESMS document (*e.g.,* fire-fighting equipment will be kept and maintained on-site and workers will be trained in emergency response procedures). If a Fire were to occur, the loss of vegetation could be extensive, but the vegetation species affected are abundant in New Brunswick and any loss would not affect the sustainability of the population.

Based on the information provided above, the planned prevention, mitigation and response measures, the lack of any SAR or SOCC in the LAA, and considering the significance criteria for residual environmental effects for the Vegetated Environment, the potential environmental effects of a Fire on the Vegetated Environment during all Project phases are rated not significant. There is a high level of confidence in this prediction.

8.17.3.8.2.3 Public Health and Safety

Public Health and Safety has to the potential to be affected should a fire spread from the PDA into surrounding forests. If meteorological conditions were such that a fire was to rapidly spread, there is risk to any resource users and cabin owners in the area both from fire and smoke inhalation. Any fire originating from Project activities would be reported immediately and the quick response time would limit the potential for uncontrolled spread. Utmost priority would be placed on the protection of human life, and all efforts would be made in conjunction with local fire fighting and emergency response personnel to evacuate potentially affected areas.

It is unlikely that a forest fire will originate from the Project site, and any fire that might occur would most likely be quickly extinguished as precautions will be taken in accordance with the *Forest Fires Act* and the fire prevention and response procedures through the ESMS document (*e.g.,* fire-fighting equipment will be kept and maintained on-site and workers will be trained in emergency response procedures).

A significant adverse residual environmental effect for Public Health and Safety is one where the Project directly and substantially endangers the safety of the public and/or Project employees to such an extent that an immediate danger exists to the life and/or health of the public and/or employees as a result of the Project, and for which planned design features, mitigation, or environmental management measures are unsuccessful at minimizing or eliminating the risks to public safety. In the worst case scenario of a large-scale forest fire resulting from Project activities, mitigation and environmental management can minimize the risk to public safety, but cannot fully eliminate these risks. For this reason, a Fire could result in a significant residual environmental effect to Public Health and Safety, but is highly unlikely to occur.

8.17.3.8.3 Determination of Significance

Despite the best planning, prevention, mitigation and response measures, a Fire could result in adverse environmental effects to all VECs. However, a Fire arising from the Project would be most likely confined to the PDA and the spread of a fire outside the PDA and causing environmental effects on a larger scale is unlikely. In consideration of the mitigation, prevention and response procedures to be put in place and the nature of the Project itself, the potential environmental effects of a Fire on the Terrestrial Environment and the Vegetated Environment during all Project phases are rated not significant. There is a high level of confidence in this prediction. Mortality of a SAR as a result of a Fire would be considered a significant environmental effect, but is unlikely to occur—the capacity of renewable resources will not be affected by the Project in this regard, given the low likelihood of occurrence.

A Fire, should one occur, could endanger the safety of the public and/or Project employees to such an extent that an immediate danger exists to the life and/or health of the public and/or employees as a result of the Project. Planned design features, mitigation, or environmental management measures would likely be successful at minimizing or eliminating the risks to public safety, and while mitigation and environmental management would minimize the risk to public safety, they cannot fully eliminate these risks. As such, the potential environmental effects of a Fire on Public Health and Safety during all phases of the Project are conservatively rated significant, but are highly unlikely to occur—the capacity of renewable resources will not be affected by the Project in this regard, given the low likelihood of occurrence. There is a high level of confidence in this prediction.

8.17.4 Overall Summary and Determination of Significance

SML will implement a number of design features, mitigation measures and operational practices intended to minimize the likelihood for accidents, malfunctions and accidental events to occur and/or the severity of such events if they did occur. Even with these measures in place, a number of potential events were deemed to be credible, and residual environmental effects on each of the identified VECs were assessed for worst-case scenarios. In all cases, worst-case scenarios and the resulting worst-case environmental effects that might arise from such scenarios were predicted to be unlikely to occur.

Table 8.17.11 summarizes the residual environmental effects predicted for each VEC for each accident scenario. Note that for most scenarios, it is assumed that these can occur during any Project phase. Overall, the environmental effects of most accidents, malfunctions and unplanned events during all phases of the Project are rated not significant, with a few exceptions where environmental effects are rated significant but are unlikely to occur.

Table 8.17.11 Summary of Residual Environmental Effects for Accidents, Malfunctions and Unplanned Events

VEC	Accident, Malfunction or Unplanned Event							
	Erosion and Sediment Control Failure	Pipeline Leak	On-Site Hazardous Materials Spill	Release of Off-Specification Effluent from Water Treatment Plant	Failure of Water Management Pond Pump	Off-Site Trucking Accident	Vehicle Collision	Fire
Atmospheric Environment	NS	NS	NS	NS	NS	NS	NS	NS
Acoustic Environment	NS	NS	NS	NS	NS	NS	NS	NS
Water Resources	NS	NS	NS	NS	NS	Ns	NS	NS
Aquatic Environment	NS	NS	NS	NS	NS	NS	NS	NS
Terrestrial Environment	NS	NS	NS	NS	NS	NS	S/U (SAR only) NS (all others)	S/U (SAR only) NS (all others)
Vegetated Environment	NS	NS	NS	NS	NS	NS	NS	NS
Wetland Environment	NS	NS	NS	NS	NS	NS	NS	NS
Public Health and Safety	NS	NS	NS	NS	NS	NS	S/U	S/U
Labour and Economy	NS	NS	NS	NS	NS	NS	NS	NS
Community Services and Infrastructure	NS	NS	NS	NS	NS	NS	NS	NS
Land and Resource Use	NS	NS	NS	NS	NS	NS	NS	NS
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	NS	NS	NS	NS	NS	NS	NS	NS
Heritage Resources	NS	NS	NS	NS	NS	NS	NS	NS
Transportation	NS	NS	NS	NS	NS	NS	NS	NS

Notes:
NS – Not Significant Residual Environmental Effect Predicted.
S – Significant Residual Environmental Effect Predicted.
U – Residual Environmental Effect is Unlikely to Occur.