

8 Effect of the Environment on the Project and Consideration of Accidents and Malfunctions

8. Effect of the Environment on the Project and Consideration of Accidents and Malfunctions

The CEAA requires an assessment of the potential effects that the environment may have on the project's construction and operation. Potential effects of this nature that could occur may be due to inclement weather conditions such as excessive precipitation and associated flooding in the river/lake, extremely cold winter weather, normal and extreme icing conditions and extremely hot summer weather. Other events that could potentially occur include earthquakes and forest fires. The potential for long-term impacts on the project due to climate change are assessed in Section 8.5.

8.1 Precipitation and Flooding

Unusually high flows (as a result of precipitation and/or snow melt) in the Muskoka River watershed during construction could potentially result in overtopping of the cofferdam and subsequent inundation of working areas, in addition to providing hazardous working conditions for the labour force working in the vicinity of the river. The temporary cofferdam and working platform around the tailrace will be designed and constructed to sufficiently handle a 1:20-yr flood event (i.e., not be overtopped). The contractor will be required to have an emergency response plan in place to deal with high water levels and flows which should floods approach the 1:20 yr one occur during construction (see Section 10.1) may require temporary evacuation of working areas.

Prior to operations, SREL will be required by MNR to have detailed Flood Emergency Procedures in place to deal with high water levels and flows during plant operations.

8.2 Extreme Winter Conditions

Construction is planned to proceed throughout the year, including the winter period. The project area can experience extremely cold conditions (see Section 2.1.1 for climate data). Extreme cold conditions could result in health and safety risks to the labour force (e.g., frost bite, hypothermia, etc) and inefficient or inoperable equipment. Extreme cold may also affect particular activities such as concrete pouring and proper setting. Contractors and workers to be employed for this project are expected to be predominantly from the regional area, accustomed to working under these conditions. They are expected to take the necessary actions to ensure proper concrete setting (appropriate winter clothing) to minimize winter weather effects.

Extreme winters could increase the potential for ice jams which are undesirable during operation and would make manipulations of stop logs impossible. However, the facility intake will be designed to enhance stable ice formation.

Ice storms, such as the significant storms that occurred in eastern Ontario and Quebec in 1998, could significantly affect on-site construction activities. Impacts could include loss of power to the site, unsafe working conditions and damaged/inoperable equipment, structural failure and ice damming, leading to flooding/inundation of the work area. However, ice storms of the severity of those experienced in 1998 are a very rare event, although storms of less severity may still have the potential to impact working conditions.

The contractor will be expected to have an emergency response plan in place to deal with worker safety relating to icing condition during construction. SREL will also develop emergency response procedures to deal with ice conditions during operation.

8.3 Extreme Summer Conditions

Extremely hot summer conditions may also pose health and safety risks to the labour force (e.g., sunburns, sun stroke, heat exhaustion during construction). Contractors will be expected to deal with this situation in developing their emergency response plan (e.g., recommending sun protection first and availability (see Section 10.1).

8.4 Earthquakes

The project area is located in the southern Ontario seismic zone, which has a low to moderate level of seismic activity (Earthquakes Canada, 2007a).

The 2005 National Building Code of Canada (NBCC) Seismic Hazard Calculation (Earthquakes Canada, 2007b) was used to determine the seismic hazard at the site. In this calculation, spectral and peak hazard values are determined for firm ground (NBCC 2005 Soil Class C – average shear wave velocity 360 to 750 m/s).

Seismic hazard is determined through consideration of spectral-acceleration (S_a) values at periods of 0.2, 0.5, 1.0 and 2.0 seconds. S_a is a measure of ground motion that takes into account the sustained shaking energy at a particular period. All parameters are expressed as a fraction of gravity. Ground motion probability values are given in terms of a 2% probability of exceedance over 50 years. This means that over a 50-yr period there is a 2% chance of an earthquake causing ground motion greater than the given expected value (Earthquakes Canada, 2007c).

Seismic hazard values for the study area are presented in Table 8.1. These values are to be considered with respect to the seismic hazard rating for the proposed structures (powerhouse and intake channels), as identified during pre-construction assessments.

Table 8.1 Seismic Hazard Values for Project Area

Sa (0.2)	Sa (0.5)	Sa (1.0)	Sa (2.0)	PGA (g)
0.185	0.112	0.056	0.018	0.084

Dam safety assessments will be completed using current seismic loading parameters based on current MNR standards and the incremental hazard classification for the dam. All new structures will be designed in accordance with the Ontario Building Code, CSA standards and/or MNR requirements as appropriate.

8.5 Climate Change and Other Weather Related Effects

Scientists estimate that global mean temperatures will warm an average of 2°C to 6°C by the year 2100. It is currently expected that warmer temperatures will result in an increase in droughts, floods, and the disruption of the environment via severe storms.

(See <http://atlas.nrcan.gc.ca/site/english/maps/climatechange/1> for additional climate change related information.)

Given the location of the North Bala Hydro Project one might expect that the potential temperature increases will result in wetter winter conditions and potentially more extreme summer storm events.

These conditions could result in higher flows in the Muskoka River watershed, which would provide more water and financial benefits to the project. The engineering design for the project will be based on a 1-in-10,000-yr flood event (critical structures not overtopped), which is normal engineering practice for a facility of this type.

Other weather related environmental conditions that could affect the project include drought and lightning strikes. Sustained drought within the watershed would result in reduced river flow, and a decreased quantity of water available for power generation (more flow passed over the falls if the river flow is below the minimum station capacity). This could adversely affect the economic viability of the project. Lightning strikes to electrical equipment could damage or incapacitate the equipment. Depending on the severity of the event, it could affect the ability of the station to transmit power to the provincial grid until repairs are made.

8.6 Accidents and Malfunctions

CEAA requires consideration of the environmental effects of accidents and malfunctions during project operation.

Failure of the dam(s) is an extremely unlikely event, but could release a significant amount of water into the downstream reaches over a short period of time. This could result in a significant short-term flow and a water level increase downstream from the facilities. Failure of the dam would not be expected to impact facilities downstream of this location. A dam failure of this sort would preclude full operation of the facility(s) until the weir(s) could be replaced to reinstate the head pond and fully submerge the intake(s). High flow events after a failure of this type would not pose any additional risk to the facility, as it would be passed through the main river channel.

As noted in Section 8.1 a detailed Flood Emergency Response Plan is required by MNR to be prepared by SREL. This plan would also address failure of the dam as, in all likelihood, other mitigation measures would already be activated (i.e., notifications to OPG and emergency personnel due to high water levels or flows) prior to dam failure.

Failure of the transmission system would require that the station be shut down until repairs were undertaken. This would affect project revenues until repairs were completed.

As noted in the previous section, a detailed Emergency Preparedness Response Plan will be prepared for each facility, which outlines the actions required to respond to these potential events.