APPENDIX B

POTENTIAL EFFECTS IDENTIFICATION MATRIX
FOR
CONSTRUCTION AND OPERATION

Potential Effects Identification Matrix for Construction and Operation

Criteria	Potential Level of Effect						Comments, Rationale	Mitigation Measures
	-H	-L	Nil	Unk	+L	+H		
General Natural Environment Considerations								
Air quality, including GHG Offsets		X			X		• Potential adverse effects during construction due to equipment exhaust, smoke from burning waste materials and dust emissions. • Potential adverse effects during operations due to diesel generator emissions. • Potential positive effects due to GHG offsets.	• Standard construction site best management practices to minimize air emissions due to exhaust, waste burning and dust. • Diesel generator operates very infrequently (typically only in emergency situations).
Water quality or quantity (surface water)		X					• Potential adverse effects on water quality during construction due to erosion and sedimentation and accidental spills. • Potential effects on water quality during operation due to shoreline erosion, inundation of terrestrial land in head ponds (e.g., nutrients, mercury inputs) and accidental spills. • Change to flow volume through bypass reach. Potential for downstream impacts to fish habitat based on changes to the magnitude, frequency, duration and timing of flows relative to the existing condition	• Standard construction site best management practices to control erosion and sedimentation and prevent accidental spills from occurring. • Spill prevention and containment measures to be in place throughout operational period. • Areas of shoreline erosion susceptibility will be identified as part of the EA and the necessity for erosion monitoring and shoreline protection works will be determined. •shoreline erosion protection if necessary will be utilized on sensitive areas. • Increase above ambient river level and clearing of vegetation in proposed head ponds to limit nutrient availability in inundated area. • Determine volume required through bypass reach on basis of biological needs. Potential modification to the magnitude , frequency and duration of peaking events particularly as it relates to critical downstream habitats and the timing of flows in relation to critical life stage activities such as spawning

Water quality or quantity (groundwater)		X					• Potential adverse effects on groundwater quality during construction due to accidental spills. • Potential decreases in local groundwater quantity during construction due to groundwater leakage into project excavations.	• Standard construction site best management practices to prevent accidental spills and manage groundwater.
Species at risk and their habitat				X			• Currently unknown if species at risk or their habitats would be adversely affected by the development since site specific inventories have not been completed yet. A search of the NHIC's Biodiversity Explorer database indicates the presence of Species at Risk in the general vicinity of the projects as follows: Peregrine Falcon (*Falco Perigrinus*) however the presence of suitable habitat is not known at this time.	• EA will determine whether suitable habitat is present in study area • Baseline inventories will be conducted on several occasions in 2010 to document the presence/ absence of species at risk – potential effects and required mitigation will be assessed subsequently in co-operation with MNR. ESA Permit/Agreements discussions to be initiated shortly, if required.
Significant earth or life science features			X				• Background search revealed no natural areas significant plant communities, wildlife concentration area, ANSI's and Provincial Parks within a 10 km grid surrounding the proposed dam site.	• N/A
Land subject to natural or human-made hazards				X			• It is currently unknown if any natural hazards exist at the proposed development sites.	• Field investigations will be conducted to assess presence/ absence of natural hazards (e.g., significant existing erosion areas).
Terrestrial wildlife (including numbers, diversity and movement of resident or migratory species)		X					• Terrestrial wildlife could be affected by loss/fragmentation of habitat (associated with construction of site facility and associated infrastructure, headpond creation, etc.), and disturbance associated with construction and operations of the proposed facility.	• Habitat loss associated with the project will be minimized to the greatest extent possible. • Mitigation measures will be developed to minimize potential effects on terrestrial wildlife from loss/ fragmentation of habitat and disturbance. • Analysis of habitat loss to inundation will consider the availability of equivalent habitat immediately outside of the zone of influence of the proposed undertaking

Natural vegetation and terrestrial habitat linkages		X					• Natural vegetation and terrestrial habitats could be affected by clearing associated with construction of site facility, roads, transmission lines and associated infrastructure, headpond creation, and accidental spills/malfunctions.	Extent of clearing associated with the project will be minimized to the greatest extent possible. • Other best management practices including limiting corridor widths, signage for wildlife crossing etc. will be considered to minimize potential impacts.
Soils and sediment quality		X					• Soil and sediment quality could be adversely affected by excavation and removal, compaction, loss due to fugitive dust or erosion or accidental spills during construction or operation.	Construction site best management practices will be implemented for erosion and sedimentation control, dust management and prevention/ containment of accidental spills to limit the potential for adverse effects on soil and sediment quality.
Significant natural heritage features and areas				X			• Background search revealed no natural areas, significant plant communities, wildlife concentration area, ANSI's and Provincial Parks within a 10 km grid surrounding the proposed dam site.	• Field studies will be conducted in 2010 and significance of identified habitats will be determined. • Mitigation measures will be developed to minimize potential effects on any representative features.
Other (specify)				X			• No other components identified to date.	• N/A
Aquatic and Riparian Ecosystem Considerations								
Shoreline dependant species	X						• Shoreline dependant riparian vegetation will be impacted by the creation of an inundation area.	• It is not possible to mitigate this effect. • Natural regeneration of shoreline habitat will eventually restore these areas for use by shoreline dependent species.
Wetland dependant species				X			• It is currently unknown if any wetlands exist at the proposed development sites.	• Field investigations will be conducted to assess presence/ absence of wetlands.

Fish habitat		X					• Fish habitat could be affected by in-stream structures (e.g.dams, tailrace excavations, temporary cofferdams and dewatering, water crossings on access roads and transmission lines), changes in flow (bypass reaches) and water level (headponds) and sedimentation. Run-of-river with peaking (modified) mode of operation may create changes in flow and water levels downstream. •There are a number of tributaries where the backwater effect of the headpond inundation could alter stream habitat at the mouths of these tributaries	• Fish habitat mitigation and compensation measures will be developed in discussions with MNR and DFO to ensure no net loss of the productivity of fish habitat as a result of the project. • Bypass flow to be determined based on biological need with MNR/DFO. • The compensation agreement with DFO will need to consider this change in habitat type as part of the overall strategy for dealing with fish habitat loss. • The EA fieldwork will document if this habitat is being used by spawning walleye. Compensation for habitat loss may be required • These tributaries will be investigated to determine the significance of habitat and whether significant habitat would be altered. Where habitat alteration is predicted, it is not possible to mitigate this effect. The compensation agreement with DFO will need to consider this change in habitat type as part of the overall strategy for dealing with fish habitat loss.
Fish migration				X			•The dams could potentially block the movement of fish.	• Fisheries investigations will be undertaken to determine where critical spawning habitats are located and if the dams would block migration to these habitats.
Fisheries		X			X		• Headponds may result in an overall increase in the amount of aquatic habitat available.	• Although the habitat may be increased, it will represent a change in habitat type vs riverine habitat. • This must be discussed with DFO and MNR as part of the overall strategy for dealing with fish habitat loss.

Erosion and sedimentation	X						• Potential for erosion and sedimentation due to construction activities. • Potential for long term bank erosion due to water level and flow management activities.	• Assessment and mitigation measures noted above are intended to assess the potential for changes to fisheries and mitigation significant changes to the extent possible.
Fish injury or mortality (impingement and entrainment)		X					• Potential for some impingement on trash racks and entrainment and mortality through turbine flows.	• Inflow velocities will be compared with swimming capabilities of fish species of concern to determine the likelihood of impingement or entrainment. If a significant impact is predicted it may be necessary to adjust intake velocities to minimize impingement and entrainment potential or to consider diversion methods for fish. • Determine expected turbine mortality using manufacturers
Flows and movement (surface or groundwater)	X	X					• Flows through bypass reaches will be reduced due to diversion of flow through the powerhouse. Flows downstream will be impacted due to the proposed peaking operation strategy	• Field investigation to determine amount and function of habitat in bypass reaches and downstream during peaking operations. • Flow in bypass reaches and downstream of facility established on basis of maintaining biological function
Drainage, flooding and drought patterns		X					• Minor changes in local drainage will occur due to facility, lay down, access road and transmission line construction. • Extreme flood levels may be somewhat higher in the headponds due to the water level increase.	• A drainage network will be installed around the facility to ensure adequate site drainage. • Facility will be constructed to meet flood passage requirements.
Water temperature		X					• Changes in water temperature in headpond due to increased surface area and slower flow velocity anticipated to be negligible.	• No mitigation required – overall thermal regime of the river not likely affected.
Other (specify)				X			• No other components identified to date.	• N/A

Aboriginal Community Considerations								
First Nation reserves or other Aboriginal communities				X			• It is not known at this time if operation of the project will have an adverse effect on local Aboriginal communities	• Potentially affected First Nations will be consulted and mitigation undertaken as required.
Spiritual, ceremonial, cultural, archaeological, or burial sites				X			• Disturbance to spiritual, ceremonial, cultural, archaeological or burial sites could occur during construction and operation activities.	• Aboriginal consultation to identify local resources will be conducted to mitigate potential negative issues. Stage 1 and 2 archaeological assessments will be completed to identify local resources (or resource potential).
Traditional land or resources used for harvesting activities				X			• Effects to the aquatic and terrestrial environment (discussed above) may result in negative effects to traditional lands and resources used for harvesting activities	• Mitigation measures, as appropriate, are provided above.
Employment					X		• Construction and operation of the project near a will result in opportunities for employment of community members.	• N/A
Lands subject to land claims			X				• There is no known land claim.	• N/A
Economic development				X			• Unknown	To be determined
Other (specify)				X			• No other components identified to date.	• N/A
Land and Resource Use Considerations								
Access to inaccessible areas (land or water)		X					• Access road upgrading to accommodate construction equipment and material delivery will result in improved access to the areas by land. Access to the area by water will remain as is.	• Public access to the construction area will be prohibited to ensure public safety. Portage routes around the project could be constructed where required to ensure safe passage around during construction and operation.

Navigation	X						• Navigation and portage routes could be affected by the proposed developments	• Existing portage routes will be identified, and a commitment will be made to maintain or temporarily re-route portage routes during construction to ensure safe passage around the sites for canoeists/kayakers. Portage routes will be restored/ maintained during operation.
Riparian rights or privileges				X			• The project area, including the headpond shoreline will exist on provincial and private lands. At present, effects to riparian resource use are not known.	• Consultation with stakeholders will determine appropriate mitigation.
Recreational use – (land or water)				X			• Scenic attractions and aesthetic or recreation features along will be assessed. The full extent of effects to recreational use will be determined in consultation with project stakeholders.	• Additional mitigation measures will be determined in consultation with project stakeholders.
Angling and hunting opportunities				X			• The extent of hunting and angling use within the project area is currently unknown; however these activities likely take place in the vicinity.	• Effects to angling and hunting opportunities will be determined in consultation with project stakeholders. • Appropriate mitigation measures will be determined based on stakeholder consultation.
Trapping activities				X			• If the project is located within licensed trapping area(s), project construction and operation, including headpond filling may result in adverse effects to harvest success.	• The current use of the area for trapping will be determined during stakeholder consultation • Appropriate mitigation measures will be determined based on stakeholder consultation.
Baitfish harvesting activities				X			• Current harvesting sites are unknown. If harvesting is going on then some effects could occur during construction.	• Consultation will be required with bait fishermen to identify harvesting areas and assess effects.
Views or aesthetics				X			• Construction and operation of the project will result in a change to aesthetics of the area. The determination of this effect as positive or negative is subjective.	• Requirements for compensation flow or other aesthetic requirements will be determined in consultation with project stakeholders and in consideration of area usage (based upon a visitor usage survey).
An existing land or resource management plan			X				• The study area lies within the Abitibi River Forest management Plan.	• To be determined

An existing water management plan			X				• There is an existing water management plan for the Serpent River.	• An amendment to the existing WMP will have to be made prior to operation of the new site.
Protected areas				X			• Unknown at this known	• To be determined.
Other (specify)				X			• No other components identified to date.	• N/A
Cultural Heritage Resources Considerations								
Archaeological sites				X			• Archaeological sites are known to exist within the project area.	• Stage 1 and 2 archaeological assessment will be completed to determine potential effects. • Appropriate mitigation measures will be proposed based on assessment findings as required.
Buildings or structures			X				• There are no structures within the area of influence.	• Appropriate mitigation measures will be proposed as required.
Cultural heritage landscapes				X			• It is unknown whether a cultural heritage landscape assessment will be required for the project.	• Appropriate mitigation measures will be proposed based on assessment findings as required.
Other (specify)				X			• No other components identified to date.	• N/A
Social and Economic Considerations								
The Location of people, businesses, institutions, or public facility				X			• Social economic resources to the community will be identified. Potential effects will be determined in consultation with local residents, business owners and other stakeholders.	• Appropriate mitigation measures will be determined based on stakeholder consultation.
Community character, enjoyment of property, or local amenities				X			• Effects to community character, enjoyment of property and local amenities are unknown.	• To be determined
Employment					X	X	• The construction and operation of the project will require local and non-local employment based on qualification.	• N/A

Public health and/or safety		X					• Construction and operation of the project will pose public safety concern and risk.	• Prevention of public access to the construction site through use of signage, gates and fencing among other security procedures as required. • Proper barriers and warning devices installed following construction to restrict public access to intake/tailrace areas during operation, including safety booms, fencing and signage.
Local, regional, or provincial economies					X	X	• Economic benefits will include employment, expenditures on materials, equipment and services, contribution of renewable energy to the Provincial supply mix.	• N/A
Tourism values				X			• See “Recreational Use” above.	• N/A
Water supply				X			• It is currently unknown whether the Serpent River is a water supply for local communities. For potential effects to water quality, please see “Water Quality or Quantity” above.	• Appropriate mitigation measures will be proposed as required.
Aesthetic image of the surrounding area				X			• See “Views or Aesthetics” above.	• N/A
Other (specify)				X			• No other components identified to date.	• N/A
Energy/Electricity Considerations								
Reliability (e.g. voltage support)					X		• New power generation units are of a relatively small capability, and operation of them in parallel with the existing power grid will provide minor impact on the overall power system reliability and power quality - voltage and frequency.	• N/A • Appropriate mitigation technical measures will be proposed in protection and control to minimize a power outage.

Security (e.g. Black Start)						X	• Operation of the projects will improve distribution customer service reliability in this area. The power generation units will be able to provide a black start and island mode of operation (assuming that is allowed by HONI) to continue to supply or electrically energize in a safe, controlled and reliable manner, part of the distribution system, including customer load that is separated from the rest of distribution system.	• The island mode of operation could require the change of the interconnection protection and control scheme/settings in the HONI distribution system. Further consultation with HONI required.
Electricity flow patterns				X			• Operation of the new power generation units will redistribute power flow in the existing distribution system.	• Appropriate mitigation technical measures will be proposed in the control system of the power grid and new generation units if required.
Other (specify)		X		X			• Operation of the new power generation units will affect existing protection and control settings in the distribution system. • Oil filled electrical and mechanical equipment can potentially spill oil into the Environment.	• Appropriate mitigation technical measures will be proposed in protection and control system of the power grid. • Appropriate preventive measures will be proposed to eliminate the risk.