

## 10. Environmental Monitoring Programs

Environmental monitoring is proposed before, during and after Project development activities take place. Monitoring programs have been developed for the following three phases of the Project:

- pre-construction period
- construction period
- post-construction operational period.

Pre-construction monitoring establishes the baseline within the Project Area in terms of the biological and social environments, and ensures that all environmental commitments required prior to construction have been met. Construction monitoring ensures that the construction activities proposed are undertaken in an environmentally responsible manner in accordance with the ER, contractor specifications and terms and conditions of permits and approval and verifies that mitigation is meeting performance objectives and identifies the need for implementation of contingency plans if it is not. Operational monitoring is used to verify predictions of effects and to confirm the effectiveness of mitigation measures, as well as identify the need for implementation of remedial action in the event that mitigation is not effective in meeting performance objectives, or unanticipated unacceptable negative effects are identified for which mitigation was not specified.

The monitoring measures, contingency plans and monitoring triggers identified in this section may be refined/revised during the subsequent approval and permitting review periods.

### 10.1 Pre-Construction Phase

Pre-construction monitoring typically starts at or before the initiation of the Class EA process and is used to establish the baseline biological and social environmental conditions within the Project Area. This information, together with the project development details, forms the basis of the assessment of effects noted elsewhere in this report, and leads into the need for and development of mitigation measures. Pre-construction monitoring also involves ensuring that the requisite approvals and permits are procured by the appropriate parties and proper procedures such as emergency and safety plans are developed/documented and in place. Table 10.1 lists the activities which are included in the pre-construction monitoring phase.

**Table 10.1 Pre-construction Monitoring Phase Tasks**

Item	Description
Baseline Studies	- Ensure that baseline studies have been completed, including Olive-sided Flycatcher breeding studies in spring 2013.
Environmental Permits and Approvals	- Ensure requisite permits and approvals are obtained (See list in Section 11).

Item	Description
Tender Specifications	- Incorporate all Contractor obligations as per the ER document, conditions of permits and approvals and other technical requirements.
Contractor Obligations	- Ensure obligations in the tender are met prior to start of construction.
Ministry of Labour Notice of Project	- Ensure that Contractor(s) has submitted a "Notice of Project" to the Ministry of Labour.
Photographic record	- Prepare photographic record of existing environment prior to construction.
Sediment and Erosion Control Plan Drawing	- To be prepared by Contractor and made available for DFO, MNR and MOE review prior to the commencement of site works.
Spill Response and Clean-up Plan	- To be prepared by Contractor prior to the commencement of site works.
Emergency Preparedness Plan	- To be prepared by Contractor prior to the commencement of site works
Water Quality Monitoring Plan	- To be prepared to identify all water quality monitoring programs to be implemented during construction.

## 10.2 Construction Phase

Table 10.2 lists the activities which are included in the construction phase monitoring (including aggregate pits, but the complete aggregate pit monitoring program is discussed in Section 10.4). Monitoring is an important component of an overall mitigation strategy. Monitoring is conducted to 1) confirm that the mitigation is installed, operated and maintained as designed (e.g., sediment and erosion controls are installed per the design in the Erosion and Sedimentation Control Plan, waste is managed in accordance with the Waste Management Plan) and to 2) confirm that the mitigation measures are meeting their performance objective (e.g., settling ponds are achieving the designed decrease in turbidity prior to discharge of water back to the receiving watercourse).

Environmental compliance monitoring is undertaken during construction by a designated Environmental Inspector employed or retained by Northland to ensure that the Contractor is abiding by all federal and provincial laws and regulations, the terms and conditions of any environmental permits and the mitigation commitments made in this ER, as well as any other plans prepared (i.e., Erosion and Sedimentation Control Plan, Spill Prevention and Response Plan and Waste Management Plan). In this regard, the Environmental Inspector will have a checklist of monitoring components to conduct on weekly, monthly or other scheduled intervals, as well as some items on an as-required basis. More information on the construction monitoring components and frequency is provided in Table 10.2.

The Environmental Inspector will report the results of all inspections in an activities log. When inspections identify deficiencies in the either the original installation/application of the mitigation (i.e., mitigation not installed in accordance with specifications), the Environmental Inspector will order the Contractor to remedy the situation by re-installing or re-applying the mitigation until it

is correct. If the Environmental Inspector observes that the mitigation is installed correctly, but not meeting performance objectives, a contingency plan will be implemented with the mitigation being altered as necessary to ensure performance objectives are met. Mitigation will be discussed with CLFN and expert Regulatory Authorities (e.g., MNR or MOE). In addition, if at any time during construction, any mitigation measure is not functioning as intended, Northland or an agent working on their behalf will immediately notify the relevant federal and provincial authorities. Work within a particular area, or a particular task may need to cease until different mitigation is designed and proven effective, to prevent additional negative effects on the environment. Additional monitoring measures (e.g., greater frequency or different methodology) may have to be specified to ensure that negative effects do not occur.

Monitoring results will be reported to the agencies (e.g., MNR, MOE) on a regular basis as required by subsequent permits and approvals or as agreed upon with the local MOE, MNR or other agency offices. Any event of non-compliance will be reported to MNR and other appropriate agencies.

The Environmental Inspector's Activity Log will be available to agencies upon request. Northland will stay in communication with these agencies throughout the construction period to ensure that agency staff are aware of the activities that are occurring on the site.

Finally, a CLFN Liaison Committee will be established to periodically meet with Northland representatives (e.g., once per month during construction and once per year during operations), review existing site conditions at the time, review the results of monitoring reports and make recommendations for any additional monitoring or remediation works that may be necessary in the eyes of the Liaison Committee.

### 10.3 Post-Construction (Operational) Phase

Post-construction monitoring occurs after all the infrastructure is in place and the facilities are operational. Information obtained from this phase of monitoring serves to verify predicted operational impacts and also serves to evaluate the effectiveness of implemented mitigation measures. Table 10.3 summarizes proposed post-construction monitoring. Post-construction monitoring will be the responsibility of Northland to implement in accordance with Table 10.3, and the conditions of any permits or approvals that may specify monitoring measures. An Operational Environmental Monitoring Report (OEMR) will be prepared and submitted annually for a minimum of 3 years post-construction to the federal agencies, and any other interested provincial agencies.

In addition, if at any time during operations, any mitigation measure is not functioning as intended, Northland or an agent working on their behalf will immediately notify the relevant provincial and federal authorities.

### 10.4 Aggregate Pit Monitoring

Many of the monitoring requirements identified in Table 10.2 and 10.3 apply to the proposed aggregate pit. However, the components of the aggregate pit monitoring program are specifically identified in Table 10.4. The monitoring program will be the responsibility of the Environmental Inspector (during construction) and of Northland (post-construction). The

aggregate pit monitoring program is designed to ensure compliance with the terms and conditions of the aggregate permits for each site, ensure that pit operations are not having unanticipated impacts on the surrounding environment, and ensure that pit rehabilitation is successful in preventing ongoing effects following pit closure. Additional monitoring requirements may be identified during the permit application process under the Aggregate *Resources Act*.

General monitoring conducted by the Environmental Inspector will be reported along with the other monitoring conducted for the Project on a weekly basis. However, a specific Compliance Assessment Report will be prepared for each pit on an annual basis when the pit is in operation, and will be filed with the MNR no later than September 30, each year.

Table 10.2 Environmental Monitoring Program During Construction

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency	Monitoring Timing	Remedial Action	Reporting	
<b>General Environmental Protection Monitoring</b>								
General Environmental Protection	Compliance with Plans	Compliance with approved plans, drawings, protocols, tender, ER and permit and approval specifications.	Owner's Construction Supervisor and/or Environmental Inspector will review all site activities on an on-going basis and meet with the contractor on a weekly basis to ensure that the contractor is in compliance with requirements.	On-going with one formal meeting per week	Throughout duration of construction period.	If contractor is not in compliance, actions will be taken by the owner/owner's representative and contractor as necessary to ensure actions are compliant with environmental requirements.	Results of this monitoring will be documented in a weekly environmental inspection report.	
	Waste Management	Ensure all employees and contractors receive appropriate training in waste management protocols (as identified in the Waste Management Plan to be prepared) as part of standard site orientation.	A record of training will be maintained to document training received by employees and contractors – training log to be reviewed by the Environmental Inspector.	Reviewed periodically, particularly when new contractors or employees commence activity at the site.	Throughout duration of construction.	If employees/contractors are working on site without having received proper training in waste management, they will be instructed to stop work until such time as they have been trained.	Monitoring will be reported in weekly environmental inspection report.	
		Ensure that the contractor is management waste in accordance with the approved Waste Management Plan.	Owner's Environmental Inspector will review all site waste management activities on an on-going basis and meet with the contractor on a weekly basis to ensure that the contractor is in compliance with requirements.	On-going, with one formal check of waste management per week and one formal meeting with Contractor per week.	Throughout duration of construction period.	If contractor is not in compliance, actions will be taken by the owner/owner's representative and contractor as necessary to ensure actions are compliant with environmental requirements.	Results of this monitoring will be documented in a weekly environmental inspection report.	
	Spill Prevention and Response		Ensure all employees and contractors receive appropriate training in spill prevention and response protocols as part of standard site orientation.	A record of training will be maintained to document training received by employees and contractors – training log to be reviewed by the Environmental Inspector.	Reviewed periodically, particularly when new contractors or employees commence activity at the site	Throughout duration of construction.	If employees/contractors are working on site without having received proper training in spill response and reporting protocols, they will be instructed to stop work until such time as they have been trained.	Monitoring will be reported in weekly environmental inspection report.
			Ensure all refuelling and maintenance occurs in designated areas.	Refuelling and maintenance practices will be monitored by Environmental Inspector.	Once per week (to monitor designated areas) and as required during site inspections when refuelling/maintenance activities are occurring	Throughout duration of construction.	If improper refuelling or maintenance practices are observed, the contractor will be instructed to adhere to established protocols – monitoring by Environmental Inspector to become more frequent following an incident of non-compliance.	Monitoring observations and recommended actions will be documented in the weekly environmental inspection report.
			Ensure all hazardous materials stored in designated locations.	Construction area will be visually assessed by Environmental Inspector to ensure all hazardous materials are stored in designated storage locations.	Once per week	Throughout duration of construction period when hazardous materials are used on site.	If hazardous materials are being stored outside designated areas, the contractor will be instructed to properly store materials. Follow up monitoring conducted as necessary to ensure actions completed to satisfaction of engineer.	Hazardous material storage monitoring will be documented in the weekly environmental inspection report.
			Monitoring integrity of secondary containment around storage areas.	Visual inspection of containment areas by Environmental Inspector to assess integrity.	Once per week	Throughout period that containment areas are in use.	If in the opinion of the Environmental Inspector and the Owner's engineer, the containment areas are not sufficient, remedial action will be initiated to ensure adequacy. Follow up monitoring conducted as necessary to ensure actions completed to satisfaction of engineer.	Containment area monitoring will be documented in the weekly environmental inspection report.

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency	Monitoring Timing	Remedial Action	Reporting
		Monitor equipment containing fluids and fuel vessels, lines and hoses, and all heavy equipment.	Equipment operators to visually monitor equipment to ensure it is not leaking or prone to leaking fluids.	Daily	Throughout the duration of construction.	If leaks are observed, the piece of equipment will be shut off and removed from sensitive areas until such time as the leak is repaired.	Remedial actions will be documented in the weekly environmental inspection report.
		Monitor work area for signs of contamination.	Work area will be monitored by Environmental Inspector for signs of contamination (e.g., fluid stains, dead or stressed vegetation) prior to site remediation.	Once.	Following completion of construction, prior to site restoration.	If contamination is observed, the contaminated soil will be removed and disposed of as per provincial and federal regulations.	Monitoring will be documented in the weekly environmental inspection report.
<b>Natural Environment Monitoring</b>							
Soil	Sediment and erosion control measures	Adequacy in preventing erosion and sedimentation	All construction areas will be visually assessed by a designated Environmental Inspector to determine the adequacy of the sediment and erosion control measures.	Once per week, prior to major rainfall and snowmelt events, and after every rainfall and snowmelt event.	Throughout the duration of the construction period.	Requirement for remedial action will be at the discretion of the environmental inspector.	Sediment and erosion control measure adequacy will be reported in a weekly environmental inspection report.
		Silt Fences	Visual inspection of all silt fences by Environmental Inspector to ensure they are properly constructed and to assess sediment accumulation behind the fence.	All silt fences will be inspected once per week and after every rainfall.	Monitoring will occur as long as the silt fences remain in place.	Silt fences must be repaired immediately if they are found to have failed.  Sediment must be removed if it accumulates to half the height of the geotextile material.	Silt fence status will be reported on a weekly basis in the environmental inspection report.
		Stockpiles	Visual inspection of all soil stockpiles for erosion by Environmental Inspector.	Once per week.	Throughout the duration the stockpile is in place.	Take action when necessary to control erosion.	Stockpile status will be reported in a weekly environmental inspection report.
		Check dams	Visual monitoring by Environmental Inspector to ensure check dam integrity, assess functionality and measure sediment accumulation.	Once per week and after every rainfall and significant snowmelt.	Throughout the duration the check dam is in place (if temporary).	Remedial action will be initiated if it is observed that rocks have been redistributed in a manner that would affect functionality and/or if erosion (e.g., bank slumping, down cutting of the channel) is observed. Sediment should be removed from the upside side of the check dam when accumulation becomes visible.	Check dam status will be reported in a weekly environmental inspection report.
		Limit of work flagging/restriction devices	Limit of work devices will be inspected by the Environmental Inspector around the construction site to ensure they are in place and that the contractor is adhering to them.	Once per week.	Throughout the duration of the construction period.	Construction site boundaries will be flagged or other restriction devices installed if they are found to not be in place.  Importance of adherence to limit of work boundaries will be reinforced with contractor if they are not being adhered to.	Limit of work boundary status will be reported in a weekly environmental inspection report.

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency	Monitoring Timing	Remedial Action	Reporting
	Revegetation	Adequacy of revegetation	Revegetation areas will be visually monitored by Environmental Inspector or suitably trained Designate to determine the adequacy of vegetation growth in preventing/minimizing erosion.	Three times per year (spring, summer and fall).	Three years following initial revegetation – provided adequate vegetation is achieved by at least the final year of monitoring.	If adequate vegetation (i.e., > 80% surface area coverage) is not observed in the rehabilitated areas prior to the end of the first growing season, other erosion protection measures will be implemented to ensure the area will remain stable over the winter and early spring.	Vegetation monitoring conducted during the construction period will be documented in the weekly environmental inspection reports.  Vegetation monitoring conducted during the operational period will be documented in the annual monitoring reports (see Table 10.3).
	Riverbank stability	Stability of river banks at each development site	River banks in immediate vicinity of each site will be visually monitored for stability by the Environmental Inspector.	Once per week, prior to major rainfall and snowmelt events, and after every rainfall and snowmelt event.	Throughout the duration of the construction period.	Remedial action will be undertaken as necessary to stabilize banks.	Bank stability monitoring will be documented in weekly environmental inspection report.
		Stability of banks during head pond filling	River banks along the head ponds will be visually monitored by the Environmental Inspector or suitably trained Designate for signs of instability, including slumping or mass erosion.	Daily during head pond filling.	Throughout the duration of head pond filling.	If bank slumping, excessive erosion or significant turbidity plumes are observed, filling will cease and the cause will be investigation and need for remedial action will be determined.	Bank stability monitoring will be documented in weekly environmental inspection report.
	Soil Compaction	Compaction in areas for revegetation	Areas designated for revegetation will be visually monitored by Environmental Inspector for signs of compaction (i.e., rutting, surface flattening) prior to site restoration	Once	Immediately prior to site restoration.	If compaction with the potential to inhibit vegetation growth is present, remedial action will be implemented.	Compaction monitoring will be reported in the weekly environmental inspection report.
Air Quality	Fugitive dust and vehicle emissions	Fugitive dust generation and vehicle emissions	Dust will be visually monitored to assess if excessively dusty conditions are present.  Vehicles will be monitored to ensure that exhaust systems are in place and functioning as intended.	No specific monitoring frequency – continuous monitoring by the environmental inspector and construction supervisors.	Throughout the duration of the construction period.	Take mitigation measures to minimize dust, per recommendations in ER.	Dust conditions will be reported in the weekly environmental inspection report.
Surface Water Hydrology	Flow rates	Amount of flow pumped from excavations (groundwater and/or infiltration through cofferdams)	Amount of flow will be calculated based on the flow rate of the pumping equipment and the amount of time the pump is operated.	Daily, during pump operation.	Throughout the duration of pumping activities.	If there is a PTTW in place to authorize pumping in excess of 50 000 litres per day, no remedial action is required.	Water takings will be documented in the annual PTTW report to the MOE.
		Amount of flow pumped for concrete batch plant	A flow meter will be installed on the pump line.	Daily, during pump operation.	Throughout the duration of pumping activities.	If no PTTW is in place and a daily volume of 40 000 litres per day is recorded, a PTTW application will be submitted to MOE to ensure that taking is authorized in the event the taking exceeds 50 000 litres per day.	Record of monitoring will be documented daily in the water taking log.
		Amount of flow pumped for construction camp	A flow meter will be installed on the pump line.	Daily, during pump operation.	Throughout the duration of pumping activities.		
		Flow rates in the Kabinakagami River	A flow monitoring station will be installed on the river at Highway 11 to continuously monitor flow in the river.	Monitoring data will be recorded on a continuous basis throughout the duration of construction.	Throughout the duration of construction	No remedial action is required. This monitoring will record flow in the river.	Flow data will be available for agencies at their request.

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency	Monitoring Timing	Remedial Action	Reporting
		Downstream flow rates during head pond filling.	Head pond filling will be monitored to ensure that restrictions to flow meet commitments. Inflow will be monitored continuously at the new flow gauge installed at Highway 11. Outflow during filling will be monitored with a combination of hydraulic discharge calculations and actual reservoir filling rates.	Calculation of filling rate and downstream flow rate will be conducted once for every meter of head pond increase, twice per day and at every change in stop log or draft tube gate.	Monitoring will occur during the head pond filling period.	If monitoring shows that water takings are exceeding allowed values, the water taking methodology will be reviewed by a hydraulic engineer and adjustments made as necessary to ensure commitments are adhered to.	Water taking will be reported per the requirements of the Permit to Take Water and at the request of the MNR District Office.
Surface Water Quality	Settling pond (as permitted under Environmental Compliance Approval).	Monitoring settling pond or other treatment method discharge sediment levels.	Settling pond discharge will be monitored for turbidity and TSS (or as per Environmental Compliance Approval Terms and Conditions)	Turbidity will be monitored once daily and TSS will be monitored once per month (or as per Environmental Compliance Approval Terms and Conditions).	Throughout the duration of settling pond use.	If discharge exceeds allowable levels prescribed by the MOE Environmental Compliance Approval, discharge will cease and remedial action will be initiated to ensure discharge criteria are satisfied.	Settling pond discharge water quality will be reported as per Environmental Compliance Approval Terms and Conditions and summarized in the annual Environmental Compliance Approval report to the MOE.  Record of monitoring will be documented daily in the water quality monitoring log.
		Monitoring settling pond pH levels.	Settling pond will be monitored for pH (or as per Environmental Compliance Approval Terms and Conditions).	pH will be monitored twice daily (or as per Environmental Compliance Approval Terms and Conditions).	Throughout the duration of settling pond use.	If discharge exceeds allowable levels prescribed by the MOE Environmental Compliance Approval, discharge will cease and the contingency plan described in the ER will be initiated to ensure discharge criteria are satisfied.	Settling pond discharge water quality will be reported as per Environmental Compliance Approval Terms and Conditions and summarized in the annual Environmental Compliance Approval report to the MOE.  Record of monitoring will be documented daily in the water quality monitoring log.
		Monitor sediment accumulation in settling pond (if required)	Sediment accumulation within the pond will be measured on a staff gauge installed in the pond by Environmental Inspector.	Once every 6 months	Throughout the duration that the pond is in operation.	When sediment reaches 50% of the design capacity it will be cleaned out to the satisfaction of the owner's engineer.	Sediment accumulation will be reported in the weekly environmental inspection report.
		Settling pond integrity (if required)	Settling pond embankments, outlet and spillway will be visually inspected by a Professional Engineer to confirm that the pond remains intact.	Once per week and after each rainfall and significant snowmelt events.	Throughout the duration that the pond is in operation.	Remedial repairs implemented as determined necessary by the inspecting engineer.	Settling pond integrity reported in the weekly environmental inspection report.
	Concrete and Cement works.	Monitoring to ensure leaching of alkaline concrete will not occur	All concrete structures will be assessed by the owner's engineer to confirm that they are adequately cured prior to wetting.	As required.	Prior to wetting any cast-in-place concrete structure.	If concrete is not adequately cured, owner's engineer will instruct the contractor to hold off on wetting until structure has adequately cured to the satisfaction of the engineer.	Monitoring to be reported in the weekly environmental inspection report.

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency	Monitoring Timing	Remedial Action	Reporting
		Monitoring of treatment process for concrete truck rinsing facility.	Automated pH monitoring in the concrete truck rinsing containment facility prior to discharge of flow to the settling pond.	As required.	Prior to batch discharge to settling pond.	If automated monitor determines that pH is outside the allowable range (to be determined by MOE), additional treatment time will be required to meet criteria. Discharge of contained wash water not to occur until water quality criteria satisfied.	Automated data recording to be maintained by logger and reported in annual Environmental Compliance Approval report for wheel washing facility.
		Monitoring of instream pH values during concrete works.	The pH of Kabinakagami River will be monitored by the Environmental Inspector immediately downstream from the spillway and powerhouse work sites using a digital pH meter.	Daily	Throughout the duration of concreting.	If pH in the river changes by more than 1 pH unit above background conditions, remedial investigation will be initiated to determine if the cause is due to concrete works at the site.	Monitoring to be reported in the weekly environmental inspection report.
	Water quality during in-stream works	Monitoring of turbidity and suspended sediment during in-stream works	Turbidity will be monitored by the Environmental Inspector in an upstream control location agreed upon by MNR Biologist and Environmental Inspector and immediately downstream from the in-stream work area using a digital turbidity meter.	Turbidity monitoring will be conducted on a daily basis when in-stream work is occurring.	Throughout the duration of instream construction activities.	If turbidity at the construction site exceeds the level at the upstream control by more than the CCME guidelines, work will cease and remedial action will be initiated to control turbidity. MNR will be notified immediately if an incident occurs	Turbidity monitoring will be reported in the weekly environmental inspection report.
		Visual monitoring of turbidity	Turbidity in the work area will be visually monitored by the Environmental Inspector (once daily) and the Construction Supervisor (continually).	Monitoring will be conducted continually when in-stream work is occurring.	Throughout the duration of instream construction activities.	If a turbidity plume is observed downstream from the work area, work will cease and remedial action will be initiated to control turbidity.	Turbidity monitoring will be reported in the weekly environmental inspection report.
	Water quality and bank stability during head pond filling	Visual monitoring of turbidity and bank stability during head pond filling	Visual inspection of shorelines, including bank stability and adjacent water quality throughout length of head pond being filled.	During head pond filling activities.	Throughout the duration of head pond filling.	If turbidity or significant bank erosion are identified during monitoring activities, filling will be stopped and an inspection will be conducted by a qualified geotechnical engineer to determine if slope stability issues exist. Agencies will be notified in participate in follow up inspections. Remedial requirements will be identified following inspection.	Monitoring will be reported in the weekly environmental inspection report.
	Leachate and net acid generating potential in excavated rock	Assess samples of rock from excavations to assess leachate and net acid generating potential prior to use or disposal.	Samples of excavated rock will be sent to an accredited laboratory for analysis of these parameters.	Once for each rock excavation area	Immediately upon excavation of representative rock samples.	Should samples reveal a high potential for acid generation, a contingency plan will be developed by the Contractor in consultation with regulatory authorities. Generally accepted mitigation disposal in an engineered containment structure with a drainage collection system (see Section 5.10.1.6).	Results will be reported immediately upon receipt to federal and provincial authorities.
Aquatic Biota	Instream construction timing restrictions	Monitor construction works to ensure no instream construction occurs outside of allowable window unless otherwise approved by MNR/DFO	Environmental Inspector and/or construction supervisor will monitor the activities of the contractor to ensure that timing window restrictions are adhered to.	Continually	Throughout the duration of the construction period.	If in-water construction activities are occurring outside the timing window without the prior approval of MNR/DFO, activity will cease until it is approved or timing restriction is over.	Monitoring will be reported in the weekly environmental inspection report.

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency	Monitoring Timing	Remedial Action	Reporting
	Cofferdam dewatering	Monitor dewatering activities to ensure dewatering pumps are shrouded	Dewatering activities will be visually monitored by the Environmental Inspector prior to commencement to ensure that pumps are properly shrouded to prevent fish entrainment.	Once	Immediately prior to dewatering.	If pumps are not properly shrouded, dewatering will not be permitted to commence until remedial action is undertaken.	Monitoring will be reported in the weekly environmental inspection report.
		Monitoring to ensure that all fish are adequately removed from dewatering area	Fish removal from dewatered areas will be monitored by an aquatic biologist to ensure all fish are properly removed and transported back to the watercourse.	Prior to final dewatering of each dewatered area.	Prior to each dewatering event.	If fish are not completely removed from the area to be dewatered, final dewatering will not be allowed until removal is complete.	Fish removal will be reported in the report for the License to Collect Fish for Scientific Purposes.
	Head Pond Filling	Monitoring to ensure that fish are not being stranded due to lower flow rates downstream from Site 6 – Wapoose during head pond filling	The shoreline will be visually assessed by the Environmental Inspector or trained designate to identify if fish are being stranded in dewatered areas within 1 km downstream from Site 6 – Wapoose.	Once	After maximum water taking rates for head pond filling have been reached.	Stranded fish will be moved back to wetted portions of the river. If stranded fish are observed, the monitoring area will be extended downstream. CLFN, MNR and DFO will be consulted and a decision will be made to see if the downstream flow rate should be increased to wet more aquatic habitat.	Monitoring will be reported in the weekly environmental inspection report.
	Blasting Effects (as per DFO Fisheries Act Authorization/approved blasting plan)	Monitoring of fish mortality during blasting in or near water.	Visual monitoring of mortality by a fisheries biologist immediately following blasts in or near water at each site. Data should include number of fish, size of fish, and species, where possible.	Once following each blast.	Throughout the duration of blasting events.	If dead fish are observed, the blasting plan will be reviewed and discussed with DFO to determine if additional measures are necessary.	Monitoring will be reported in the weekly environmental inspection report.
Aquatic Habitat	General Construction Monitoring	Monitor work in water to ensure that works are constructed in accordance with permits and approvals.	All aquatic habitat mitigation features (e.g., habitat enhancement area) will be monitored during and immediately following their installation by a fisheries biologist to ensure they have been constructed in accordance with DFO/MNR requirements.	Once following construction of the feature.	Throughout the duration of construction, as required.	If a significant deviation from the approved plans occurs or is required for some unanticipated reason, it will be discussed with MNR and DFO. If unacceptable to these agencies, corrective actions will be initiated.	Monitoring will be reported in the annual monitoring report prepared in accordance with the requirements of the Fisheries Act Authorization.  Monitoring will also be documented in the weekly environmental inspection report.
	Aquatic Habitat Conditions	Photographic record.	Photographs of the work area will be taken by the Environmental Inspector to document construction process from similar vantage points as photographs taken during pre-construction monitoring.	Four times per year (seasonally).	Throughout duration of construction.	Not applicable	Photographs will be provided to DFO and MNR.
Terrestrial Vegetation	General Construction Monitoring	Monitor work to ensure that boundaries of work areas and head pond clearing, and other mitigation measures previously identified, are respected.	Environmental inspector will monitor the activities of the contractor to ensure that identified work areas, and other previously identified mitigation measures, are adhered to.	Periodically, during all construction activities.	Throughout the duration of the construction period.	Should clearing beyond the identified work area boundaries be identified, or damage to the remnant vegetation communities is detected, restoration activities will be undertaken immediately to revegetate the community. Should repeated infringements beyond the work area boundaries be noted in a given area, fencing will be considered to restrict access.	Monitoring will be reported in the weekly environmental inspection report.

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency	Monitoring Timing	Remedial Action	Reporting
	Site Restoration	Monitor site restoration to ensure landscaping, erosion protection, slope stability, revegetation is adequate.	Environmental Inspector will monitor the activities of the contractor to ensure that site restoration is adequate.	Continually during site restoration.	Throughout the duration of the site restoration period.	If activities are occurring during site restoration that are not approved within the site restoration protocol, these activities are to be ceased.	Monitoring will be reported in the weekly environmental inspection report.
Wildlife	General Construction Monitoring	<ul style="list-style-type: none"> <li>Monitor clearing and blasting activities to ensure that none of these activities are occurring within the restriction windows</li> <li>Forest Habitats: May 24 to July 31</li> <li>Open Habitats: May 24 to July 23</li> <li>Wetland Habitats: May 16 to July 23.</li> </ul>	Environmental Inspector and/or construction supervisor will monitor the work plan and activities of the contractor to ensure that restriction windows for clearing and blasting are followed.	Weekly during breeding period.	Throughout the duration of the construction period.	<p>If clearing or blasting is to occur within the restriction window, areas to be cleared or within 100 m of blast sites are to be surveyed by a biologist to determine if bird nesting, bat maternity colonies, denning, or breeding evidence of other species occurs in the area. If any of these activities are found to be present, work should either be delayed until the site is no longer in use, or a mitigation plan is developed in consultation with</p> <p>EC/MNR that may include an alternate route around the feature (&gt; 100 m away) or other suitable mitigation.</p>	Monitoring will be reported in the weekly environmental inspection report.
	General Construction Monitoring	Monitor site cleanliness to avoid wildlife attraction.	Environmental Inspector will monitor site cleanliness.	Continually	Throughout the duration of the construction period.	If site cleanliness is determined to be an issue, the environmental inspector and/or the construction supervisor are to reinforce this issue with the contractor.	Monitoring will be reported in the weekly environmental inspection report.
	Reptiles and Amphibians	Incidental take of frogs and amphibians during movements to and from breeding habitats.	Monitoring of travel along roadways near amphibian breeding habitats by Environmental Inspector.	Weekly during amphibian breeding period (preference to be given to times when conditions for amphibian movements are optimal, such as during warm nights with light rain).	Throughout the duration of the construction period.	Should signage not be effective at reducing speed of travel through area, and incidents of incidental take of frogs and amphibians are recorded, flagmen to be posted at boundaries of area to reinforce reduced speed limits.	Monitoring will be reported in the weekly environmental inspection report.

Table 10.3 Environmental Monitoring During Operations

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency and Timing	Anticipated Data Product	Trigger for Action	Reporting
<b>Natural Environment Monitoring</b>							
General Environmental Protection Monitoring	Spill Prevention and Response	Ensure all employees and contractors trained in spill prevention and response.	A record of training will be maintained to document training received by employees and contractors – training log to be maintained on-site.	As required any time new employees or contractors are working on site.	Confirmation that all new staff and contractors have been trained in procedures.	If contractors and staff have not been trained, they must stop work until receiving adequate training.	Training log will be updated as required.
		Ensure all refuelling and maintenance occurs in designated areas.	Refuelling and maintenance practices will be routinely monitored by site operator to ensure required mitigation being implemented.	On a routine basis.	Refuelling activities reported in site operator's log.	If procedures are not being adhered to, site operator must alter his activities.	Informal reporting in site operator's log.
		Ensure all hazardous materials stored in designated locations.	Powerhouse will be visually assessed to ensure all hazardous materials are stored in designated storage locations on a monthly basis by the site operator.	Monthly, as part of operator's normal site monitoring.	Verification that all storage as per requirements.	If material not properly stored, remedial action initiated immediately to ensure proper storage. Procedures for material handling to be reviewed and amended as required if non-compliance observed.	Monitoring and actions reported in operator's log.
		Monitoring integrity of secondary containment around storage areas.	Visual inspection of containment areas by site operator to assess integrity.	Monthly, as part of operator's normal site monitoring.	Verification that all containment as per requirements.	If containment areas not functioning as designed they must be reviewed by a qualified inspector and remedial actions initiated as required to ensure proper working.	Monitoring and actions reported in operator's log.
		Monitor equipment containing fluids.	Visual inspection of equipment in powerhouse by site operator to ensure it is not leaking or prone to leaking fluids.	Monthly, as part of operator's normal site monitoring.	Verification that all equipment leak free.	If leaks are observed, site operator will initiate repairs to ensure no leaks are occurring.	Monitoring and actions reported in operator's log.
Soils	Erosion and sediment control	Adequacy of revegetation efforts.	Sites that have been revegetated will be visually monitored by a qualified biologist to assess success of revegetation efforts. All planted trees and shrubs will be assessed for survival and the surface area coverage of grass/wildflower planting areas will be assessed to determine adequacy in controlling erosion.	Three times per year (spring, summer and fall) in Years 1, 2 and 3 following site restoration efforts.	Estimates of survival and surface area coverage.	If any shrubs or trees are dead, they will be replaced. If 80% surface area coverage does not develop in the wildflower/grass planting beds by the end of the Year 3 monitoring period, Northland Power will undertake remedial plantings to achieve this target.	Revegetation success will be reported in the annual Operational Monitoring Report.
		Erosion and sediment control measures.	Monitoring to be conducted per conditions of permits and approvals. Access road water crossings and disturbed areas to be routinely monitored to ensure that all mandatory standards are met continually throughout the life of the Project.	Routine monitoring three times per year (spring, summer and fall) throughout life of Project.	Verification of adequacy of sediment and erosion control.	If erosion is observed, MNR will be contacted to discuss remedial requirements.	Monitoring will be reported in the annual Operational Monitoring Report.
	Shoreline erosion	Erosion of the shoreline in the proposed head ponds.	The shoreline will be visually assessed by a qualified professional for signs of erosion. Erosion areas will be photographed and described and the need for remedial action will be assessed.	Once per year throughout life of facilities	Professional assessment of shoreline erosion conditions in head ponds.	Significant shoreline erosion (e.g., large slumps, widespread erosion, numerous falling trees) will be remediated as necessary to ensure the long-term stability of the shoreline. Assessment for remedial action to be made by professional engineer.	Bank stability monitoring to be reported in the annual OEMR.

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency and Timing	Anticipated Data Product	Trigger for Action	Reporting	
Groundwater	Groundwater table levels	Groundwater tables in head pond	Head pond groundwater tables will be monitored by the installed of a groundwater monitoring well adjacent to each head pond. One well will be installed on the west bank adjacent to each head pond upstream from the dam structure. An automated water level data logger will be installed to record groundwater level over the course of a year following commencement of operations.	The automated data logger will be set to record groundwater level in the monitoring well on a 15 minute basis.	Groundwater levels at 15-minute intervals over 1-year.	No trigger for action.	Results report in OEMR.	
Surface Water	Zone of Influence	Extent of effects of the Project on water levels and flows downstream from Site 6 - Wapoose	A monitoring methodology, using a science-based protocol will be determined in consultation with regulatory authorities.	Monitoring will be implemented during the first term of the WMP.	The downstream zone of influence determined based on a science protocol	No trigger for action.	Results reported in OEMR.	
	Water Levels	Head Pond water levels	The head pond water levels will be recorded at the upstream face of the intake structures using a real-time water level transducer – results will be linked to facility control system.	15 minute intervals for duration of facility lifetime.	Instantaneous water level readings at 15 minute intervals.	If water levels are below the lower compliance limit, an Incident Report will be prepared and sent to MNR in accordance with standard reporting procedures under the WMP.	An annual water level report, including electronic tabulated data, will be submitted to MNR as part of the WMP compliance monitoring program. An Incident Report will be prepared for any water levels that are out of compliance with the plan.	
	Flow Rates	Flow through the spillway	Flow over the spillways will be recorded on an hourly basis calculation using the water level of the head pond and the rule curve of the spillway.	Flow over the spillways will be recorded on an hourly basis calculation using the water level of the head pond and the rule curve of the spillway.	At 15 minute intervals for duration of facility lifetime.	Instantaneous flow rate through spillway at 15 minute intervals.	No action required.	An annual flow report, including electronic tabulated data will be submitted to MNR as part of the WMP compliance monitoring program.
		Flow through the powerhouse	Flow through the powerhouses will be calculated based on the amount of power generated – results will be linked to the facility control system.	Flow through the powerhouses will be calculated based on the amount of power generated – results will be linked to the facility control system.	At 15 minute intervals for duration of facility lifetime.	Instantaneous flow through powerhouse at 15 minute intervals.	No action required.	An annual flow report, including electronic tabulated data will be submitted to MNR as part of the WMP compliance monitoring program.  Flow through the powerhouse will also be documented in the annual PTTW report for the MOE.
Flow through turbines when powerhouse shuts down due to low water levels and head ponds are filling		Flow through the turbine will be monitored to ensure that the minimum flow of 3 m <sup>3</sup> /s is maintained throughout the period when head ponds are filling to commence spilling.	Flow through the turbine will be monitored to ensure that the minimum flow of 3 m <sup>3</sup> /s is maintained throughout the period when head ponds are filling to commence spilling.	At 15-minute intervals during head pond filling period prior to commencement of spilling.	Instantaneous flow through powerhouse at 15-minute intervals.	If 3 m <sup>3</sup> /s is not being passed, flow through the turbine will be immediately reduced to ensure this flow value is maintained at all times.	An annual flow report, including electronic tabulated data will be submitted to MNR as part of the WMP	

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency and Timing	Anticipated Data Product	Trigger for Action	Reporting
							compliance monitoring program.  This data will also be reported to MNR each time the powerhouse shuts down due to water levels being lower than the plant capacity.
		Flow in the Kabinakagami River	Flow rates in the Kabinakagami River upstream from the facilities will be monitored by a new gauge that will be installed at Highway 11 prior to construction of the facilities.	The flow gauge will record flow at the site continuously.	Continuous flow rates in the Kabinakagami River upstream from the facilities.	No action required.	The flow from this gauge will be recorded in the annual flow report, including electronic tabulated data that will be submitted to MNR as part of the WMP compliance monitoring program.
	Surface Water Quality	Surface water chemistry	Surface water samples will be collected at baseline monitoring stations and within each head pond and submitted for analysis of parameters monitored during baseline studies, including low level mercury. Sampling will target varying flow rates and flow will be determined during each sampling event. Mercury samples will be submitted to an accredited laboratory with minimum detection limits of 0.1 ng/L for total mercury and 0.02 ng/L for methyl mercury. Temperature and dissolved oxygen will be recorded at each sampling location.	Eight times during the open water season to represent a range of flow conditions, including low flow summer period in Years 1, 2 and 3 following construction.	Water quality results to compare to baseline and PWQO and CWQG.	Significant changes will be reviewed with MOE to determine if additional sampling or investigation into the source of the changes is necessary.	Water quality monitoring results will be documented in an annual OEMR. At the end of Year 3, MOE will make a determination on the need for additional monitoring.
		Dissolved Oxygen	During each surface water sampling event, dissolved oxygen levels throughout the water column will be monitored downstream from each facility, and at the deepest point upstream from each dam (that can be safely access). Monitoring of DO and water temperature will be conducted at 1-m intervals from the surface to the channel bottom.	Eight times during the open water season to represent a range of flow conditions, including low flow summer period in Years 1, 2 and 3 following construction.	DO and temperature levels throughout the water column.	If anoxic conditions are developing within the head ponds, this will be reviewed with MOE to determine if additional sampling or investigation into the source of the changes is necessary.	DO monitoring results will be documented in an annual OEMR.
	Water temperature	Water temperature throughout zone of impact	Water temperature loggers will be installed upstream from the Site 3 - Neeskah Head pond, downstream from each facility, approximately 1 km downstream from Wapoose and at Roger's Road Landing and set to record hourly water temperatures.	Hourly water temperatures recorded for 10-yr period.	Hourly water temperatures.	No trigger for action.	Water temperature monitoring will be documented in an annual OEMR.
Aquatic Biota and Habitat	Fish Communities	Fish community	RIN Study will be undertaken in each head pond, and at the upstream and downstream control site where RIN undertaken in 2009.	Years 2, 6, and 10 following commencement of operations.	Basic descriptive stats to be calculated and compared to provincial measures as the RIN database become established. Also compared to baseline measures.	No trigger for action.	Fish community data will be reported in an annual OEMR.

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency and Timing	Anticipated Data Product	Trigger for Action	Reporting
		Small fish downstream from Wapoose.	Electrofishing transects conducted in 2009 will be repeated in the reach downstream from Wapoose, at the Wall and at Roger's Road Landing	Years 2, 6, and 10 following commencement of operations.	Species presence/absence, percent composition and CPUE.	No trigger for action.	Fish community data will be reported in an annual OEMR.
		Small fish at downstream end of tailraces	Electrofishing will be conducted in wadeable and safe portions of the downstream end of each tailrace to confirm that small fish are using the blast rock habitat in the tailrace area.	Years 2, 6, and 10 following commencement of operations.	Species presence/absence, percent composition and CPUE.	If small fish are not using the area, habitat conditions will be reviewed to determine if conditions are suitable for small fish use. Mitigation options will be discussed with MNR, DFO and CLFN. If it is determined that blast rock is not providing desired habitat conditions, mitigation options (e.g., addition of rounded substrate) will be discussed and considered for implementation.	Fish community data will be reported in an annual OEMR.
Spawning	Spring spawning fish species.	Spring spawning studies will be conducted within each head pond and through the reach downstream to Roger's Road Landing to verify that fish are spawning within the head pond and that spawning continues to occur in the unaffected reach downstream. Spawning study effort will focus on Walleye within the head ponds and Lake Sturgeon downstream from Wapoose.	Years 1, 2, 6 and 10 following commencement of operations.	Confirmation of spawning locations and relative abundance at spawning locations.	If no spawning is observed within the head ponds and there is a community of Walleye present, the habitat conditions will be reviewed. If habitat conditions are not suitable, habitat will be remediated to create appropriate conditions.	Spawning data will be reported in an annual OEMR.	
Lake Sturgeon	Lake sturgeon conditions downstream from Site 6 - Wapoose	Lake Sturgeon condition will be assessed in the Kabinakagami River downstream from Site 6 – Wapoose to assess if Project-induced changes may be having adverse effects on sturgeon condition.	Years 1, 2, 6, 10, 20 and 40 following commencement of operations.	Data regarding sturgeon condition (e.g., length-weight ratios, body dimensions).	If sturgeon condition decreases over time, the potential cause will be investigated. Mitigation options, or additional study requirements will be discussed with CLFN, DFO and MNR.	Data will be reported in an annual OEMR.	
Benthic Invertebrates	Invertebrate communities in head pond and downstream reach.	Benthic invertebrate sampling will occur in head ponds and at sampling transect locations downstream from Wapoose and at Roger's Road Landing in a similar manner as the baseline studies in October 2009.	Years 2, 6, and 10 following commencement of operations.	Benthic invertebrates species richness, community types and density.	No trigger for action.	Benthic invertebrate data will be reported in an annual OEMR.	
	Invertebrate communities in tailraces	Benthic invertebrate sampling will be conducted in wadeable and safe portions of the downstream end of each tailrace to confirm that invertebrates are using the blast rock habitat in the tailrace area.	Years 2, 6, and 10 following commencement of operations.	Benthic invertebrates species richness, community types and density.	If benthos are not using the area, habitat conditions will be reviewed to determine if conditions are suitable for benthic use. Mitigation options will be discussed with MNR, DFO and CLFN. If it is determined that blast rock is not providing desired habitat conditions, mitigation options (e.g., addition of rounded substrate) will be discussed and considered for implementation.	Benthic invertebrate data will be reported in an annual OEMR.	
Odonates	Odonate communities in head ponds and downstream reach.	The baseline odonate study will be repeated to determine changes in species composition and abundance due to the Project.	Years 2 and 6 following commencement of operations.	Odonate species richness, community types and abundance.	No trigger for action.	Odonate data will be reported in an annual OEMR.	

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency and Timing	Anticipated Data Product	Trigger for Action	Reporting
	Aquatic Habitat	Habitat enhancement/creation areas downstream from powerhouses.	Constructed areas downstream from the powerhouses and spillways will be assessed for habitat conditions including substrate stability, water depth and flow velocity with respect to their function as spring spawning areas to verify that they are functioning as intended.	Years 1, 2, and 6.	Documented habitat variables.	If habitat variables outside the design parameters (i.e., too fast or too deep) or substrate not stable (e.g., substrate changes observed) remedial action will be initiated to create appropriate conditions.	Habitat monitoring to be documented in annual monitoring report required for the Fisheries Act Authorization.
		Head pond habitat conditions.	Aquatic habitat conditions in the head pond (e.g., substrate, vegetation, instream structure) will be visually assessed using the baseline study shoreline cruise methodology to document post construction habitat features.	Years 2, 6 and 10 following commencement of operations.	Habitat mapping throughout head ponds.	No trigger for action.	Habitat monitoring will be reported in the Annual OEMR.
	Cold Water Tributaries	Cold Water tributary Response to the Project	Form, function and biotic response of Carey Creek to the proposed development will be assessed.	Years 2, 6 and 10 following commencement of operations.	Data regarding habitat and biotic changes to inundated mouth of Carey Creek to confirm effects of waterpower development.	No trigger for action.	Results will be reported in the Annual OEMR
	Fish Tissue Mercury Concentrations	Large and Small Fish Tissue Mercury throughout the Study Area.	Fish tissue mercury concentrations will be assessed at an upstream control, within each head pond at in downstream areas in accordance with MOE requirements.	Years 1, 2, and 6 and 10.	Fish tissue mercury levels in fish from various Project areas and upstream control.	Tissue mercury levels will be provided to MOE sportfish contaminant laboratory for inclusion in the Guide to Eating Ontario Sportfish. Data will also be provided to CLFN so that community members are aware of any consumption restrictions.	Fish tissue mercury will be reported in the Annual OEMR.
	Fish mortality	Mortality due to turbine passage	Visual monitoring by plant operator for dead fish within the tailrace between the powerhouse and 50 m downstream. Any dead fish observed will be collected, if possible, identified to species and measured for fork length (if possible).	Two times per week between May 1 and November 30 during each year of operations.	Data on quantity, species and size of fish dying due to turbine passage.	If mortality rates exceed those predicted in Section 5.12.2.6 of this ER, DFO will be notified immediately. Northland will take immediate action to reduce the number of fish entering the powerhouse or killed due to turbine passage. A long-term strategy will be developed to reduce mortality rates and this will be sent to DFO for approval.	Monitoring results will be reported to DFO every 2 years, with the report submitted by December 15 in the year in which reporting occurs.
	Fish Mortality	Mortality due to trash rack impingement or other factors	Visual monitoring by plant operator for dead fish impinged on the trashrack or located at any other location within or adjacent to the facility when maintenance is being conducted.	During trashrack cleaning events or other maintenance activities around the facility.	Data on quantity, species and size of fish dying due to trashrack impingement or turbine passage.	If mortality rates exceed those predicted in Section 5.12.2.6 of this ER, DFO will be notified immediately. Northland will take immediate action to reduce the number of fish entering the powerhouse or killed due to turbine passage. A long-term strategy will be developed to reduce mortality rates and this will be sent to DFO for approval.	Monitoring results will be reported to DFO every 2 years, with the report submitted by December 15 in the year in which reporting occurs.

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency and Timing	Anticipated Data Product	Trigger for Action	Reporting
Terrestrial Vegetation	Restored Vegetation Communities	n/a	Restored vegetation communities are to be surveyed by the project biologist. An overall impression of the success of revegetation efforts is to be noted, while several 10 x 10-m plots will be established within the restored lands to make detailed notes on success within those areas, such as percent cover, species present. As part of this assessment, the extent of spread of non-native species will be documented.	Years 2 and 6 following site restoration activities.	Documented status of restored sites.	If revegetated areas remain bare or sapling survival is less than 60%, additional revegetation efforts will be undertaken.	Site restoration monitoring to be documented in annual OEMR.
	Vegetation adjacent to the proposed head ponds	Mortality due to higher groundwater table conditions.	Vegetation adjacent to the proposed head pond will be surveyed to assess if mortality is occurring due to elevated groundwater conditions.	Years 1, 2, and 6 following site restoration activities.	Assessment of mortality of vegetation adjacent to proposed head pond.	No trigger for action.	Vegetation mortality monitoring to be documented in annual OEMR.
Sediment	Sediment transport	Changes in sediment transport downstream from Site 6 – Wapoose due to the presence and operation and of the facilities.	The four full geomorphic field stations established to assess baseline sediment transport upstream and downstream from the facilities (as committed to in Section 5.5.2.2) will be reassessed throughout Year 1 following completion of construction to confirm changes in sediment transport downstream from Site 6 – Wapoose.	Year 1	Fluvial Geomorphological assessment report quantifying changes in the sediment transport regime.	No trigger for action.	The report will be a stand-alone report prepared following completion of the study. It will be submitted to all interested agencies.

Table 10.4 Aggregate Pit Monitoring Programs

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency	Monitoring Timing	Remedial Action	Reporting
<b>General Environmental Protection Monitoring</b>							
General Environmental Protection	Compliance with Plans	Compliance with Aggregate Resources Act Permit conditions, Aggregate Resources Provincial Standards and the approved Site Plan.	Owner's Environmental Inspector will review all site activities at each aggregate pit on an on-going basis and meet with the contractor on a weekly basis to ensure that the contractor is in compliance with requirements.	On-going with one formal meeting per week	Throughout duration of pit operations during Project construction.	If contractor is not in compliance, actions will be taken by the owner/owner's representative and contractor as necessary to ensure actions are compliant with environmental requirements.	Results of this monitoring will be documented in a weekly environmental inspection report.  Overall compliance monitoring results for each pit will be documented in a separate Compliance Assessment Report which will be provided to MNR no later than September 30 each year of operation.
	Waste Management	Ensure all employees and contractors receive appropriate training in waste management protocols (as identified in the Waste Management Plan to be prepared) as part of standard site orientation.	A record of training will be maintained to document training received by employees and contractors – training log to be reviewed by the Environmental Inspector.	Reviewed periodically, particularly when new contractors or employees commence activity at the site	Throughout duration of construction.	If employees/contractors are working on site without having received proper training in waste management, they will be instructed to stop work until such time as they have been trained.	Monitoring will be reported in weekly environmental inspection report.
		Ensure that the contractor is management waste in accordance with the approved Waste Management Plan	Owner's Environmental Inspector will review all site waste management activities on an on-going basis and meet with the contractor on a weekly basis to ensure that the contractor is in compliance with requirements.	On-going, with one formal check of waste management per week and one formal meeting with Contractor per week	Throughout duration of construction period.	If contractor is not in compliance, actions will be taken by the owner/owner's representative and contractor as necessary to ensure actions are compliant with environmental requirements.	Results of this monitoring will be documented in a weekly environmental inspection report.

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency	Monitoring Timing	Remedial Action	Reporting
	Spill Prevention and Response	Ensure all employees and contractors receive appropriate training in spill prevention and response protocols as part of standard site orientation.	A record of training will be maintained to document training received by employees and contractors – training log to be reviewed by the Environmental Inspector.	Reviewed periodically, particularly when new contractors or employees commence activity at the site	Throughout duration of construction.	If employees/contractors are working on site without having received proper training in spill response and reporting protocols, they will be instructed to stop work until such time as they have been trained.	Monitoring will be reported in weekly environmental inspection report.
		Ensure all refuelling and maintenance occurs in designated areas, as shown on the Aggregate Permit Site Plan.	Refuelling and maintenance practices will be monitored by Environmental Inspector.	Once per week (to monitor designated areas) and as required during site inspections when refuelling/maintenance activities are occurring	Throughout duration of construction.	If improper refuelling or maintenance practices are observed, the contractor will be instructed to adhere to established protocols – monitoring by Environmental Inspector to become more frequent following an incident of non-compliance.	Monitoring observations and recommended actions will be documented in the weekly environmental inspection report.
		Ensure all hazardous materials stored in designated locations, as shown on the Aggregate Permit Site Plan.	Construction area will be visually assessed by Environmental Inspector to ensure all hazardous materials are stored in designated storage locations.	Once per week	Throughout duration of construction period when hazardous materials are used on site.	If hazardous materials are being stored outside designated areas, the contractor will be instructed to properly store materials. Follow up monitoring conducted as necessary to ensure actions completed to satisfaction of engineer.	Hazardous material storage monitoring will be documented in the weekly environmental inspection report.
		Monitoring integrity of secondary containment around storage areas.	Visual inspection of containment areas by Environmental Inspector to assess integrity.	Once per week	Throughout period that containment areas are in use.	If in the opinion of the Environmental Inspector and the Owner's engineer, the containment areas are not sufficient, remedial action will be initiated to ensure adequacy. Follow up monitoring conducted as necessary to ensure actions completed to satisfaction of engineer.	Containment area monitoring will be documented in the weekly environmental inspection report.
		Monitor equipment containing fluids and fuel vessels, lines and hoses, and all heavy equipment.  Monitor pit area for signs of contamination.	Equipment operators to visually monitor equipment to ensure it is not leaking or prone to leaking fluids.  Work area will be monitored by Environmental Inspector for signs of contamination (e.g., fluid stains, dead or stressed vegetation) prior to site remediation.	Daily  Once.	Throughout the duration of construction.  Following completion of construction, prior to site restoration.	If leaks are observed, the piece of equipment will be shut off and removed from sensitive areas until such time as the leak is repaired.  If contamination is observed, the contaminated soil will be removed and disposed of as per provincial and federal regulations.	Remedial actions will be documented in the weekly environmental inspection report.  Monitoring will be documented in the weekly environmental inspection report.

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency	Monitoring Timing	Remedial Action	Reporting
<b>Natural Environment Monitoring</b>							
Soil	Sediment and erosion control measures	Adequacy in preventing erosion and sedimentation, in accordance with the methods identified in the Site Plan for each pit	All construction areas will be visually assessed by a designated Environmental Inspector to determine the adequacy of the sediment and erosion control measures.	Once per week, prior to major rainfall and snowmelt events, and after every rainfall and snowmelt event.	Throughout the duration of the construction period.	Requirement for remedial action will be at the discretion of the environmental inspector.	Sediment and erosion control measure adequacy will be reported in a weekly environmental inspection report.
		Silt Fences	Visual inspection of all silt fences by Environmental Inspector to ensure they are properly constructed and to assess sediment accumulation behind the fence.	All silt fences will be inspected once per week and after every rainfall.	Monitoring will occur as long as the silt fences remain in place.	Silt fences must be repaired immediately if they are found to have failed.  Sediment must be removed if it accumulates to half the height of the geotextile material.	Silt fence status will be reported on a weekly basis in the environmental inspection report.
		Stockpiles, including the location of stockpiles as shown on the Site Plan for each pit.	Visual inspection of all soil stockpiles for erosion by Environmental Inspector.	Once per week.	Throughout the duration the stockpile is in place.	Take action when necessary to control erosion.	Stockpile status will be reported in a weekly environmental inspection report.
		Limit of work flagging/restriction devices to identify the Site Plan boundaries and permitted pit development area.	Limit of work devices will be inspected by the Environmental Inspector around the aggregate pits to ensure they are in place and that the contractor is adhering to them.	Once per week.	Throughout the duration of the construction period.	Construction site boundaries will be flagged or other restriction devices installed if they are found to not be in place.  Importance of adherence to limit of work boundaries will be reinforced with contractor if they are not being adhered to.	Limit of work boundary status will be reported in a weekly environmental inspection report.
	Revegetation	Adequacy of revegetation and pit restoration in accordance with the conditions of the aggregate permit	Revegetation areas will be visually monitored by Environmental Inspector or suitably trained Designate to determine the adequacy of vegetation growth in preventing/minimizing erosion.	Three times per year (spring, summer and fall).	Three years following initial revegetation – provided adequate vegetation is achieved by at least the final year of monitoring.	If adequate vegetation (i.e., > 80% surface area coverage) is not observed in the rehabilitated areas prior to the end of the first growing season, other erosion protection measures will be implemented to ensure the area will remain stable over the winter and early spring.	Vegetation monitoring conducted during the construction period will be documented in the weekly environmental inspection reports.  Vegetation monitoring conducted during the operational period will be documented in the annual monitoring reports (see Table 10.3).
Air Quality	Fugitive dust emissions	Fugitive dust generation from the aggregate pits	Dust will be visually monitored to assess if excessively dusty conditions are present.	No specific monitoring frequency – continuous monitoring by the environmental inspector and construction supervisors.	Throughout the duration of the construction period.	Take mitigation measures to minimize dust, per recommendations in ER.	Dust conditions will be reported in the weekly environmental inspection report.
Surface Water Hydrology	Flow rates	Amount of groundwater pumped from pit excavations	Amount of flow will be calculated based on the flow rate of the pumping equipment and the amount of time the pump is operated.	Daily, during pump operation.	Throughout the duration of pumping activities.	If there is a PTTW in place to authorize pumping in excess of 50 000 litres per day, no remedial action is required.	Water takings will be documented in the annual PTTW report to the MOE.
		Amount of flow pumped from Swallow Lake for concrete batch plant at Taylors Pit	A flow meter will be installed on the pump line.	Daily, during pump operation.	Throughout the duration of pumping activities.	If no PTTW is in place and a daily volume of 40 000 litres per day is recorded, a PTTW application will be submitted to MOE to ensure that taking is authorized in the event the taking exceeds 50 000 litres per day.	Record of monitoring will be documented daily in the water taking log.

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency	Monitoring Timing	Remedial Action	Reporting
Surface Water Quality	Settling pond (as permitted under Environmental Compliance Approval)	Monitoring settling pond or other treatment method discharge sediment levels (if determined to be necessary for individual pits as part of the Site Plan).	Settling pond discharge will be monitored for turbidity and TSS (or as per Environmental Compliance Approval Terms and Conditions)	Turbidity will be monitored once daily and TSS will be monitored once per month (or as per Environmental Compliance Approval Terms and Conditions).	Throughout the duration of settling pond use.	If discharge exceeds allowable levels prescribed by the MOE Environmental Compliance Approval, discharge will cease and remedial action will be initiated to ensure discharge criteria are satisfied.	Settling pond discharge water quality will be reported as per Environmental Compliance Approval Terms and Conditions and summarized in the annual Environmental Compliance Approval report to the MOE.  Record of monitoring will be documented daily in the water quality monitoring log.
		Monitor sediment accumulation in settling pond (if required)	Sediment accumulation within the pond will be measured on a staff gauge installed in the pond by Environmental Inspector.	Once every 6 months	Throughout the duration that the pond is in operation.	When sediment reaches 50% of the design capacity it will be cleaned out to the satisfaction of the owner's engineer.	Sediment accumulation will be reported in the weekly environmental inspection report.
		Settling pond integrity (if required)	Settling pond embankments, outlet and spillway will be visually inspected by a Professional Engineer to confirm that the pond remains intact.	Once per week and after each rainfall and significant snowmelt events.	Throughout the duration that the pond is in operation.	Remedial repairs implemented as determined necessary by the inspecting engineer.	Settling pond integrity reported in the weekly environmental inspection report.
	Leachate and net acid generating potential in excavated rock	Assess samples of rock from excavations at the proposed Pelican Road Quarry to assess leachate and net acid generating potential prior to use or disposal.	Samples of excavated rock will be sent to an accredited laboratory for analysis of these parameters.	Once for each rock excavation area	Immediately upon excavation of representative rock samples	Should samples reveal a high potential for acid generation, a contingency plan will be developed by the Contractor in consultation with regulatory authorities. Generally accepted mitigation disposal in an engineered containment structure with a drainage collection system (see Section 5.10.1.6).	Results will be reported immediately upon receipt to federal and provincial authorities.
Terrestrial Vegetation	General Construction Monitoring	Monitor work to ensure that boundaries of work areas at each pit, and other mitigation measures previously identified, are respected.	Environmental inspector will monitor the activities of the contractor to ensure that identified work areas, and other previously identified mitigation measures, are adhered to.	Periodically, during all construction activities.	Throughout the duration of the construction period.	Should clearing beyond the identified work area boundaries be identified, or damage to the remnant vegetation communities is detected, restoration activities will be undertaken immediately to revegetate the community. Should repeated infringements beyond the work area boundaries be noted in a given area, fencing will be considered to restrict access.	Monitoring will be reported in the weekly environmental inspection report.
	Site Restoration	Monitor site restoration to ensure landscaping, erosion protection, slope stability, revegetation is adequate in accordance with the approved Site Plan.	Environmental Inspector will monitor the activities of the contractor to ensure that site restoration is adequate.	Continually during site restoration.	Throughout the duration of the site restoration period.	If activities are occurring during site restoration that are not approved within the site restoration protocol, these activities are to be ceased.	Monitoring will be reported in the weekly environmental inspection report.

Environmental Component	Parameter	Sub-Parameter	Monitoring Methodology	Monitoring Frequency	Monitoring Timing	Remedial Action	Reporting
Wildlife	General Construction Monitoring	<ul style="list-style-type: none"> <li>Monitor clearing and blasting activities at pits to ensure that none of these activities are occurring within the restriction windows</li> <li>Forest Habitats: May 24 to July 31</li> <li>Open Habitats: May 24 to July 23</li> <li>Wetland Habitats: May 16 to July 23.</li> </ul>	Environmental Inspector and/or construction supervisor will monitor the work plan and activities of the contractor to ensure that restriction windows for clearing and blasting are followed.	Weekly during breeding period.	Throughout the duration of the construction period.	<p>If clearing or blasting is to occur within the restriction window, areas to be cleared or within 100 m of blast sites are to be surveyed by a biologist to determine if bird nesting, bat maternity colonies, denning, or breeding evidence of other species occurs in the area. If any of these activities are found to be present, work should either be delayed until the site is no longer in use, or a mitigation plan is developed in consultation with</p> <p>EC/MNR that may include an alternate route around the feature (&gt; 100 m away) or other suitable mitigation.</p>	Monitoring will be reported in the weekly environmental inspection report.
	General Construction Monitoring	Monitor site cleanliness to avoid wildlife attraction.	Environmental Inspector will monitor site cleanliness.	Continually	Throughout the duration of the construction period.	If site cleanliness is determined to be an issue, the environmental inspector and/or the construction supervisor are to reinforce this issue with the contractor.	Monitoring will be reported in the weekly environmental inspection report.