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.	• 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. • Peaking operations will be modified to the extent required to adequately limit and control erosion and water level fluctuations in the area of the project. • 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

							• 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	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			• Only bird SAR known from the project study area	• EA will determine whether suitable habitat is present in study area. • Baseline inventories were conducted 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 Agreements discussions to be initiated shortly after distribution of this document.
Significant earth or life science features				X			• Search of the Ontario Biodiversity Explorer (NHIC on-line database) indicates that there are no documented occurrences of Significant earth or life science features (ANSIs) in the study area	• The results of 2010 field investigations will be assessed for presence/ absence of significant earth or life science features.
Land subject to natural or human-							• It is currently unknown if any	• Field investigations will be

made hazards				X			natural hazards exist at the proposed development sites.	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, head pond 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, powerlines and associated infrastructure. head pond creation, etc., 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			• It is currently unknown if any natural areas significant plant communities, wildlife concentration area, etc. exist within a 10 km grid surrounding the proposed dam site.	• Field studies were 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	• N/A

							to date.	
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 non-bedrock shoreline habitat will eventually restore these areas for use by shoreline dependent species. • Exposed bedrock vegetation communities cannot be re-created
Wetland dependant species				X			•.Small areas of wetland exist at the proposed development site	•. The wetlands will be further described based on field investigations conducted in 2010
Fish habitat	X						• Fish habitat could be affected by in-stream structures (e.g. dam, tailrace excavations, temporary cofferdams and dewatering, water crossings on access roads and powerline), changes in flow (bypass reach) and water level (head pond) and sedimentation. • Approximately 8 km of riverine habitat will be replaced by lacustrine habitat due to inundation associated with the head pond. • There is potential for walleye spawning habitat at the base of Wanatango Falls to be impacted by the diversion of water away from this habitat to the turbines.	• 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. • 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. • 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

							• There are a number of tributaries where the backwater effect of the head pond inundation could alter stream habitat at the mouths of these tributaries. The changes in magnitude, frequency, duration and timing of flow relative to the existing condition could impact in fish habitat for an unknown distance downstream of the facility.	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. • Identify critical downstream habitats within zone of influence (TBD) and consider 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
Fish migration				X			•The dams could potentially block the movement of fish.	• Fisheries investigations have been undertaken to determine where critical spawning habitats are located and if the dams or operating strategies would block migration to these habitats.
Fisheries	X				X		• Head pond may result in an overall increase in the amount of aquatic habitat available.	• Although the amount may be more it will be lacustrine 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.	• Standard construction site best management practices to minimize erosion and sedimentation potential during construction. • Bank stabilization measures, as required, on very susceptible erosion sites.

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 published formulas with site and facility characteristics.
Flows and movement (surface or groundwater)		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 limited peaking operation strategy	• Field investigation to determine amount and function of habitat in bypass reaches and downstream during limited 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 powerline construction. • Extreme flood levels may be somewhat higher in the head ponds 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 head pond 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				X			• It is not known at this time if	• Potentially affected First Nations

Aboriginal communities							operation of the project will have an adverse effect on local Aboriginal communities.	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. A Stage 1 has been completed and a Stage 2 Archaeological Assessment 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 an Aboriginal community will result in opportunities for employment of community members.	• N/A
Lands subject to land claims				X			• There is no known land claim in the area of the project.	• Consultation with government agencies (provincial and federal) and the Aboriginal communities will be undertaken to confirm that no land claims exist.
Economic development					X		• Unknown	To be determined through consultation.
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. The necessity of barriers

								to access along powerline routes will be discovered in the consultation program
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. Consultation with Transport Canada will be undertaken.
Riparian rights or privileges		X					• The project area, including the head pond shoreline will exist on provincial and private lands. At present, the degree of effects to riparian resource use are not known but can be assumed to be low.	• 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 within the project area is currently unknown; however it is assumed to take place in the vicinity Recreational use of the river, including angling, is very light. Angling pressure reaches a peak in late May and drops off sharply for the remainder of the year (Nowak and MacRitchie 1984).	• Effects to current 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					• The project area is located within licensed MNR trapping line CC033. Project construction and operation, including head	• The current use of the area for trapping will be determined during stakeholder consultation • Appropriate mitigation measures

							pond filling may result in adverse effects to harvest success. • The project area also overlaps with two Bear Management Areas (CC-30-011 and CC-30-016)	will be determined based on stakeholder consultation.
Baitfish harvesting activities		X					• The project area occurs within licensed Baitfish Harvest Area C02249. Impacts 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 Abitibi River. The effects of this project proposal are unknown at this time.	• Consultation with the Steering Committee for this plan will be undertaken. 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.	• A Stage 1 has been completed and a Stage 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							• Structural resources potentially	• Appropriate mitigation measures

				X			affected by the project are currently unknown.	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 facilities				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 mitigation measures such as signage, gates and fencing and/or other security procedures as required. • Proper barriers and warning devices installed following construction to restrict public access to intake/tailrace areas during operation may include such safety measures as safety booms, fencing and signage.
Local, regional, or provincial economies				X	X	X	• Economic benefits will include employment, expenditures on materials, equipment and services, contribution of	• Consultation program with local or regional recreational businesses will be undertaken.

							renewable energy to the Provincial supply mix. It is unknown if there is potential to effect any local businesses related to recreational or other activities that may be impacted by the facility	
Tourism values				X			• See "Recreational Use" above.	• N/A
Water supply				X			• It is currently unknown whether the Frederick House River is a water supply for local communities. For potential effects to water quality, please see "Water Quality or Quantity" above. It is also unknown if groundwater is used in the area for water supply	• Water supply information will be collected. 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	• The island mode of operation could require the change of the interconnection protection and control scheme/settings in the HONI

							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.	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.