Drainage Area	Water Body Feature name	Water Body Location ID	Crossing Infrastructure	Site Specific Considerations	Potential Impacts
	Tributary E	WB78	• overhead cabling • construction area		overhead
	Tributary G	WB76	• overhead cabling • construction area		
	Tributary H	WB75	• overhead cabling • construction area		
	Tributary I	WB74	• overhead cabling • construction area		
		WB72	• construction area		

Note: fish habitat sensitivity was derived from the DFO *Practitioners Guide to the Risk Management Framework* and considers habitat factors such as species sensitivity, species dependence on habitat, rarity, and habitat resiliency. The assessment should be considered preliminary for the purposes of assessing impact as further assessment would be required for final sensitivity determination.

A total of 14 locations have been identified where watercourse features come within 120m of the project location, but are not crossed by project infrastructure. These locations are summarized in Table 4.

Table 4. Summary of Potential Impacts and Site Specific Considerations for Intermittent/Permanent Watercourse Locations Within 120m of the Adelaide Project Location (but not crossing)

Drainage Area	Water Body Feature name	Water Body Location ID	Associated Infrastructure and Distance (m)	Site Specific Considerations	Potential Impacts
Ausable River	Tributary E	WB82	CA - 120 BU - 120	moderate sensitivity fish habitat, top predator species present, no in-water work or drilling, increased risk of impacts based on proximity to water body (closer = greater risk)	outlined in Section 6.2., in-water work does not apply, new crossing structures do not apply

Drainage Area	Water Body Feature name	Water Body Location ID	Associated Infrastructure and Distance (m)	Site Specific Considerations	Potential Impacts
Adelaide Creek	Adelaide Creek	WB58	UL- 66 CA- 56	Moderate sensitivity, top predator species present, no in-water work, increased risk of impacts based on proximity to water body (closer = greater risk)	outlined in Section 6.2., in-water work does not apply, new crossing structures do not apply
	Morgan Drain	WB16	AR- 22 UL- 16 CA- 6	low sensitivity fish habitat, generally tolerant baitfish species present, no in-water work, increased risk of impacts based on proximity to water body (closer = greater risk)	
		WB17	WT-60 AR-111 UL-116 CA-51		
Mud Creek	Dodman's Drain	WB22	WT- 45 AR- 96		
		WB51	UL- 17 CA - 4		
	Walker Drain	WB23	WT- 48 AR- 100		
	Sutherland Drain	WB50	WT- 37 AR- 87 UL- 100 CA- 26		
Ptsebe Creek	Tributary A	WB12	OL- 82 CA - 55		
		WB43	BU- 114 CA - 114		
	Tributary D	WB80	OL- 56 CA - 44		
	Tributary F	WB77	OL- 46 CA - 38		
	Tributary I	WB72	OL- 16		
	Tributary J	WB73	OL- 119 CA - 105		

Note: fish habitat sensitivity was derived from the DFO *Practitioners Guide to the Risk Management Framework* and considers habitat factors such as species sensitivity, species dependence on habitat, rarity, and habitat resiliency. The assessment should be considered preliminary for the purposes of assessing impact as further assessment would be required for final sensitivity determination.

Legend

WT- Wind Turbine
AR- Road Access
OL- Overhead Line (transmission line)
UL- Underground Line
CA- Construction Activity (includes crane walk, and staging and disturbance areas)
BU- Building (includes substation and interconnection point

7.0 Recommendations

Based on the analysis of potential negative impacts, mitigation measures provided in the following sections are designed to reduce potential impacts to water bodies and their ecological functions. It is anticipated that the implementation of mitigation measures will be achieved through the conditions of approval for the REA application.

7.1 General Project Phase Mitigation

7.1.1 Design Related Mitigation

Mitigation through design is the measure for avoiding or minimizing impacts to water bodies.

The selection of crossing locations should be made to avoid key habitat features such as spawning habitat or refuge pools. Locations should also be selected within straight reaches of the channel and avoid crossing reaches at the point in which they are meandering etc. as to minimize potential for erosion and sedimentation.

Existing surface water drainage patterns and functions should be maintained through proper stormwater management design considerations. Newly impervious surfaces (i.e. access roads, turbine pads etc.) should consider the use of permeable materials, where possible, as to reduce impacts associated with the increase in newly impermeable surfaces.

Consideration of water body crossing structure design should also be made to limit the degree of impact. This can be achieved by considering maintaining the minimum culvert length possible (i.e. cutting back from grading limit to road limit and support with head wall, utilizing existing culverts, use of open bottom structures such as an open foot box culvert). The culvert should be sized appropriately according to municipal engineering standards as to not result in alterations in stream hydrology, scouring or flooding. Non-open bottomed culverts should be embedded as to avoid perched conditions, and furthermore, maintaining passage. Crossing structure type should be determined in consultation with agency and municipality staff and will be dependent on sensitivity of

the water body and location. This will be completed during the permitting phase, prior to any in-stream construction activities. In conjunction with determination of appropriate crossing structures, the proposed underground electrical collector lines should also be considered with agency staff and any applicable municipal requirements.

Should HADD of fish habitat be unavoidable, lost or altered habitat must be compensated for under the *Fisheries Act*. Compensation measures must be employed to ensure there is no net loss of fish habitat. The combination of mitigation and compensation measures will ensure that impacts to fish (including freshwater mussels) and their habitats are avoided. Additional information specific to crossing locations may also be necessary to ensure compliance under the federal *Fisheries Act*. This will be addressed in the detailed design, permitting and approvals phase of the project.

7.1.2 Construction Related Mitigation

Mitigation measures are recommended to minimize risk associated with potential impacts to water bodies during construction. These mitigation measures are described in the following sections. Site-specific mitigation measures will be identified during detailed design phase.

7.1.2.1 Timing of Works

All in-stream construction activities must adhere to watercourse specific timing windows set by the OMNR as to avoid critical spawning/migration periods of warmwater species. This timing window will take into consideration that all watercourse features for which in-water works is proposed, are managed as warmwater fisheries. A preliminary timing window for which all in-water work at the Adelaide project is recommended to occur, is the time period of July 1 to March 3 in order to protect warmwater species, although this window will require confirmation from local OMNR. In general, construction activities near water or in-water should take place within the low flow period in the late summer months as to avoid or minimize impacts. No in-water work is currently proposed at the Lenting Drain, a coldwater system, however if the specifications of the project change and in-water work is proposed at Lenting Drain, the coldwater timing window (June 15 to September 15) would apply.

Clearing, grubbing, and grading activities should be timed to avoid seasonally wet periods (i.e. spring), wherever possible. Construction should avoid high volume rain events (20mm in 24 hours) and significant snow melts/thaws, resuming once soils have stabilized as to not increase risk of erosion, soil compaction, or the potential for sediment release into nearby watercourses. A Flood Response Plan should be developed to respond with on-site flooding ain order to mitigate any possible effects to the aquatic environment.

7.1.2.2 Erosion & Sediment Control Plan

To minimize the potential for construction related sediment release into nearby watercourses, a comprehensive Erosion and Sediment Control (ESC) plan will be developed. The ESC plan will minimize sediment and erosion impacts to streams through the incorporation of specific elements. The reader is referred to the E*rosion and Sediment Control Guideline for Urban Construction*, December 2006 (ESC Guideline), prepared by the Greater Golden Horseshoe Area Conservation Authorities (GGHACA) for guidance related to preparation of an ESC plan.

The goal of the ESC plan is to preserve and protect the water body locations that have potential to be affected by construction activities. On all sites, multiple layers of protection are to be employed prior to the commencement of construction along with a regulated process for monitoring and maintenance to ensure that the ESC measures are functioning within approved limits. ESC condition reports will be prepared as part of the monitoring and maintenance plan. Where ESC measures are found to be in an unacceptable condition, they are to be repaired or replaced immediately. Increased ESC measures (i.e. silt fencing) should be implemented in all situations where a water body or drainage feature (i.e. ephemeral watercourse, swale, ditch etc.) are located within 120m of any construction activity, unless otherwise agreed upon with appropriate agency staff.

7.1.2.3 Bank Stabilization

Riparian vegetation planting after construction should be implemented to stabilize watercourse channel banks and encourage rapid re-vegetation of disturbed soils to prevent collapse, erosion and sedimentation. Seeding should be completed as soon as weather permits, following reconstruction of the slope. Seeds should also be protected

with a layer of erosion control matting to assist in stabilizing the slope and propagating seed. Additional restoration of banks may require application of topsoil, native seed mix and native shrubs. The vegetated banks will also act to buffer potential materials (i.e. sediment) that may flow in from adjacent lands and valleys into water bodies. These riparian areas can substantially reduce erosion of stream banks which, in turn, will minimize sedimentation, support fish habitat, and protect the many sensitive ecological functions that occur in water bodies (River Keepers 1998).

If insufficient time is available in the growing season to establish vegetative cover, an overwintering treatment such as erosion control blankets, fiber matting, rock reinforcement/armoring or equivalent will be applied to contain the site over the winter period. Where rock will be utilized, large, clean, angular rocks should be used. Planting of vegetative cover should then follow in the next growing season. Maintenance and inspection of the vegetative cover will continue until such time as the disturbed areas are sufficiently stabilized through vegetative growth to prevent overland runoff of suspended materials.

7.1.2.4 Construction Equipment

To minimize impacts from construction equipment (i.e. cranes, back hoes etc.), machinery should be operated in a manner that minimizes disturbance to the banks and bed of the watercourse. Equipment should stay outside of the watercourse and bank area as much as possible. Machinery should arrive on site in clean condition and is to be checked and maintained free of fluid leaks. Machinery must be refueled, washed and serviced a minimum of 30m away from all water bodies and other drainage features as to prevent any deleterious substances from entering a watercourse. Fuel and other construction related materials should be stored securely away from any drainage features. Construction staging areas should also be located away from any water body (i.e. 30m away).

A Spill Response Plan (SRP) must be developed prior to commencement of construction. This SRP should provide a detailed response system to deal with events such as the release of petroleum, oils and lubricants or other hazardous liquids and chemicals. A spill kit must also be kept on site at all times and on-site workers must be trained in the use of this kit and be fully aware of the SRP.

A spill is defined in the Ontario EPA as a discharge "into the natural environment, from or out of a structure, vehicle or other container, that is abnormal in quality or quantity in light of all the circumstances of the discharge". Such spills will be identified as major spills, which must be reported to the MOE's provincial spill response center immediately.

To minimize the potential for soil compaction, construction equipment should be restricted to designated controlled vehicle access routes.

7.1.2.5 Construction Debris

Any construction debris removed from the construction site should be stabilized to prevent it from entering the nearby water bodies. This could include covering stockpiles with biodegradable mats or tarps as well as hanging netting or tarps underneath the water body crossing structure (if applicable). Staging and stockpiling areas should also be located away from watercourses (i.e. 30m). Any waste generated from the site should be removed and disposed of appropriately off site according to municipal standards.

7.1.2.6 In-Water Work

At watercourse crossings, in-water work has potential to release sediment into the watercourse downstream. Mitigation measures include conducting in-water work when flows are low or absent, or by working in dry conditions, using accepted methods to bypass flows such as damming (i.e. coffer dam) and pumping the water around the in-water construction area or using a diversion channel. Mitigation associated with surface water dewatering is discussed in Section 7.1.2.7.

Any watercourse locations requiring in-water work or work within a regulated area (typically watercourse flood plains) will require a permit from the respective jurisdictional conservation authority, including the Ausable Bayfield Conservation or the St. Clair Region Conservation Authority. Permitting will be required under the *Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*, Reg. 147/06 and Reg. 171/06, respectively. Permitting will be granted upon review and approval of a completed EIS based on the final design details of the project. Review and approval under the *Fisheries Act (1986)* will also be required by the

above noted authorities on behalf of the DFO. Should HADD of fish habitat be unavoidable, lost or altered habitat must be compensated for under the *Fisheries Act (1986)*. Compensation measures must be employed to ensure there is no net loss of fish habitat. The combination of mitigation and compensation measures will ensure that impacts to fish (including freshwater mussels) and their habitats are avoided. Additional information specific to crossing locations may also be necessary to ensure compliance under the federal *Fisheries Act (1986)*. Regulation 147/06 and 171/06 permitting as well as approval under the *Fisheries Act (1986)* will be addressed in the detailed design, permitting and approvals phase of the project.

7.1.2.7 Dewatering

It is anticipated that groundwater dewatering will be minimal and will likely not exceed 50,000L/day. In the event that this volume is surpassed, the mitigation measures discussed within this section are expected to mitigate against potential negative impacts associated with dewatering activities.

Limited surface dewatering is anticipated for construction during in-water works. Since these areas will be isolated with use of water containment structures, surface dewatering is not expected to interfere with surrounding watercourse levels.

Typical dewatering mitigation is discussed for the following impacts:

- Water Quality Impairment;
- Water Level Alteration; and,
- Erosion and Sedimentation

<u>Water Quality Impairment</u>

Any discharges of water should meet the Ministry of Environment's *Water Management Policies, Guidelines, Provincial Water Quality Objectives* (MOE 1999) Policy 2 provisions. This policy states that where the existing water quality of a water body does not meet Provincial Water Quality Objectives (PWQO), it should not be degraded further and all practical measures should be taken to upgrade the water quality to PWQO. Furthermore, discharges would be required to be at or better than the quality of the receiving watercourse. Any discharges to the municipal storm sewer system must meet local storm sewer discharge by-law criteria prior to discharge.

To mitigate potential effects associated with the discharge, water quality samples must be obtained prior to discharge to ensure the quality is suitable for discharge and will not result in an impact to the receiving watercourse. If the groundwater is not suitable for discharge, alternate locations of disposal must be considered or adequate treatment must be carried out. At a minimum, groundwater is to be passed through a sediment filtration system prior to being discharged to a watercourse. The success of all mitigation will be verified though groundwater quality sampling.

Water level Alteration

Prior to groundwater dewatering, anticipated discharge rates and estimated zones of influence (ZOI) should be evaluated in relation to the associated water bodies to ensure the volumes will not impact water body hydrologic function. A Water Level Response Plan must be developed where a water body is located within a groundwater dewatering ZOI. Water levels of the water body must be monitored to determine if dewatering activities are resulting in alteration of water levels within the water body. Criteria for an acceptable alteration of water levels must be negotiated with agencies during the detailed design, permitting and approvals phase of the project. This will include identification of a level in which the Water Level Response Plan must be initiated. The plan would include contingencies for the supplementation of flow with water of a quality appropriate for discharge.

By-pass channels must be maintained to regulate flow through the watercourse and prevent from back flooding or overtopping the water containment structure and flooding the isolated construction area. This includes frequent monitoring of condition and implementation of contingency plans in the event the by-pass channel fails.

Prior to surface water dewatering, fish must be collected and relocated to a suitable location, preferably downstream and away from the construction area. This should be executed through the development of a Fish Salvage Plan. Dewatering pump hoses should also be fitted with screens at end of pipe as to not entrain or impinge fish in the hose or pumps. *Freshwater Intake End-of Pipe Guidelines* should be referenced to

determine appropriate screening standards (DFO 1995). A Scientific Collection Permit will be required from the OMNR, prior to execution of salvage.

Erosion and Sedimentation

Proposed discharge rates should be evaluated to determine if they are ecologically appropriate as to not cause erosion or damage to fish habitat to the receiving water body. Depending on rates, discharge may be required to be split between multiple locations in the watercourse. Flow dissipaters (i.e. sand bags, hay bales, etc) should also be installed at the location of discharge(s) to mitigate potential for erosion.

When using water containment structures to isolate a segment of a water body, silt curtains should be installed downstream or surrounding the proposed dam location prior to the installation and removal of the dam. This mitigation measure is applied to minimize in-stream sedimentation.

7.1.2.8 Drilling

The greatest potential impact associated with directional drilling is 'frac-out', where drilling mud escapes upwards into a water body. The primary mitigation measure in preventing a frac-out is to have geotechnical studies completed at proposed drilling locations as to ensure drilling is a feasible option and will not likely result in a frac-out based on geological conditions. An emergency frac-out response plan should be developed and implemented in event a frac-out occurs. This plan will include steps to contain, monitor and clean-up in response to the event. The DFO Operational Statement for Directional Drilling should be referenced in the development of the response plan (DFO 2007).

To minimize risk of drilling related debris or mud entering a watercourse as well as preventing erosion and sedimentation from equipment, drilling entry/exit shafts should be located at least 30m away from any water body.

The Spill Response Plan should also include details associated with drilling operations and be implemented in the event of a spill.

7.1.3 Operational Related Mitigation

As risk of impacts during the operational phase are limited to the potential for water quality impairment from contaminant spills, and erosion and sedimentation from maintenance activities, mitigation measure are focused on water quality as well as erosion and sedimentation.

Recommendations to mitigate for contaminant spills are discussed in Section 7.1.2.4.

The use of herbicides for the removal of vegetation should be avoided. If application is required, it should be limited and adhere to BMP's for herbicide application, and use herbicides approved for use adjacent to water bodies or within riparian buffer areas.

Recommendations to mitigate for erosion and sedimentation are discussed in Section 7.1.2.2.

7.1.4 Decommissioning Related Mitigation

Recommendations associated with decommissioning activities will generally follow the same guidelines as provided above in the construction related mitigation recommendations noted in Section 7.1.2.

During the decommissioning phase, if a decision is made to discontinue the project and remove all turbines and associated infrastructure, it is anticipated that all watercourse crossing structures will remain in place, which will benefit landowners. Furthermore, leaving structures in place will eliminate the need for additional in-water work which in itself will act to mitigate the potential for sedimentation, contaminant spills, and loss of habitat commonly associated with this type of work. Additionally, this will minimize the necessary remediation activities that are required to rehabilitate the site following the destruction of riparian vegetation and various effects on in-stream aquatic habitat.

If a decision is made to remove all crossing structures upon decommissioning of the project, NRSI recommends that a comprehensive management plan be prepared prior to the commencement of any activities. This plan will include the proper steps required for removing structures with the lowest collective footprint to the site. Steps must be taken in consultation with proper agencies while respecting in-water timing windows provided

through the local district OMNR. Finally, a mitigation and rehabilitation strategy will be prepared to counteract any and all negative environmental impacts caused by decommissioning activities.

7.2 Site Specific Water Body Mitigation

Recommended mitigation measures for each water body location are provided Tables 5 and 6.

Table 5. Summary of Water Body Crossing Locations and Recommended Mitigation Measures

Drainage Area	Water Body Feature Name	Water Body Location ID	Crossing Infrastructure	Potential Impacts	Recommended Mitigation Measures
Ausable River	Ausable River	WB41	• overhead cabling • construction area	outlined in Section 6.2., in-water work and drilling does not apply as cabling will be installed overhead, no risk of impacts to moderately sensitive top predator species	outlined in Section 7.1(excluding mitigation measure associated with in-water works, drilling and new water crossing design)
Adelaide Creek	Adelaide Creek	WB59	• overhead cabling • construction area	outlined in Section 6.2., in-water work and drilling does not apply as cabling will be installed overhead, risk of impacts to moderately sensitive top predator species due to proximity of construction to water body	outlined in Section 7.1(excluding mitigation measure associated with in-water works, drilling and new water crossing design)
		WB60	• overhead cabling • construction area		
		WB34	• underground cabling • construction area	outlined in Section 6.2., risk of impacts to moderately sensitive top predator	outlined in Section 7.1

Drainage Area	Water Body Feature Name	Water Body Location ID	Crossing Infrastructure	Potential Impacts	Recommended Mitigation Measures
				species due to proximity of construction to water body	
	Tributary E	WB33	• underground cabling • construction area	outlined in Section 6.2, risk of impacts to low sensitivity baitfish species due to proximity of construction to water body	
	Cleland Drain	WB2	• underground cabling • construction area		
	Wilson Drain	WB4	• underground cabling • construction area		
	Morgan Drain Branch A	WB14	• underground cabling • construction area	outlined in Section 6.2, risk of impacts to low sensitivity baitfish species due to proximity of construction to water body	outlined in Section 7.1
	Down Drain	WB18	• underground cabling • construction area		
Adelaide Creek	Seeds Drain	WB30	• underground cabling • construction area		
Mud Creek	Dodman's Drain	WB21	• underground cabling • construction area		
		WB22	• underground cabling • construction area		
Mud Creek		WB39	• underground cabling • construction area	outlined in Section 6.2, risk of impacts to low sensitivity baitfish species due to proximity of construction to water body	outlined in Section 7.1
	Walker Drain	WB23	• underground cabling • construction area		
	Sutherland Drain	WB24	• underground cabling • construction area		

Drainage Area	Water Body Feature Name	Water Body Location ID	Crossing Infrastructure	Potential Impacts	Recommended Mitigation Measures
Lenting Drain	Lenting Drain	WB42	• overhead cabling • construction area	outlined in Section 6.2., risk of impacts to sensitive coldwater species due to proximity of construction to water body, in-water work and drilling does not apply as cabling will be installed overhead	outlined in Section 7.1(excluding mitigation measure associated with in-water works, drilling and new water crossing design)
		WB10	• overhead cabling • construction area	outlined in Section 6.2., risk of impacts to sensitive coldwater species due to proximity of construction to water body, in-water work and drilling does not apply as cabling will be installed overhead	outlined in Section 7.1(excluding mitigation measure associated with in-water works, drilling and new water crossing design)
		WB11	• overhead cabling • construction area		
Big Swamp Drain	Big Swamp Drain	WB97	• overhead cabling • construction area	outlined in Section 6.2., in-water work and drilling does not apply as cabling will be installed overhead, risk of impacts to moderately sensitive top predator species due to proximity of construction to water body	
Ptsebe Creek	Tributary A	WB65	• overhead cabling • construction area		
	Tributary D	WB79	• overhead cabling • construction area		
	Tributary E	WB78	• overhead cabling • construction area		
Ptsebe Creek	Tributary G	WB76	• overhead cabling	outlined in Section 6.2., in-	

Drainage Area	Water Body Feature Name	Water Body Location ID	Crossing Infrastructure	Potential Impacts	Recommended Mitigation Measures
			• construction area	water work and drilling does not apply as cabling will be installed overhead, risk of impacts to moderately sensitive top predator species due to proximity of construction to water body	
	Tributary H	WB75	• overhead cabling • construction area		
	Tributary I	WB74	• overhead cabling • construction area		
		WB72	• construction area	outlined in Section 6.2, risk of impacts to low sensitivity baitfish species due to proximity of construction to water body	outlined in Section 7.1

Table 6. Summary of Water Body Locations within 120m of the Project Locations and Recommended Mitigation Measures

Drainage Area	Water Body Feature name	Water Body Location ID	Associated Infrastructure and Distance (m)	Potential Impacts	Recommended Mitigation Measures
Ausable River	Tributary E	WB82	BU – 120 CA - 120	outlined in Section 6.2., in-water work does not apply, new crossing structures do not apply, risks are associated with proximity of project components and construction work to water body	outlined in Section 7.1 (excluding mitigation measure associated with in-water works, drilling and new water crossing design)
Adelaide Creek	Adelaide Creek	WB58	UL- 66 CA- 56		
	Morgan Drain	WB16	AR- 22 UL- 16 CA- 6		
		WB17	WT-60 AR-111 UL-116 CA-51		
Mud Creek	Dodman's Drain	WB22	WT- 45 AR- 96		
		WB51	UL – 17 CA - 4		
	Walker Drain	WB23	WT- 48 AR- 100		
	Sutherland Drain	WB50	WT- 37 AR- 87 UL- 100 CA- 26		
Ptsebe Creek	Tributary A	WB12	OL- 82 CA - 55		
		WB43	BU- 114 CA - 114		
	Tributary D	WB80	OL- 56 CA - 44		
	Tributary F	WB77	OL- 46 CA - 38		
	Tributary I	WB72	OL- 16		
	Tributary J	WB73	OL- 119 CA - 105		

7.3 Monitoring

An adaptive management approach to the protection of water body protection requires regular site inspections and monitoring by a designated on-site Environmental Manager(s) (EM). Understanding the condition of the natural ecosystem throughout all phases of the project will form the basis upon which to consider altering construction methods, environmental protection measures, and monitoring programs. Ultimately, any determination related to the application of mitigation and contingency measures will be informed by ongoing analyses of monitoring data, and rely on the experience and judgment of the on-site EM in consultation with the OMNR, MOE and DFO as regulatory agencies.

Pre-construction monitoring is recommended where baseline conditions must be determined (i.e. water quality, water levels etc.). Active construction monitoring will be required at all locations where drainage features and water bodies are present. Active construction monitoring will be required at all locations of construction as well as water bodies located in close proximity. Post-construction monitoring may also be required to certify that proper restoration, stabilization, and overall quality of runoff is returned to pre-construction conditions as well as to satisfy regulatory permitting and/or authorizations. Detailed monitoring plans will be developed within the detailed design phase and will incorporate other monitoring required by regulatory permitting and authorizations i.e.) Letter of Advice (LOA), Fisheries Act Authorization, Permit to Take Water (PTTW) etc. They will also incorporate specific details of developed plans (i.e. ESC Plan, Flood Response Plan etc.)

General recommended monitoring activities are summarized in Table 7.

Table 7. Summary of General Monitoring Recommendations

Recommended Monitoring	Timing of Monitoring	Estimated Frequency of Monitoring
Monitor on-site conditions (i.e. erosion and sediment control measures, spills, flooding	• Construction phase	• Weekly during active construction periods • Prior to, during and after forecasted rain events (>20mm in 24 hours) or significant snowmelt events • Daily during extended rain or snowmelt periods

Recommended Monitoring	Timing of Monitoring	Estimated Frequency of Monitoring
		• Monthly during inactive construction periods • As detailed in the ESC Plan, SRP, and Flood Response Plan
Monitor meteorological conditions from Environment Canada	• Construction phase	• Daily review of weather forecasts
Document changes to existing aquatic habitat	• Pre-construction (to document existing conditions) • Construction Phase	• Once pre-construction • Daily during in-water and work within 30m • Weekly for work occurring within 31-120m of a water body
Monitor end point of dewatering discharge for water quality and erosion (if dewatering)	• Construction phase	• Daily erosion checks during discharge • Water quality prior to discharge, once a week thereafter or as described by agencies
Monitor by-pass channel (if applicable)	• Construction phase	• Daily checks of the channel to ensure it is functioning appropriately and water is flowing through as designed
Monitor aquatic habitat at drilling locations (if drilling)	• Construction phase	• Continuous monitoring of aquatic habitat conditions when drilling underneath a water body
Monitor surface water quality for general parameters (i.e. temperature, pH, dissolved oxygen, conductivity, TSS, turbidity, nutrients, metals)	• Pre-construction (to document baseline conditions) • Construction Phase	• Pre-construction sampling should meet agency requirements as to adequately establish baseline conditions • Frequent measurements of in-situ parameters and turbidity during construction • Other general water quality parameters as required by agency
Monitor water levels within water bodies during groundwater dewatering	• Pre-construction (to document baseline conditions) • Construction Phase • Post-construction	• Pre-construction monitoring frequency adequate to characterize baseline levels • Staff gauge readings daily during dewatering • Continuous level loggers (logged in 1hour increments and downloaded weekly) during active dewatering • Monitor post-construction until water levels return to baseline • As described in the Water Level Response Plan

8.0 Impact Assessment Summary

A summary of general project phase water body potential impacts, recommended mitigations and resulting impacts are presented in Table 8.

A summary of water body specific potential impacts, recommended mitigations and resulting impacts are presented in Tables 3-6 in Sections 6.3.1 and 7.2, respectively. With appropriate application of recommended mitigation measures outlined in this report, it is anticipated there will be no resulting significant impacts.

Table 8. Summary of General Project Phase Potential Impacts, Recommended Mitigation Measures and Resulting Significance of Impact

Potential Impact	Recommended Mitigation Measure(s)	Resulting Impact Significance[1]
Design Phase		
• Alteration of local drainage patterns	• design to maintain existing surface water drainage patterns and functions (including project layout, grading, storm water management facilities and structure designs) • utilize existing roads and road crossing structures where possible • crossing structures should be sized appropriately according to municipal engineering standards as to not result in alterations in stream hydrology, scouring or flooding crossing structures • newly impervious surfaces should consider use of permeable materials	• Not Significant
• Fish habitat alteration/loss	• consideration of design layout to minimize number of crossings • consider layout distances to water body features and sensitivity of those features • crossing locations should be selected as to avoid key habitat features (i.e. refuge pool) and cross the feature within a straight reach of the channel as to avoid meanders etc. and cross perpendicular • crossing structures should be designed to reduce loss and alteration of habitat (i.e. reduce affected area by cutting back from grading limit to road and install headwall, open bottom culvert etc.) • crossing structure should be properly sized and positioned appropriately (angle and embedded) as to avoid erosion issues and creation of potential fish barriers • crossing structures should be sized appropriately according to municipal engineering standards as to not result in alterations in stream hydrology, scouring or flooding crossing structures • crossing structure type should be determined in consultation with agency and municipality staff and should consider sensitivity of the water body and location of crossing • implement trenchless (i.e. directional drilling) technology at crossings where possible • any loss to the productive capacity of a watercourse must be compensated for under the *Fisheries Act*	• Not Significant
Construction Phase		
• Erosion and sedimentation	• implement trenchless (i.e. drilling) technology at crossings where possible • minimize potential for soil compaction (see Soil Compaction) • controlled vehicle and machinery access routes, keep away from water bodies • avoid clearing, grubbing and grading activities during seasonally wet periods (i.e. spring) • Avoid work during high volume rain events (>20mm in 24hrs) or snow melts are observed, resuming once soils have stabilized.	• Not Significant

[1] Considers if recommended mitigation measures are applied

Potential Impact	Recommended Mitigation Measure(s)	Resulting Impact Significance[1]
	• implement Flood Response Plan if on-site flooding occurs • implement Erosion and Sediment Control Plan • stabilize banks as soon as possible after construction disturbance (i.e. plantings, rock etc.), if insufficient time is available in the growing season to establish vegetative cover, an overwintering treatment such as erosion control blankets, fiber matting etc. should be applied to contain the site over the winter period • minimize disturbance by keeping construction equipment outside and away from water bodies • work in dry conditions (i.e. low flow period) or isolate in-water work area with use of a water containment structure • install silt fencing in-water downstream of water containment structures • dewatering discharge rates should be evaluated as to not result in erosion and sedimentation to receiving water body • dewatering discharge should be dissipated (i.e. sand bags, hay bales etc.) and may require to be split to more than one location • implement Stormwater Management Plan	
• Water Quality Impairment	• implement Erosion and Sediment Control Plan • implement Spill Response Plan • keep machinery clean and refuel a minimum of 30m away from any water body • fuel and other construction related chemical stored securely away from water bodies • any discharges to a water body must meet MOE Policy 2 standards (at or better water quality that than of the receiving water body) • adequately treat any discharge water prior to discharge as to meet MOE policy 2 standards (i.e. filer bags) • implement Stormwater Management Plan	• Not Significant
• Temporary disruption of fish habitat (in-water work)	• restrict construction to warmwater timing windows, as indicated by local OMNR • work in the dry (i.e. low flow) or isolate work area with a water containment structure or by working in dry conditions using accepted methods to bypass flows such as damming • machinery should be operated in a manner that minimizes disturbance to the banks and bed of the watercourse • when using a water containment structure, implement Fish Salvage Plan to remove any fish prior to dewatering work area • stabilize banks as soon as possible after construction disturbance (i.e. plantings, rock etc)	• Not Significant
• Water Level Alteration	• dewatering ZOI and rates should be determined prior to dewatering and assessed for impact on affected water bodies • implement Water Level Response Plan, trigger criteria to be determined in consultation with OMNR • maintain temporary by-pass channel (when required) during in-water work as to maintain flow and prevent back flooding and overtopping of water containment structure	• Not Significant

Potential Impact	Recommended Mitigation Measure(s)	Resulting Impact Significance[1]
• Soil Compaction	• controlled vehicle access routes • staging areas should be located away from water bodies (i.e. 30m)	• Not Significant
• Debris entering a water body	• construction debris should be stabilized (i.e. tarps) away from water bodies • refuse and other material should be appropriately disposed of off-site • staging areas should be located away from water bodies (i.e. 30m) • drilling shafts should be located away from water bodies (i.e. 30m)	• Not Significant
• Drilling Frac-out	• conduct appropriate geotechnical studies as to ensure directional drilling is appropriate at that location and will not result in a 'frac-out' • develop emergency response plan in the unlikely event of a 'frac-out' when drilling below a water body, this plan will deal with issues associated with water level alteration, water quality and erosion & sedimentation	• Not Significant
Operational Phase		
• Water quality impairment	• implement Spill Response Plan • void or limit use of pesticides, implement BMP's • address any impacts resulting from design or construction phases	• Not Significant
Decommissioning		
• See construction related impacts and recommended mitigation		

9.0 Summary and Conclusions

A detailed assessment of the water bodies within and adjacent to the proposed Adelaide Wind Energy Centre project has occurred through the use of a detailed Records Review (NRSI 2012a) and Site Investigations (NRSI 2012b) conducted by NRSI biologists.

Through the completion of these studies, NRSI has confirmed the presence of 23 water bodies within the project area, all of which have been identified as intermittent/permanent watercourses. Within these watercourses, a total of 37 individual locations have been identified where these water bodies are present within 120m of the project location.

Twenty of the 23 water bodies have been identified as crossing a project component. These 19 water bodies cross a project component at a total of 26 individual locations within the project area. These crossing locations include a combination of construction areas, underground, and/or overhead cable crossings. The remaining 4 water body features are located within 120m of the project location, but without a direct crossing locations.

With the exception of the Lenting Drain, which is designated as coldwater with sensitive coldwater salmonids species, all watercourses within the project area are designated as warmwater systems. The Ausable River and Adelaide Creek contain moderately sensitive top predator sport fish species and the remaining water bodies contain tolerant baitfish species. As such, the latter watercourses have been ranked as low sensitivity whereas Ausauble River and Adelaide Creek are ranked as moderately sensitive and the remaining tributaries and drains as low sensitivity when assessing impacts to these features.

With this Environmental Impact Study, it is maintained that with the implementation of the planned mitigation measures, monitoring programs and contingency plans, as presented above, there is unlikely to be any significant impacts to identified water body features resulting from the Adelaide Wind Energy Centre project.

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