Appendix I. ENVIRONMENTAL PROTECTION PLAN

Bateston Community Wind Power Project

Environmental Protection Plan

PREPARED BY

McCallum Environmental Ltd.

December 20, 2013

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Environmental Protection Plan (EPP)

1.0 INTRODUCTION

This Environmental Protection Plan (EPP) has been prepared to guide the design and installation of the physical components of the Bateston Community Wind Power project.

The purpose of the EPP is to establish procedures and methods to be used in the construction and operation of the Bateston Community Wind Power project that reduce impacts on the environment. The EPP applies provincial and, where appropriate, federal regulations & guidelines for construction activities and procedures.

The EPP includes an Emergency Response Plan (ERP) to address environmental emergencies, an Environmental Management Plan which lays out the procedures to be followed during the conduct of the work and a Site Restoration Plan (SRP). This ERP will be harmonized with the contractor's ERP and will be made available to all site personnel.

The EPP incorporates approved design methods for erosion and sediment control, defines setbacks from streams and wetlands and areas of environmental or heritage significance. It provides guidance for appropriate engineering designs for surface water management and stream crossings. The EPP also designates the timeframes for seasonally sensitive activities and establishes prohibitions for the project design and construction activities.

This document may be amended from time to time. Amendments will be issued by the Proponent Celtic Current LP and the project manager will ensure that all copies will receive amendments.

2.0 EMERGENCY RESPONSE

The following provides contact numbers in the case of emergencies involving: worker safety, public safety, and emergency response to address environmental emergencies.

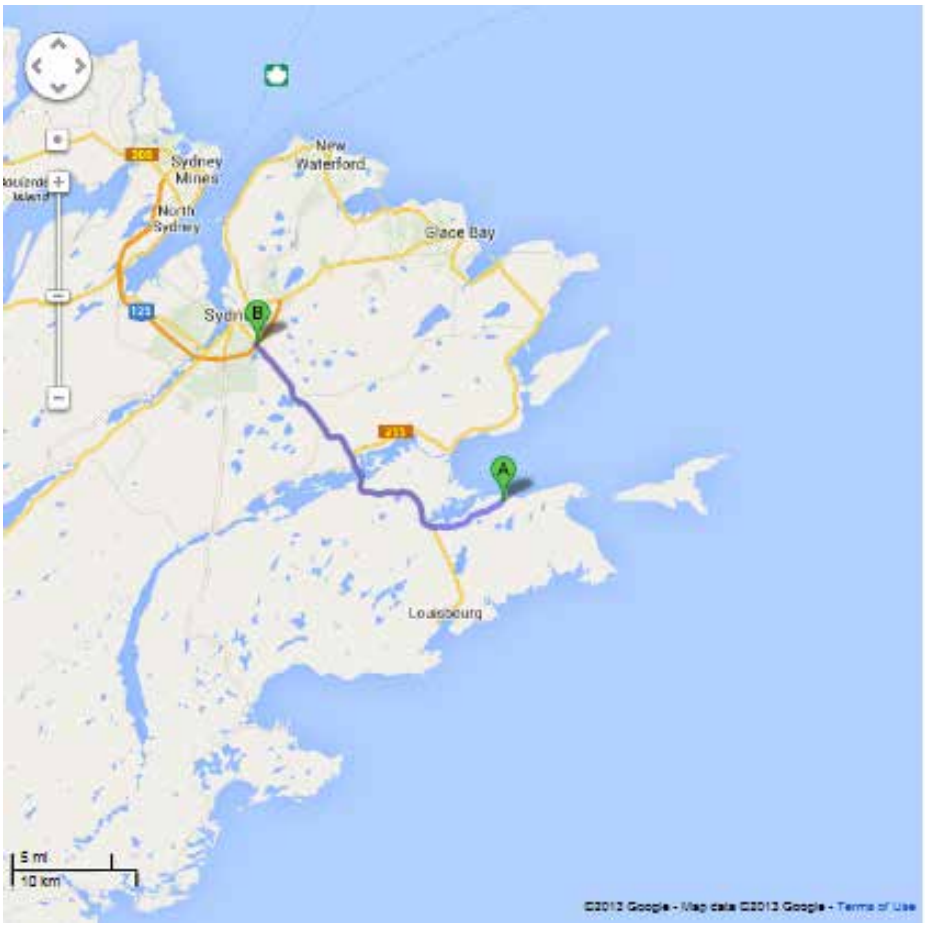
2.1 Emergency Contact List

Organization	Contact Name	Contact Number
Fire Department	-	**911**
Ambulance	-	**911**
RCMP Police	-	**911**
Hospital	Cape Breton Regional Hospital 1482 George St, Sydney, NS	**(902) 567-8000**
Poison Control	-	**1-800-565-8161**
Chief Financial Officer, **Celtic Current LP**	Martha Campbell	**1-902-945-2300**
Project Manager **Celtic Current LP**	Peter Archibald	**1-902-945-2300**
Health and Safety Officer, **Celtic Current LP**	TBA	
Nova Scotia Department of Environment	Emergency Measures Office	**1-800-565-1633**
Nova Scotia Environment Sydney	Karen Madden	**(902) 563-2100**
Nova Scotia **Department of Labour**	Health and Safety - 24 hour Response	**1 -800-952-2687**
NS Department of Natural Resources, Cape Breton County	Terry Power	**(902) 563-3370**
Environment Canada	Environmental Protection Emergency Response	**1-800-426-6200**
Environmental Advisor **Celtic Current LP**	Meghan Milloy	**(902) 880-6375**
Archaeological Artifacts, **Special Places Coordinator**	Laura Bennett	**(902) 424-6475**

2.2 Key Personnel Contact List

Position	Name	Phone Number	Fax Number	Cell Phone Number
Chief Executive Officer, Celtic Current LP	Leonard van Zutphen	(902)	(902)	(902)
Chief Financial Officer, Celtic Current LP.	Martha Campbell	(902)	(902)	(902)
Project Manager	Peter Archibald	(902)	(902)	(902)
Field Inspector, Celtic Current LP	Meghan Milloy	(902) 446-8252	-	(902) 880-6375
Health and Safety Officer	TBA			
Senior Environmental Advisor	Robert McCallum	902-446-8252		(902) 292-0514
Legal Counsel	TBA			
NS Environment, Sydney Nova Scotia	Karen Madden	(902) 563-2100	(902) 563-2387	-
DNR, Cape Breton County	Terry Power	(902) 563-3370	(902) 567-2535	-
Fisheries and Oceans, (DFO)	Charles McInnis	(902) 863-5670		
NS Tourism, Culture and Heritage	Laura Bennett	(902) 424-6475	(902) 424-0560	-
Maritime Aboriginal Peoples Council	Roger Hunka	(902) 895-2982	-	-
Union of Nova Scotia Indians	Nancy Paul	(902) 538-4107	-	-
Mi'kmaq Rights Initiative	Eric Christmas	(902) 843-3880	-	-

2.3 Guide Map to Regional Hospital



A Main a Dieu Rd, Bateston, NS, Canada

1.	Head **southwest** on **Main a Dieu Rd** toward **Paddys Ln** About 10 mins	go 6.2 km total 6.2 km
2.	Turn right onto **Louisbourg Hwy/Nova Scotia Trunk 22 N** (signs for **Sydney N**) Continue to follow Nova Scotia Trunk 22 N Destination will be on the left About 19 mins	go 23.1 km total 29.3 km

B **Cape Breton Regional Hospital**
1482 George St, Sydney, NS B1P 1P3, Canada

3.0 ENVIRONMENTAL MANAGEMENT PLAN GENERAL PROVISIONS

The Environmental Management Plan (EMP) has been developed to guide site specific construction activities and procedures. The purpose of the EMP is:

1. to manage and minimize risks and potential environmental impacts from construction activities;
2. To ensure that Celtic Current's commitments to minimizing environmental effects are met;
3. To ensure development activities meet all provincial, federal and municipal requirements;
4. To provide mitigation of the potential environmental impacts due to construction activities; and,
5. To provide a reference document for planning and/or conducting construction activities that may have an impact on the environment.

This EMP was developed by Celtic Current to describe the protection measures to be followed by Celtic Current personnel and all contractors required for activities associated with development of the Bateston Community Wind Power Project. Celtic Current's appointed project manager will be responsible for the enforcement of these procedures.

3.1 Construction Environmental Mitigation Measures

A. Design Specifications

1) Construction specifications will be completed to turbine manufacturer's technical specifications for:
    1) Access Roads and Crane Platforms
    2) Civil works, Crane and Road Requirements
    3) Other engineering design specifications pertaining to the Bateston Community Wind Project as specified by Celtic Current and their project engineers;

    If a conflict arises between technical specifications and regulatory requirements, regulatory requirements shall prevail, unless amendments are approved by the appropriate regulatory body.

B. Work Areas

1) All construction activities will be restricted, as much as practically possible, to approved work spaces, designated access roads and turbine sites;

2) During tower foundation construction, the crane platform areas may also serve as storage areas for material (e.g. reinforced steel) and machinery.

C. Runoff Control and Prevention of Sedimentation

1) When possible, the contractor will avoid grading immediately before or after heavy rain events, which would further loosen the road surface and promote runoff of graded material;

2) Aggregate which is to be used in or near watercourses will be washed quarried material;

3) For construction activities near watercourses, erosion and sediment control measures will be used to minimize erosion and ensure silt containment. The contractor will be responsible for maintaining these erosion and sedimentation control systems to ensure their effectiveness. These measures are outlined in Section 4.4;

4) All silt fences will maintain a minimum setback distance from water courses and wetlands of 10m;

5) Any water which intrudes into excavations that will be removed by pumping will not be discharged directly into any wetland or watercourse. If discharge water from pumping operations contains Total Suspended Solids (TSS) which exceeds 25 mg/l above the background condition of the watercourse at the site, discharge water from excavation will be pumped to a designated area up-gradient and downstream of the excavation. The discharge may be either be allowed to spill onto the ground and return to the watercourse following the natural topography, providing that the discharge is greater than 100 metres from a natural drainage course. Sedimentation bags, or containers with washed gravel will be used to dissipate flow and reduce erosion;

6) Following completion of construction and once vegetation has established, non bio-degradable erosion and sediment barriers will be removed from those areas which may be flooded by watercourses under high flow seasonal conditions to prevent these materials from being entrained in the watercourses;

7) If bridge footing excavations intrude into a watercourse for any reason, the contractor will be responsible to obtain prior environmental approvals and permitting for the watercourse alterations, diversions or temporary barriers as necessary to complete the installation;

8) Material placed in or adjacent to the watercourses for the temporary diversion will be removed as soon as possible by the contractor after the construction of work is completed;

9) Celtic Current will conduct visual assessments, both quarterly and after severe storm events, of the site to ensure the effectiveness of erosion and sedimentation control measures, unless otherwise approved by NSE.

10) Celtic Current and the Contractor will follow the *Nova Scotia Erosion and Sediment Control Manual* and/or follow the erosion and sediment control plan as outlined in this document (Section 4.4);

11) Any loss of containment or release of sediments will be reported immediately to the project manager and to NSE.

D. Bedrock Removal and Blasting

1) Where possible, rock excavation will be performed by ripping rather than blasting. Should blasting be required, no blasting will occur unless otherwise approved by NSE;

E. Pits

1) All aggregate sources will be approved by the project engineer and based on considerations such as the Pit and Quarry Guidelines (NSDOE May 4, 1999);

2) The Contractor will be responsible for obtaining NSE approvals for Pits greater than 2 hectares in size. Quarries of any size require NSE approval;

3) The slopes of all excavation pits will be constructed to a 3:1 slope;

4) If a pit is inconspicuous and poses a perceived safety hazard, the area will be marked with signs and/or fencing, depending on its location;

5) Pits may be backfilled with native material, and seeded with non-invasive, native, herbaceous plant species. Alternatively, pits may sloped to 3:1, stabilized, erosion controlled, and reclaimed to allow water to naturally collect within the pits to provide wetland habitat. In compliance with Section 6 of the Migratory Bird Regulations (MBR), this activity may not be conducted during the breeding season if birds which may use embankments for nesting sites are identified in the pit(s), typically between May 1st and August 31st for most species;

6) If adequate borrow pits and/or disposal sites are not available within the project area, offsite sources of fill will be used.

F. Vehicle and Equipment Operation and Fueling

1) All personnel, vehicles, equipment, etc…will follow all applicable traffic regulations and posted site speed limits and traffic controls;

2) Appropriate dust suppression measures will be used as required. Water will be used for dust suppression. The use of any other substance for dust is to be avoided;

3) Storage of petroleum, oil and lubricants (POL) on site during the construction phase will be in designated areas and will be done in compliance with applicable provincial and federal regulations, codes and guidelines;

4) The contractor will maintain an onsite emergency spill containment kit to adequately control any loss of fuel or lubricant by equipment;

5) Waste petroleum products, oils and lubricants (POL) will be properly contained and not released into the environment. Waste POL and all spent containers will be

contained and removed from the site for proper disposal at an approved disposal facility;

6) Vehicles will be fueled at designated sites away from wetlands and watercourses (minimum distance 50 m);
7) The transportation of dangerous goods will be conducted in compliance with the Transportation of Dangerous Goods Act;
8) The construction site will have restricted access signage to prevent trespassing or inadvertent entrance by public vehicles. ''Restricted Access'' signs will be posted at the entrance of primary access roads which leave private property and enter onto public right-of-ways;
9) Equipment and vehicles will yield the right-of-way to wildlife;

G. Construction Waste

1) Construction waste will be removed from the project area and disposed of at an approved location or facility;
2) Disposal of waste materials from construction activity will be in accordance with NSDTC's Standard Specifications (1980 and revisions) for Access Road Construction;
3) Unless otherwise directed by the project manager, limbs and timber will be chipped at the site, in accordance with the Nova Scotia Forest Fire Protection Act. Non-combustible material, overburden and rock will be disposed of where their use as fill material is impractical;
4) Waste disposal areas will be located where they do not negatively impact rivers, wetlands or any watercourse;
5) Portable toilets will be used at the construction site so that no untreated sewage is disposed of in the watercourses or on site.

H. Species of Concern, Rare and Endangered Species, and Historic Artifacts

1) A buffer area of 30 m will be established around rare plants using surveying ribbon and signs to prevent unauthorized intrusion;
2) Should excavation uncover historic artifacts, work at the excavation site will cease and the project engineer will be contacted immediately. The project manager will contact the appropriate authorities from the Department of Tourism, Culture and Heritage and First Nations. Work on site will re-commence work following regulatory clearance.

I. Surface Water, Wetlands, Watercourses

1) No construction will occur within 30 metres of a wetland or watercourse unless otherwise authorized by Nova Scotia Environment (NSE);
2) Culverts will be installed as per the requirements of NSE;
3) The design of all water crossings and culverts will be approved by an individual who has successfully completed Nova Scotia Watercourse Alteration training;
4) Disposal of any agent, either directly or indirectly, will not be permitted into any watercourse or wetland;
5) Prior to construction, watercourses will be inspected at locations upstream, adjacent to, and downstream of the site. The conditions of these areas will be photographed as background information on the riparian zone and stream features at each water crossing.

J. Wildlife Encounters

1) Garbage disposal will occur at designated disposal locations throughout the project for removal;
2) Harassment of any wildlife by site personnel will not be permitted;
3) Wildlife sightings will be reported to the project engineer or designate;
4) Any disruption or injury to wildlife will be reported to the local Provincial Wildlife Officer;
5) In the event of encounters with injured wildlife at the worksite, the project engineer or designate will contact the local Provincial Wildlife Officer. No attempt will be made to move the animal and no person at the worksite will come into direct contact with the animal;
6) Dead animals will be reported, as soon as possible, to the project engineer or designate who will notify the local Provincial Wildlife Officer. The locations of animals will be marked and reported to the project engineer or designate. The project engineer or designate will record the date and time it was found; state of decomposition; injury sustained (if identifiable); and species. This information will be kept on file with Celtic Current for incorporation into the post-construction monitoring program;

K. Fires / Medical Emergencies

1) All site personnel will be responsible for fire prevention and will conduct their work in a safe manner to prevent fires;
2) Flammable waste will not be disposed of on site but will be removed for disposal in an appropriate manner;

3) Smoking will be prohibited within 50 m of flammable products;
4) Some personnel will have taken the training course for dealing with energy industry fires but not for wildland fires. In the event of a wildfire, the workers will follow the Contractor Emergency Response Plan;
5) In the event of a fire on or near the turbine site, onsite personnel will attempt to put out the fire if it is safe to do so, using the onsite firefighting equipment. The fire will be reported immediately to the project engineer or designate. If the fire cannot be contained, the nearest fire department (Barney's River Volunteer Fire Department) will be contacted at 9-1-1.
6) In case of medical emergencies, the Contractor Emergency Response Plan will be adhered to;
7) Celtic Current will provide members of the nearest fire departments and medical rescue personnel with project plans and access road layouts for the project area. GPS coordinates for the road alignments and turbine locations will be provided to emergency responders for their reference;

4.0 ENVIRONMENTAL PROTECTION PLAN

The following are general guidelines that promote environmental protection:

- Plan operations from "cradle to grave";
- Report unsafe acts and/or acts that could result in harm to the environment;
- Address the issues if they are known, do not turn a blind eye;
- Conserve soil;
- Protect water resources;
- Control emissions;
- Prepare emergency response plans;
- Manage waste;
- Do not litter;
- Conduct HSE inspections;
- Regulatory inspections may be conducted at any time and participation and cooperation is required;
- If an incident occurs follow proper procedures;
- Practice good housekeeping at all times;
- Report HSE issues internally and externally as required;
- Maintain records as required;

4.1 Access Road Construction

4.1.1 Clearing and Grubbing

- Any merchantable timber present on the road alignment will be cut, decked and removed for sale or reuse;
- Only the areas required for the road alignment, construction work areas and laydown areas will be cleared and grubbed;

- Burning of cleared and grubbed material is not permitted. Excess brush and cleared materials will be chipped and the chips distributed over the site unless otherwise directed.
- In consultation with the environmental advisor brush piles may be created around cleared areas as wildlife habitat. The locations and size of such brush pile will be determined by the requirements of individual sites and the discretion of the environmental advisor;

4.1.2 Road Specifications

- The specifications for the road characteristics will be provided by the wind turbine provider and the contractor providing the heavy lift crane. However, road side slopes will be designed to achieve a maximum 2:1 slope (horizontal:vertical). Figure 4.2: Typical Access Road Cross Section and Ditch Detail shows the specifications to be followed for the access roads;
- Prior to construction, the final road specifications will be reviewed by the project manager, project engineer (civil) and environmental advisor for compliance with applicable provincial standards and environmental guidelines who will advise the Turbine provider and the contractor on any required amendments.

4.1.3 Construction Methods

- The access road will be logged and all timber skidded to appropriate log decks;
- All stumps will be stripped by bulldozer and piled along the boundary of the cleared right-of-way;
- Surface soils will be stripped to both sides of the access road;
- Subsoils will be stripped to the underlying parent material layer and piled on both sides of the access road, adjacent to surface soil piles;
- Subsoils will be stripped from the ditchline and placed in the middle of the road to build up the road traveling surface;
- During road construction, a trench will be dug with a backhoe, running parallel to the road. The ditch will be filled with stripped non-salvageable materials, and ultimately filled in;
- Previously piled subsoils will be feathered back into the ditchline;
- Previously piled topsoils will be feathered back into the ditchline over the subsoils;
- Where steep hills, small hills or knolls are encountered, the tops of the hills will be cut and pushed down the road to reduce the slopes required for travel;

4.2 Water Crossings

For the sizing of the culverts and bridges, *the Design Flow Formula Map for Nova Scotia for 1:100 Year Storm Event (Permanent Structures)* [updated in 2008] will be consulted.

The drainage area will be delineated using a combination of applied methods (Watercourse Alteration Guidelines) and computer programming. Basically, the area will be mapped with both the 5m contour data as well as recent aerial photographs. The zones of delineation were set out making sure to cross the contour lines at 90 degrees. Instead of overlaying a dot grid and counting, the GIS program is able to give precise calculated area measurements in hectares.

4.3 TURBINE SITE

The preparation and construction of the turbine site will follow the applicable requirements of Section 3.1 *a* through *m*. In addition, the following requirements will apply.

4.3.1 Clearing and Grubbing

- Any merchantable timber present on the turbine site will be cut, decked and removed for sale or reuse.
- Only the areas required for the turbine layout, construction pad and crane will be cleared and grubbed;
- Burning of cleared and grubbed material is not permitted. Excess brush and cleared materials will be chipped and the chips distributed over the site unless otherwise directed;
- In consultation with the environmental advisor, brush piles may be created around cleared areas as wildlife habitat. The locations and size of such brush piles will be determined by the requirements of individual sites on the advice and discretion of NSDNR and the wildlife advisor;
- Two lift stripping of soils may occur if subsoils are suitable to do so;
- Surface soils will be stripped and pushed to the boundary of the cleared site;
- A second stripping of subsoils may occur if possible, and will be pushed to the boundary of the turbine sites;
- Subsoils will be leveled to provide a suitable working surface;

4.4 Project Erosion & Sediment Control Options

Celtic Current would like to emphasize that it recognizes that successful erosion / sedimentation control requires correct installation of controls specific to site conditions, while also recognizing that ongoing maintenance is essential for successful outcome.

The planning strategies and structural components presented in this document are as equally important as the conceptual understanding of the principles of their implementation to ensure good construction performance and protection of the environment.

As such Celtic Current is providing what it perceives to be Best Management Practices for the project. Within the project, at the field level, any of these practices may be installed. Each area within the project will require specific control plans to be developed on-site using the principles and guidelines presented in conjunction with the lead Contractor (TBD).

The difference between erosion and sediment control methods is defined and summarized for the purposes of this document and all related activities on at construction projects as follows:

- Erosion Control is the process whereby the potential for erosion is minimized and is the primary means in preventing the degradation of downstream aquatic resources;
- Sedimentation Control is the process whereby the potential for eroded soil being transported and/or deposited beyond the limits of the construction site is minimized and is, for all intents and purposes, a contingency plan.

Both erosion and sedimentation control measures are dynamic and need to respond to requirements encountered throughout construction. Therefore, both temporary and permanent erosion and sedimentation control measures should be expected to evolve throughout construction to varying degrees based on site conditions and field performance of implemented measures.

Celtic Current will install erosion controls immediately after a disturbance resulting from a project in an erosion prone area. Erosion controls will be properly maintained, reinstalled as necessary and/or replaced until restoration is complete.

Erosion and sedimentation control measures required can be classified into two categories:

1. Temporary Measures: Those measures during the construction phase that may be completely removed to facilitate further construction that has other erosion control measures associated with it; and
2. Permanent Measures: Incorporated into the overall design of the development to address long-term post construction erosion and sedimentation control.

Temporary erosion and sedimentation control measures will be constructed at the start of the construction phase. However, additional measures will likely need to be constructed throughout construction. Permanent erosion and sedimentation control measures can be constructed during or at the end of the construction phase.

Examples of temporary measures include:

- Seeding;
- Slope texturing;
- Synthetic permeable barrier,
- Mulching;
- Hydroseeding;
- Biodegradable coverings;
- Filter fence;
- Fibre rolls and wattles;

Examples of permanent measures include:

- Offtake ditches;
- Energy dissipater;
- Earth dyke
- Gabion;
- Rock check;
- Sediment pond/basin;

Dependent on site conditions, some temporary measures will be retained for a longer duration to render its life span more permanent. With both temporary and permanent measures, the functional longevity of the method to be used will be taken into account prior to implementation.

This is not limited to the duration of the project, but to return to pre-disturbance conditions. The Construction Consultant/Environmental Monitor will consult with construction personnel on the appropriate measures to be taken. The measures outlined in the following tables discuss various erosion and sedimentation control locations of ideal use, advantages and limitations.

Table 1. Methods for Protection of Exposed Surfaces

Method	Slopes	Ditches & Channels	Large Flat Surface Areas	Borrow & Stockpile Areas	Advantages	Limitations
Topsoiling	X	X	X	X	Placing topsoil provides excellent medium for vegetation root structure to develop in; organic content promotes plant growth, reuse organics (topsoil or peat) stripped from the site at start of grading; absorb raindrop energy to minimize erosion potential	Cannot be effective without seeding and allowing time for plant growth; not appropriate for slopes steeper than 2H:1V (steep slopes will require soil covering over topsoil and specialized design); dry topsoil susceptible to wind erosion, susceptible to erosion prior to establishment of vegetation
Seeding	X	X	X	X	Inexpensive and relatively effective erosion control measure, effectiveness increases with time as vegetation develops, aesthetically pleasing, enhances terrestrial and aquatic habitat	Must be applied over prepared surface (topsoiled), grasses may require periodic maintenance (mowing), uncut dry grass may be a fire hazard, seeding for steep slopes may be difficult, seasonal limitations on seeding effectiveness may not coincide with construction schedule, freshly seeded areas are susceptible to runoff erosion until vegetation is established, reseeding may be required for areas of low growth
Mulching	X	X	X	X	Used alone to protect exposed areas for short periods, protects soil from rainsplash erosion, preserves soil moisture and protects germinating seed from temperature extremes, relatively inexpensive measure of promoting plant growth and slope protection	Application of mulch on steep slopes may be difficult, may require additional specialized equipment not commonly used.
Hydroseeding-Hydromulching	X	X	X	X	Economical and effective on large areas, mulch tackifier may be used to provide immediate protection until seed germination and vegetation is established, allows re-vegetation of steep slopes where conventional seeding/mulching techniques are very difficult, relatively efficient operation, also provides dust and wind erosion control	Site must be accessible to Hydroseeding Hydromulching equipment (usually mounted on trucks with a maximum hose range of approximately 150 m), may require subsequent application in areas of low growth as part of maintenance program

Riprap Armoring	X	X			Most applicable as channel lining with geotextile underlay, used for soils where vegetation not easily established, effective for high velocities or concentrations, permits infiltration, dissipates energy of flow from culvert inlets/outlets, easy to install and repair, very durable and virtually maintenance free, flexible lining for ditches with ice build-up	Expensive, may require heavy equipment to transport rock to site and place rock, may not be feasible in areas of the province where appropriate rock is not readily available, may be labour intensive to install (hand installation); generally thickness of riprap is higher when compared to gabion mattress
Gravel Blankets	X	X			Stabilizes soil surface with rock lining thus minimizing erosion, permits construction traffic in adverse weather, may be used as part of permanent base construction of paved areas, easily constructed and implemented, can be used to stabilize seepage piping erosion of slope	Must be designed by qualified geotechnical personnel, expensive, may not be feasible in areas of the province where gravel is not readily available, areas of high groundwater seepage may require placement of non-woven geotextile underlay and additional drainage measures
Biodegradable Erosion Control Products	X	X			Provides a protective covering to bare soil or topsoiled surface where degree of erosion protection is high, can be more uniform and longer lasting than mulch, wide range of commercially available products	Use must be based on design need of site, certification of physical properties and performance criteria (tractive resistance) is required, labour intensive to install, temporary blankets may require removal prior to restarting construction activities, not suitable for rocky slopes, proper site preparation is required to seat onto soil correctly; high performance is tied to successful vegetation growth
Cellular Confinement System	X	X		X	Lightweight cellular system and easily installed, uses locally available soils or grout for fill to reduce costs	Not readily used in construction, expensive, installation is labour intensive (hand installation), not suitable for slopes steeper than 1H:1V
Planting Trees and Shrubs	X		X	X	Establishes vegetative cover and root mat, reduces flow velocities on vegetative surface, traps sediment laden runoff, aesthetically pleasing once established, grows stronger with time as root structure develops, usually has deeper root structure than grass	Expensive, revegetated areas are subject to erosion until plants are established, plants may be damaged by wildlife, watering is usually required until plants are established

Riparian Zone Preservation	X	X	X	X	Preserve a native vegetation buffer to filter and slow runoff before entering sensitive (high risk) areas, most effective natural sediment control measure, slows runoff velocity, filters sediment from runoff, reduces volume of runoff on slopes	Stipulate construction activities with careful planning to include preservation areas, freshly planted vegetation for newly created riparian zones requires substantial periods of time before they are as effective as established vegetation at controlling sediment
Slope Texturing	X			X	Roughens slope surface to reduce erosion potential and sediment yield; suitable for clayey soils	Additional cost; not suitable for silty and sandy soils; not practical for slope length <8 m for dozer operation up/down slope

Table 2. Methods for Runoff Control

Method	Slopes	Ditches & Channels	Large Flat Surface Areas	Borrow & Stockpile Areas	Advantages	Limitations
Slope Texturing	X		X	X	Contouring and roughening (tracking) of slope face reduces runoff velocity and increases infiltration rates; collects sediment; holds water, seed and mulch better than smooth surfaces; promotes development of vegetation, provides loss of soil reduction in soil erosion compared with untracked slopes	May increase grading costs, may cause sloughing in sensitive (wet) soils, tracking may compact soil, provides limited sediment and erosion control and should not be used as primary control measure
Offtake Ditch	X		X	X	Collects and diverts sheet flow or runoff water at the top of a slope to reduce down slope erosion potential, incorporated with permanent project drainage systems	Channel must be sized appropriately to accommodate anticipated flow volumes and velocities, lining may be required, may require design by qualified personnel, must be graded to maintain positive drainage to outlets to minimize ponding
Energy Dissipater	X	X			Rip rap or sandbags slow runoff velocity and dissipate flow energy to non-erosive level in relatively short distances, permits sediment collection from runoff	Small diameter rocks/stones can be dislodged; grouted rip-rap armouring may breakup due to hydrostatic pressures, frost heaves, or settlement; may be expensive, may be labour intensive to install; may require design by qualified personnel for

						extreme flow volumes and velocities
Gabions		X			Relatively maintenance free, permanent drop structure, long lasting (robust), less expensive and thickness than rip-rap, allows smaller diameter rock/stones to be used, relatively flexible, suitable for resisting high flow velocity	Construction may be labour intensive (hand installation), extra costs associated with gabion basket materials, synthetic liner required underneath to prevent undercutting
Log Check Dam		X			Equally effective as silt fences for sediment trapping and straw bale barriers as drop structure, may include timber salvaged from site during clearing operations, most applicable at clearing/grubbing stages of construction	May be expensive, not commonly used after stripping stage, not appropriate for channels draining areas larger than 4 ha (10 acres), labour intensive to construct, gaps between logs may allow sediment laden runoff to escape, logs/timbers will rot over time (not permanent)
Synthetic Permeable Barriers		X			Reusable/moveable, reduces flow velocities and dissipate flow energy; retains some sediments; used as grade breaks in grades	Not to be used as check structures, must be installed by hand in conjunction with Biodegradable components, become brittle in winter and are easily damaged by construction. Only partially effective in retaining some sediment, primarily used for reducing flow velocities and energy dissipation
Fibre Rolls and Wattles	X				Function well in freeze-thaw conditions, low cost solution to sheet flow and rill erosion on slopes, low to medium cost flow retarder and silt trap, can be used on slopes too steep for silt fences or straw bale barriers, biodegradable	Labour intensive to install (hand installation), designed for slope surfaces with low flow velocities, designed for short slope lengths with a maximum slope of 2:1

Table 3. Methods for Sediment Control

Method	Slopes	Ditches & Channels	Large Flat Surface Areas	Borrow & Stockpile Areas	Advantages	Limitations
Riparian Zone Preservation	X	X	X	X	Preserve a native vegetation buffer to filter and slow runoff before entering sensitive (high risk) areas, most effective natural sediment control measure, slows runoff velocity, filters sediment from runoff, reduces volume of runoff on slopes	Stipulate construction activities with careful planning to include preservation areas, freshly planted vegetation for newly created riparian zones requires substantial periods of time before they are as effective as established vegetation at controlling sediment
Brush or Rock Filter Berm	X	X	X	X	More effective than silt fences, uses timber and materials salvaged from site during clearing and grubbing, can be wrapped and anchored with geotextile fabric envelope	More expensive than silt fences, temporary measure only, not effective for diverting runoff, expensive to remove, not to be used in channels or ditches with high flows
Fibre Rolls and Wattles	X				Function well in freeze-thaw conditions, low cost solution to sheet flow and rill erosion on slopes, low to medium cost flow retarder and silt trap, can be used on slopes too steep for silt fences or straw bale barriers, biodegradable	Labour intensive to install (hand installation), designed for slope surfaces with low flow velocities, designed for short slope lengths with a maximum slope of 2:1
Pumped Silt Control Systems (Silt Bag)		X			Filter bag is lightweight and portable, simple set up and disposal, sediment-laden water is pumped into and contained within filter bag for disposal, different aperture opening sizes (AOS) available from several manufacturers; for emergency use only under overflow conditions	May be expensive, requires special design needs, requires a pump and power source for pump, suitable for only short periods of time and small volumes of sediment laden water, can only remove particles larger than aperture opening size (AOS)

Silt Fence	X		X	X	Economical, most commonly used sediment control measure, filters sediment from runoff and allows water to pond and settle out coarse grained sediment, more effective than straw bale barriers	May fail under high runoff events, applicable for sheet flow erosion only, limited to locations where adequate space is available to pond collected runoff, sediment build up needs to be removed on a regular basis, damage to filter fence may occur during sediment removal, usable life of approximately one year
Earth Dyke/Barrier			X	X	Easy to construct, relatively inexpensive as local soil and material is used; can be easily converted to Sediment Pond/Basin	Geotechnical design required for fill heights in excess of 3 m, may not be suitable for all soil types or sites; riprap spillway and/or permeable outlet may be required
Gabions		X			Relatively maintenance free, permanent drop structure, long lasting (robust), less expensive and thickness than rip-rap, allows smaller diameter rock/stones to be used, relatively flexible, suitable for resisting high flow velocity	Construction may be labour intensive (hand installation), extra costs associated with gabion basket materials, synthetic liner required underneath to prevent undercutting
Rock Check Dam		X		X	Permanent drop structure with some filtering capability, cheaper than gabion and armouring entire channel, easily constructed	Can be expensive in areas of limited rock source, not appropriate for channels draining areas larger than 10 ha (4 acres), requires extensive maintenance after high flow storm events, susceptible to failure if water undermines or outflanks structure
Log Check Dam		X			Equally effective as silt fences for sediment trapping and straw bale barriers as drop structure, may include timber salvaged from site during clearing operations, most applicable at clearing/grubbing stages of construction	May be expensive, not commonly used after stripping stage, not appropriate for channels draining areas larger than 4 ha (10 acres), labour intensive to construct, gaps between logs may allow sediment laden runoff to escape, logs/timbers will rot over time (not permanent)
Synthetic Permeable Barriers		X			Reusable/moveable, reduces flow velocities and dissipate flow energy; retains some sediments; used as grade breaks in grades	Not to be used as check structures, must be installed by hand in conjunction with Biodegradable components, become brittle in winter and are easily damaged by construction. Only partially effective in retaining some sediment, primarily used for reducing flow velocities and energy dissipation

Table 4. Control Methods and Appropriate Construction Activity.

METHOD	Clearing & Grubbing	Stripping	Borrow Sources	Sub Excavation	Stockpiles	Cut Slope	Fill Slope	Ditches / Channels	Culverts	Temporary Haul Roads
Silt Fence	X	X	X		X	X	X		X*	X
Gabions								X	X	
Brush or Rock Filter Berm	X	X	X		X	X	X			
Continuous Berm	X	X	X		X	X	X			X
Earth Dyke Barrier	X	X	X		X	X	X			X
Inlet Protection								X	X	
Rock Check Structure								X		
Log Check Structure								X		
Synthetic Permeable Barrier								X		
Straw Bale Check								X		
Straw Bale Barrier			X		X	X	X			X
Biodegradable Erosion Products					X	X	X	X		
Rip Rap Armouring								X	X	
Cellular Confinement System						X	X	X		
Gravel Blankets						X	X	X		
Energy Dissipaters								X	X	
Sediment Ponds and Basins		X						X		
Slope Drains						X	X			
Offtake Ditches		X	X	X		X	X			
Seeding			X		X	X	X	X		
Mulching			X		X	X	X	X		
Hydroseeding			X		X	X	X	X		
Topsoiling			X		X	X	X	X		
Planting Trees and Shrubs						X	X	X		
Fibre Rolls			X		X	X	X			
Riparian Zone Preservation	X	X	X	X	X	X	X	X		X
Pumped Silt Control Systems								X	X	
Slope Texturing			X	X	X	X	X			X

Notes:
* Suitable for spilling basin at culvert inlet

Personnel associated with this project will adhere to the following generic guidelines:

- Maintain existing vegetation cover whenever possible and minimize the area of disturbance by minimizing travel. Maintaining existing vegetation cover is the best and most cost-effective erosion control practice;
- Retain and protect vegetation layer to reduce erosion potential;
- All vehicular traffic must stay within designated accesses. All suspected off RoW travel must be reported immediately to the Environmental Monitor/Construction Consultant;
- Install all erosion and sediment control practices prior to any soil disturbing activities, when applicable;
- Avoid frequent or unnecessary travel over erosion prone areas;
- Install silt fence on the down-slope perimeter of all steep (3:1 or greater slope) disturbed areas according to the attached installation instructions;
- Add mulch, straw crimping or silage along with native vegetation seed to all disturbed areas as required;
- Upon final abandonment, areas that have erosion potential may be straw crimped and or matted and seeded to return the area to pre-disturbance conditions in a timely fashion.

Inspection & Maintenance

Continued inspection and maintenance of erosion and sedimentation control measures may be required after completion of construction. Regular inspections should be conducted on a weekly basis or as required with respect to storm events and snow melt.

The contractor will be responsible for maintenance of the erosion control works installed under this EPP during construction. During operations, Celtic Current will be responsible for maintenance.

Inspection and maintenance will continue until the erosion control is no longer required. The following circumstances and conditions will determine this outcome:

a. Revegetation of bare soil was successful;
b. No obvious erosion scour is observed;
c. No obvious bedload of silt and sediment laden runoff is observed;
d. Inspection and maintenance report indicates satisfactory performance;

All maintenance preformed on erosion and sediment control measures will be recorded.

4.5 Vegetation Management Program

Celtic Current recognizes that each operational region is unique and that weed management that is effective in one area, may not be effective in another. However, Celtic Current's policy to

control vegetation will be based upon the species identified during discussions with landowners, regulators and field assessments.

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Celtic Current will take the following approach to vegetation management:

- Prevention
- Chain of Custody
- Procedures for Vegetation Control
- Monitoring
- Identification

4.5.1 Prevention

- Prevention is paramount to an effective weed management program;

- Celtic Current will attempt to minimize the potential for weed introduction/invasion by seeding all disturbed areas with landowner approved seed mixes.

4.5.2 Seeding

- Use a certified native seed mix. Purchase only certified seed from a recognized member of the Canadian Seed Growers Association (CSGA). Obtain a certificate of analysis that identifies weeds found in samples of analyzed by a seed lab;

- Broadcast versus seed drills shall be utilized. If the area has minimal disturbance then broadcast the seed but use a packing wheel attachment or covered chains dragged over the seed to enhance contact with the soil;

4.5.3 Operational Considerations

- Avoid driving vehicles across infestations. Fence off areas of infestation if necessary;
- Ensure imported materials (gravel, clay) are free of vegetative matter and soil. Avoid importing straw because it is very difficult to assess for weeds;
- Ensure equipment used during treatment programs is clean and free of any weed debris before entering the area that has been treated.

4.5.4 Chain of Custody

Successful implementation of the weed management program is dependent on awareness and participation by all parties active in the pasture and immediate surrounding area. It requires commitment from management, planning, communication, training, reporting and follow-up.

Celtic Current's Vegetation Management Policy guidelines will include:

- If landowners manage or implement a vegetation control program on surrounding lands, during the planning process Celtic Current will solicit their participation in a cooperative weed management program;
- Only licensed applicators licensed in the jurisdiction in which the lands are located may enter upon and treat vegetation on a Celtic Current site;
- The Senior/Lead Operator, in consultation with the Environmental Co-coordinator and licensed contractor, shall specify the herbicide (mixture) to be used on the access road, turbine pad, or other facilities;
- The Senior/Lead Operator shall insure that the contractor complies with all Workplace Hazardous Material Information System requirements, and that the contractor has a spill response plan and appropriate spill response equipment in place;
- The Senior/Lead Operator shall review site-specific environmental sensitivities with the contractor as part of the required project Pre-Job Meeting;
- Celtic Current employees will fulfill the day-to-day components of the weed management program.

4.5.5 Procedures for Vegetation Control

Celtic Current will use information collected in prior seasons to evaluate the infestation of noxious and invasive species over time and prepare a weed treatment plan for operations in the upcoming year.

As no one method of vegetation control may be effective, the following procedures will be implemented in a synergistic manner for all Celtic Current operations on project lands:

- The most effective and least costly method of weed control is to prevent their establishment;
- Integrated weed management may combine chemical, mechanical and natural controls with each measure implemented as needed. Treatments should not be employed on a scheduled basis but used in response to a situation identified during past monitoring;
- After a site has been cleared, prepared and seeded, regular monitoring and weed pulling is necessary in order to keep the site from being overrun by undesirable plant species. This prevents extensive root systems from forming. Once established, these root systems become extremely difficult and costly to remove completely;
- Preventative control must be incorporated for all operations. Construction machinery used in decommissioning is to be washed before entering work areas. This is to help prevent spread of nuisance, restricted or noxious weeds;
- Monitoring of the areas over a 2-5 year period (if location undergoing reclamation) or during the lifetime of a facility, is required to alleviate problems as they occur or until weeds are controlled and vegetation is established as appropriate. As monitoring occurs, disturbed areas will also be checked for new occurrences of weeds, and appropriate control methods will be applied to any outbreaks;

4.5.5.1 MOWING

- Celtic Current may rely on mowing as an effective form of weed control in the area;
- Repeated mowing controls perennial weeds by depleting root reserves. It will also prevent seed production of annual and biennial weeds;
- If only one mowing is planned, it should be completed during the budding stage of perennial weeds;
- Mowing must be completed early in the season, before vegetation sets seeds and multiple mowing treatments may be utilized;
- Mower selection will also be considered. Rotary mowers with one or more horizontal blades will cut plants at the highest setting above ground level to reduce potential impacts to nesting species. Lightweight mowers may be used to cut herbaceous weeds;
- Mowing will be completed during the construction phase and may be ongoing through operations as part of the Weed Management Program;
- To prevent conflicts with nesting birds, the *Migratory Birds Act* and *Species at Risk Act,* and still maintain effective weed control, mowing will not be completed during the critical breeding season and will be completed after July 15 unless vegetation characteristics dictate mowing within the time frame. Where weed control requires earlier intervention, field surveys will be done to identify active nests or other conflicts so that these may be avoided during the mowing operations;
- Direct impacts to vegetation will be limited to within the surveyed boundaries of the access and turbine pad boundaries. Mowers will travel off trails while mowing but otherwise will utilize existing access roads, minimizing additional soil disturbance.

4.5.5.2 HAND PULLING

- Hand pulling may be effective for small patches of perennial weeds however it is most effective for annual and biennial weeds. Pulling of annual weeds prevents seed production. If weeds are in flower, bag and dispose of them at an approved garbage facility to prevent seed spread;
- Hand pulling is most effective when you are trying to prevent the establishment of new species;
- Pulling and digging individual plants may be used to eradicate very small-scale infestations;

4.5.5.3 CHEMICAL CONTROLS

- Herbicide application that results in soil sterilization is strictly prohibited;
- Always notify adjacent landowners/occupants prior to the application of herbicides;
- If required permits will be obtained from regulatory bodies for the application of herbicides within 30 metres of an open water body. Pesticides must not be stored, mixed or equipment cleaned within 30 metres of an open body of water;
- Herbicide drift is a concern for ground application. Contractors are responsible for ensuring that any herbicide applications conducted are done so in a safe and responsible manner. The choice of chemical should be made with adjacent land uses in mind;
- Herbicides should not be sprayed when winds are excessive (winds over 16 km/hr are considered a drift hazard). Applications should occur only when winds are blowing away from water bodies, sensitive sites, or areas of concern (as identified by regulators and/or landowners). Conditions of temperature inversions should also be avoided;
- Presently, chemical control is accomplished through low-volume application of approved herbicides directed specifically toward weed species. The herbicide application is performed primarily with backpack sprayers, although some applications have been completed with hand-held nozzles attached to hydraulic truck-mounted sprayers via a rubber hose. Regardless of the specific spray equipment, reasonable efforts must be made to minimize impacts to desirable low-growing shrub and herbaceous species present. Low-volume applications entail lightly wetting of the foliage of undesirable woody species. The herbicide is then transferred throughout the plant, including into the roots, resulting in the death of the plant. Since foliar herbicide application requires leaves on the target plant, this method of herbicide treatment is performed only during the summer months when the vegetation is actively growing. There is very little impact to adjacent vegetation or the environment due to the limited amount of herbicide applied, the selected application to only undesirable weeds, and the careful selection of the herbicide mixture;
- During rainfall, herbicides are moved from land into waterbodies by runoff. The occurrence of herbicides in the waterbodies depends on the intensity and timing of the rainfall and location and timing of herbicide applications. Herbicide application requires extra care and caution to ensure water quality, and aquatic and riparian habitats will not be affected by the application. Natural vegetation should be left along natural water bodies to ensure bank stability and to provide a natural buffer and filter for chemicals;

4.5.6 Monitoring

Monitoring of locations is required to alleviate problems as they occur or until weeds are controlled and vegetation established as appropriate;

4.5.7 Protection of Flora & Fauna SARA Species during Vegetation Management

- In order to comply with the SARA and MBCA, as a requirement of the regulatory approval process, Celtic Current has already conducted flora and fauna assessments on the affected lands;
- The data collected during those assessments will be used to identify known, probable, or other habitat types, species at risk locations, and the likelihood of species at risk occurring within a specific area (i.e. LSD, section, etc…). The information collected in the preliminary stages will be used to create effective vegetation management strategies that avoid or protect species at risk, and ultimately comply with SARA and MBCA;
- For example, vegetation requiring control may require mowing but occur within a setback distance identified in assessments. In that instance, hand spraying or tillage, or weed pulling may be an appropriate response;
- As with any effective management strategy, Celtic Current's vegetation management strategy will be dynamic and require thoughtful execution.

4.6 Culvert Maintenance

All maintenance will be carried out in accordance with the *Nova Scotia Watercourse Alteration Specifications (2006)* or updated versions thereof.

4.6.1 Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs;

4.6.2 Limit the removal of accumulated material (i.e., branches, stumps, other woody materials, garbage, etc) to the area within the culvert, immediately upstream of the culvert and to that which is necessary to maintain culvert function;

4.6.3 Remove accumulated material and debris slowly to allow clean water to pass, to prevent downstream flooding and reduce the amount of sediment-laden water going downstream.

5.0 SITE RESTORATION PLAN (SRP)

The objective of the SRP is to remove all garbage from site, control erosion as may be necessary, restore soil capability, and reclaim the project areas and associated disturbed portions to a land capability which is equivalent to pre-disturbance characteristics.

Reclamation will take place once construction equipment has left the location or as soon as soil and weather conditions permit. The landowners will be notified prior to the initiation of the reclamation activities and again upon completion. Reclamation success is dependent on good landowner communication and upon favourable conditions in the root zone for optimum crop growth. The key soil factors that determine root zone quality include the water holding capacity, organic content, structure and consistence, salinity, nutrient balance and soil regime.

5.1 Interim Reclamation

Celtic Current shall attempt to reclaim all disturbed land surfaces within 2 growing seasons. Interim reclamation, including site and debris clean-up, slope stabilization and re-contouring with subsoil, and spreading of topsoil shall be done progressively and concurrently with operations.

Reclamation of the sites during production requires re-contouring the non-use portion of each surveyed pad area.

The subsoil will be used to re-contour each site to allow natural drainage patterns to exist without creating slopes that have the potential for erosion.

Any unexpected disturbances that occur outside the immediate working area of the sites will be reclaimed to pre-development conditions immediately.

5.2 Final Project Reclamation

Timeline

Decommissioning	**Activity**	**Timeline**	**Off Site Land Use Requirements**
Turbine	Removal of tower and turbine infrastructure	May – July	Use provincial, municipal or private roads for access to water or soils; May require temporary work space for equipment storage prior to removal from project lands; Use of water from local sources for reclamation purposes; Reclamation of borrow
	Removal of transformer	May – July	
	Partial excavation and removal of cement base to depth >1.5 meters	June – July	
	Removal of gravel pad and gravel from access	July – August	
	Recontouring of pad and access road	July – August	
	Reclamation of surface soils	August – September	
	Re-seeding	September -	

		October	pits at pre-approved locations; Use of landfill or recycling activities for equipment/waste disposal.
Power Lines/ Transformer Station	Removal of above ground poles and lines	May – July	
	Removal of transformer station and associated infrastructure	May – July	
	Removal of gravel pads	June – July	
	Removal of interconnection lines and infrastructure	July – August	
	Removal of access roads	July – August	
	Recontouring of pad and access roads	August – September	
	Reclamation of surface soils	September - October	

Soils

- Upon cancellation and abandonment of the location, all disturbed areas are to be re-contoured to pre-construction conditions. Loading of slopes with unconsolidated material will be avoided during slope re-contouring;
- All grades and drainages will be restored by removing any culverts and fills;
- Topsoil replacement should not be done until all subsoil leveling and cleanup has been completed, to prevent mixing by leveling after topsoil replacement;
- Surface diversion berms will be installed, as required. Run-off will be diverted to stable and vegetated off-right-of-way areas;
- In areas that have compaction problems, rip compacted subsoils, with a multi-shank ripper to an approximate depth of thirty (30) centimetres. Postpone ripping until subsoils dry out so that they fracture when ripped. Disc ripped subsoils to smooth the surface. Limit discing to that necessary to break up clods so as to minimize the potential for further compaction;
- Remove all foreign materials including geotextile;
- Bridges, fences and culverts are to be restored to meet or exceed pre-construction conditions;
- Rocks/stones exposed on the surface as a result of construction activity will be removed from the right-of-way prior to and after topsoil/surface material replacement. The concentration of surface and profile rocks will be equivalent to, or better than the surrounding fields. Rocks/stones will be disposed of at a site approved by the landowners;
- Any areas with rutting or erosion gullies will be re-contoured and all strippings will be replaced evenly over all portions of disturbed areas. Replacement of soils during wet

weather or high winds will be avoided. This will prevent damage to soil structure and reduce the potential for erosion of topsoil;

- Once sub-soil has been adequately reclaimed, topsoil will be replaced. Replaced topsoil will be disced to alleviate compaction and break up aggregates then harrowed to create an adequate seed bed;
- Erosion control in the form of matting, hale bales and/or cross ditching may be necessary on slopes;
- Complete re-contouring and stabilization of disturbed areas. Smooth water channeling ruts and outside berms. Ensure that all erosion control and water management measures (e.g. water bars, drainage dips, culverts and ditches) are working;
- If grading or other earthwork is required to facilitate vehicle/equipment on areas, strip and salvage topsoil and organic material for replacement during clean-up procedures;
- Complete scarification of the disturbed areas with disc or multi-shank ripper;
- Replace soil material and surface strippings from the down slope locations;
- Where soils have been disturbed, implement appropriate reclamation procedures (i.e. seeding, erosion blankets, slash rollback, straw crimping, etc.) to promote stability of the site, soil preservation, and plant re-establishment. Ensure the natural drainage is restored;

Vegetation

- Once topsoil has been re-distributed, disturbed areas will be re-seeded, as soon as weather permits, with an approved Canada #1 Certified Seed mixture from a local source. The Certificates of Analysis will be retained for documentation. Seed mixture design will be based upon observations of vegetation species in surrounding areas, discussions and recommendations put forth by the landowners and regulators, and availability of seed mixtures;
- Cover crops may be planted in areas requiring seeding of natives. If native vegetation seeding is to occur in the fall, plant the cover crop in the spring of the same year;
- Additionally, disturbed areas will likely require perennial species for long-term protection. The seed mix approved by the regulators and/or landowners/occupants will be used on all disturbed soils. The contract inspectors will mark these areas needing seeding on survey maps, so that crews can easily locate the areas and apply the seed as soon after disturbance as possible. In areas away from water, and where natural seed sources are available, contractors may depend on natural seeding.
- Seeding rates and methods will be based upon characteristics of the area, weather conditions, erosion potential of slopes, and landowner recommendations;
- Fertilizer may be needed in some cases but will not be applied unless approved by regulators and/or landowners;
- Locations should be monitored monthly during growing seasons. Typical monitoring should occur in June, July, and August. Monitoring will consist of visually inspecting the

areas to ensure vegetation has been established and is healthy, erosion has been mitigated, and landowner concerns have been adequately mitigated;

- Restore gates and fences;

6.0 Monitoring Program for Surface Water Impacts

6.1.1 Celtic Current's Commitments

As part of its environmental program, Celtic Current has made the following commitments regarding monitoring the project for surface water impacts during construction; operations; and maintenance:

- Celtic Current will conduct visual inspections, both quarterly, and after severe storm events, on the site to ensure the effectiveness of erosion and sedimentation controls;
- If issues are noted during these assessments, Celtic Current. will take the necessary steps to ensure erosion and sedimentation controls are repaired, replaced, upgraded, or installed as necessary;
- Celtic Current will provide summaries of the monitoring program to NSE on a quarterly basis, and reports will be submitted to NSE within 30 days from the last day of the preceding quarter;
- If an immediate or large scale impact is noted following a severe storm event, updates may be provided to NSE at that time;

7.0 Spill Response

Celtic Current recognizes its responsibility for its operations and the effects that these operations have on employees, landowners, the public and the environment. Although facilities and operating procedures are designed to prevent upsets that could result in a spill, spills may occur.

To a large extent, effective spill response is dependent on the amount of planning that is undertaken before a spill occurs. Sound planning will help reduce the number of spills, improve the success of response activities, reduce environmental impact, decrease conflict with regulatory agencies and the public, and lower spill response costs. Spill planning is a continuous process that requires commitment, cooperation and input. Components of planning include:

- Company policy and spill strategy;
- Spill prevention;
- Contingency plans;
- Equipment readiness (know local contractors);

Celtic Current will take immediate action to control a spill including:

- Shut in the source of the spill and start documentation;
- Assess the spill;
- Initiate containment and recovery;
- Protect the public and worker safety;
- Supervise the spill clean-up;
- Prepare status reports;
- Remediate and reclaim the affected area; and
- Conduct a de-briefing session to help prevent a similar incident.

Celtic Current's policy in regard to spill planning and control operations involves:

- Authority to initiate emergency actions;
- Reporting structures for notification and approvals;
- Authority for expenditures related to spill activities;
- Authority to activate additional resources as needed;
- Authority to respond to unidentified spills.

If a spill occurs, a single authority will immediately assume overall responsibility for coordination of response actions. For small spills one individual can oversee the entire operation, especially if that individual can obtain advice and support from internal resources, spill specials, regulatory staff and others.

7.1.1 Containment and Recovery

Once a spill has occurred, it is important for Celtic Current to initiate a well-organized response that includes shutting in the source, initiating containment and recovery, clean-up and reclamation. As no two spills are alike, it is impossible to provide a rigid set of instructions. Trained personnel must adapt to the unique circumstances of the spill and use available resources. If one technique fails, a new approach or improvisation of existing methods must be attempted. In general, spill response should be approached as follows:

- **Spill notification** - is the starting point for initial response. Documentation starts at this stage and must be continued until the site is reclaimed. Activate the spill contingency plan, mobilize resources, confirm spill and shut-in the spill source;
- **Assessment of incident factors** - includes the identification of hazards associated with the incident (hazard assessment), the site assessment and security of the impact.

- **Set objectives** – following the site assessment, the response team should develop an action plan that includes clear and concise objectives. The priorities are to protect human life, property and the environment. An action plan that outlines objectives will likely be developed by company personnel with input from regulatory agencies**;**
- **Incident control** – includes containment, recovery and spill management with a focus on communication. Control is accomplished by having a defined incident commander with authority and availability to resources;
- **Evaluation** – the spill response must be evaluated on a continuous basis and changes made to the action plan if necessary. The entire response team must be briefed when changes occur.

7.1.2 Containment and Recovery Techniques

- **Dikes, bellholes, trenches** – the most common method of containing a land spill is to use a combination of dikes, bellholes and trenches around the spill perimeter, with feeder trenches inside the spill itself to move fluids towards a recovery area. Feeder trenches can be constructed by hand or mechanical excavation only when the area has been deemed safe and continuous monitoring is undertaken.
- **Inverted weirs** – this technique is used when it is necessary to allow the natural movement of water to leave the spill site. An inverted weir consists of an earthen berm supported with sand bags or a plastic liner and the appropriate-sized culverts on an angle to contain oil inside the spill perimeter.
- **Filter fences** – can be constructed with pins and chicken wire or snow fence and bales (straw or hay). Filter fences can be effective to contain spills without severely affecting the natural movement of water.
- **Sorbent** – It may be appropriate to use a combination of natural sorbents (like straw or hay) with commercial synthetic sorbents. The overuse of sorbents can create a disposal problem and generate unnecessary waste.
- **Ice-slots** – in general, oil spilled under solid ice will flow with the current, with significant portions becoming trapped in pockets under the ice. The containment and recovery technique involves creating an opening in the ice (ice-slot) downstream of the spill and then recovering accumulations or removing ice from the opening, back to the source point of the spill. In using this technique it is important to follow the following steps:
    - Assess the weight-bearing capacity of the ice, water depths and current patterns;
    - Locate the ice-slot such that it is at an angle to the current (30 degree maximum) with a slight “J” into the main current to promote the movement of oil towards the recovery area;
    - Construct the ice-slot using backhoes, chain-saws or ice-augers providing the ice weight-bearing capacity is adequate and there are

no flammable vapours under the ice. The ice slot should be approximately .75m or 2ft wide;

- o Place a skimmer or vacuum unit in the ice-slot;
- o Recover accumulations or pockets of oil and contaminated ice. Consider in-situ burning as an alternative;
- o If there are natural openings in the ice it may be possible to use booms and skimmers. Caution should be taken when working in these natural conditions with respect to weight-bearing capacity.

7.1.3 Spill Waste Disposal

- Waste materials that are generated from a spill should be minimized and managed so that there are no long-term problems with disposal. The following are some of the common waste materials associated with spills and some options for disposal:

- **Contaminated fresh water** – removal and hauling by vacuum truck to an approved disposal facility;

- **Contaminated soil** – excavation by machinery or hand, loading, hauling, and disposal at an approved disposal facility

- **Vegetation/sorbents** – incineration, approved landfill;

- **Garbage** – incineration, approved landfill;

- **Construction materials** – clean and reuse, approved landfill, incineration;

- **Contaminated ice and snow** – store in secure containment until ice melts and recover spilled product for disposal.

8.0 Training/Contingency Planning/HSE

Celtic Current has a Corporate Health Safety & Environment Program which will be followed during construction, operations, and maintenance. The HSE Program outlines procedures for training, reporting and contingency planning and is summarized below:

8.1 ORIENTATION FOR NEW EMPLOYEES

Each new employee and contractor will have an orientation familiarizing him/her with ***Celtic Current*** Safety Policy, Probationary Period, Terms of Employment-plus work instructions and process sheets pertinent to the job. Every reasonable attempt will be made to ensure these are understood before contractors and employee signs acceptance and begins work.

PROJECT SITE SPECIFIC ORIENTATION: Contractors & Employees (Conducted by Site Manager or Supervisor)

Items Covered:

Celtic Current Safety Policy and Expectations
Contractors (manager, supervisor and employee) responsibility
Hazard identification specific to the project and site
Environmental protection requirements
Personal Protective Equipment (PPE) as required
Equipment, machinery safety
Training and training documentation required
Tailgate meetings conducted and documented
Near-Miss, Incident, Accident reporting and documentation
Emergency plan and procedures
List of all hazardous chemicals to be brought on site (MSDS)
Safe work procedures required

TRAINING: Contractors & Employees

Job, equipment specific training (is each employee trained, competent to do the job – is that training documented)
Safe work procedures are in place and employees trained on the procedures
First Aid training as required
Training for employees on Rights and Responsibilities (OH&S Act.)
WHMIS Training (chemical identification, safe handling procedures, MSDS knowledge and location)
Transportation of Dangerous Goods (TDG)

TRAINING SCHEDULE

Job specific training updated as required
WHMIS training (review yearly)
First Aid (up-dated as required)
TDG (every 3 years)

8.2 SAFE WORK PROCEDURES

Job specific, safe work procedures prepared and employees trained
All employees are encouraged to recognize, identify, and suggest improvements to the safety work procedures.

8.3 HAZARD IDENTIFICATION

JOH&S Representative or JOH&S Committee:

The JOH&S Representative or the individual members of the JOH&S Committee, will conduct informal audits on a daily basis.

The JOH&SC will conduct a formal audit / inspection once a month prior to the regular meeting.

Employees:

Each and every employee, contractor and contract employees are expected to conduct an informal audit / inspection of their work area to identify hazards daily before starting work. (How can I get hurt here today and how can I prevent that from happening).

PROCEDURE FOR CONTROLLING IDENTIFIED HAZARDS

Eliminate:

Where possible the hazard will be eliminated.

Guard and/or control:

Where elimination is not possible the identified hazard will be guarded and/or controlled using recognized engineering methods and/or safe work procedures.

Personal Protective Equipment (PPE):

Where the identified hazard cannot be eliminated or controlled with engineering methods Personal Protective Equipment will be required.

TRACKING & MONITORING THE RESULTS:

Worker's Compensation figures will be monitored to track the results of our safety program.

Hazard / Near - miss / Incident / Accident and Solution reports will be tracked and monitored.

NOTE: ***This OH&S Program has been developed in co-operation with the Occupational Health and Safety Representative.***

Appendix I: Inquiry & Complaint Reporting Procedures

Inquiry & Complaint Reporting Procedures

Celtic Current has developed a procedure for receiving, recording, investigating, resolving and reporting public inquiry or non-compliance events which may occur from time to time on the Bateston Community Wind Power Project. One of the key outcomes of the process is to ensure there are steps taken so that Celtic Current can learn from our experiences and maintain diligence in its ongoing operations.

Celtic Current is implementing a Contact Management Program to:

- Record enquiries, comments and complaints;
- Develop, manage and record responses to enquiries, comments and complaints;
- Support data collection and reporting requirements;
- Support communication, liaison and notification activities;
- Record communication, consultation and liaison activities;
- Assist the project team in managing issues;

Celtic Current will handle all comments and complaints concerning the Bateston Community Wind Power Project in a timely and prudent fashion.

Procedures

Celtic Current will manage the contact management data with responsibility to:

- Track and report out on enquiries and follow-up actions required; and
- Coordinate responses to enquiries.

Public Complaints

Complaints will be considered either reportable or non-reportable as follows:

- **Reportable** – An expression of concern or inquiry related to a specific topic or event that is related specifically to Celtic Current's operations and requires Celtic Current to take corrective action;
- **Non-Reportable** – An expression of concern or inquiry related to general industry-related activities, and includes non-project specific issues and concerns. These complaints typically will not require action by Celtic Current Responses to Non-Reportable public complaints will be as described in Sections 1, 3, 4, 11, and 12 below.

Recording

1. Public or regulatory concerns and enquiries will be recorded by the person(s) receiving the complaint. Any person witnessing, or involved in, an event shall report it verbally to their supervisor and on an Inquiry/Complaint form.

2. If required by regulations or the terms and conditions of approval the appropriate/designated person(s) shall immediately report the event to appropriate regulatory authorities.

Management

3. Recorded information will be provided to the Celtic Current Chief Operating Officer (COO), or person(s) delegated by the COO to receive such information;
4. The recorded information will be entered into Celtic Current's internal Contact Management Database within 96 hours of occurrence outlining the circumstances as known at that time and indicating what further investigations may be required. Responses will be as indicated below.

Resolution

5. Celtic Current will designate person(s) for ensuring that a Reportable Public Complaint is addressed, as outlined in this document. Celtic Current will acknowledge receipt of Reportable Public Complaints within 5 business days of receiving the complaint back to the complainant or inquirer.
6. Toward resolution, Celtic Current will evaluate the root causes of the complaint, investigate the issue(s) and report the findings back to Celtic Current management.
7. If resolution of the complaint can be handled in the 5 business day time frame (indicated in Step 5) Celtic Current will include information related to the response with the acknowledgement of receipt.
8. Celtic Current will make suitable efforts to resolve complaints and inquiries through thoughtful and timely responses or negotiations with complainants or inquirers.
9. In such a case that Celtic Current commits to implementing a solution, Celtic Current shall inform the complainant of the expected time frame for implementation.
10. An issue is "resolved" where Celtic Current has considered complaints and inquiries in good faith and has formulated and implemented, or committed to implementing, the appropriate solutions in a time frame acceptable to both parties.

Communicating Responses

11. Responses will be coordinated and provided by Celtic Current in a manner appropriate to the type of inquiry, and may include:
    - Meetings in person
    - Telephone calls
    - Emails
    - Letters

Record Keeping

12. Documentation to support recording, management, resolution and communication response standards shall be filed in accordance with the Celtic Current Corporate Records Management Program.

13. Celtic Current will use its Contact Management Database to record Reportable Public Complaints [and Regulator Inquiries], acknowledgements of receipt, and responses to any such complaints. The database will ensure accurate records maintained and will be used to develop required reports.

Self Auditing

14. Within 90 days of a Reportable Public Complaint being entered into the Contact Management Database, Celtic Current shall review the file to verify that the resolution has been achieved.
15. Unless a file in the Contact Management Database is referred to mediation or becomes the subject of a judicial proceeding or an arbitration, any outstanding actions under this process shall be audited every 90 days until the file is resolved.

Mediation

16. If the Self Auditing demonstrates that a Reportable Public Complaint has not been resolved through the resolution process herein, and subject to Sections 17 and 18, below, Celtic Current will engage a mediator who will be responsible for attempting to facilitate an agreement of resolution between Celtic Current and a complainant. Celtic Current will therefore send a notice of mediation to the complainant within 5 business days of having completed the Self Auditing.
17. Engagement of the mediator under Section 16, above, is conditional on the complainant providing agreement in writing to participate in mediation upon receiving notice of mediation from Celtic Current
18. Mediation is not required where, after the first 90-day audit period, the issue has been resolved.
19. The “Mediation Period” is the later of 30 days from the issuance of the notice of mediation or a date to be agreed on in writing by Celtic Current and the complainant in question.

Alternative Dispute Resolution

20. In lieu of mediation or if no agreement is reached through mediation within the Mediation Period, Celtic Current will consider other appropriate forms of alternative dispute resolution. Alternative dispute resolution may include, but is not limited to, arbitration.
21. Where Celtic Current identifies arbitration as an appropriate dispute resolution mechanism, it shall follow the applicable procedural rules set out in the

Arbitration Act, R.S.N.S., c. 19, s. 1, if the complainant agrees to the following terms:

a) All arbitration costs due in advance of a decision from an arbitrator or umpire shall be paid by each party submitting to arbitration in equal parts;

b) Where payment of arbitration costs are specified, billed or estimated prior to the decision from an arbitrator or umpire, but are not due until after a decision is rendered, the complainant's portion shall be submitted and held in trust to the benefit of Celtic Current for the duration of arbitration; and

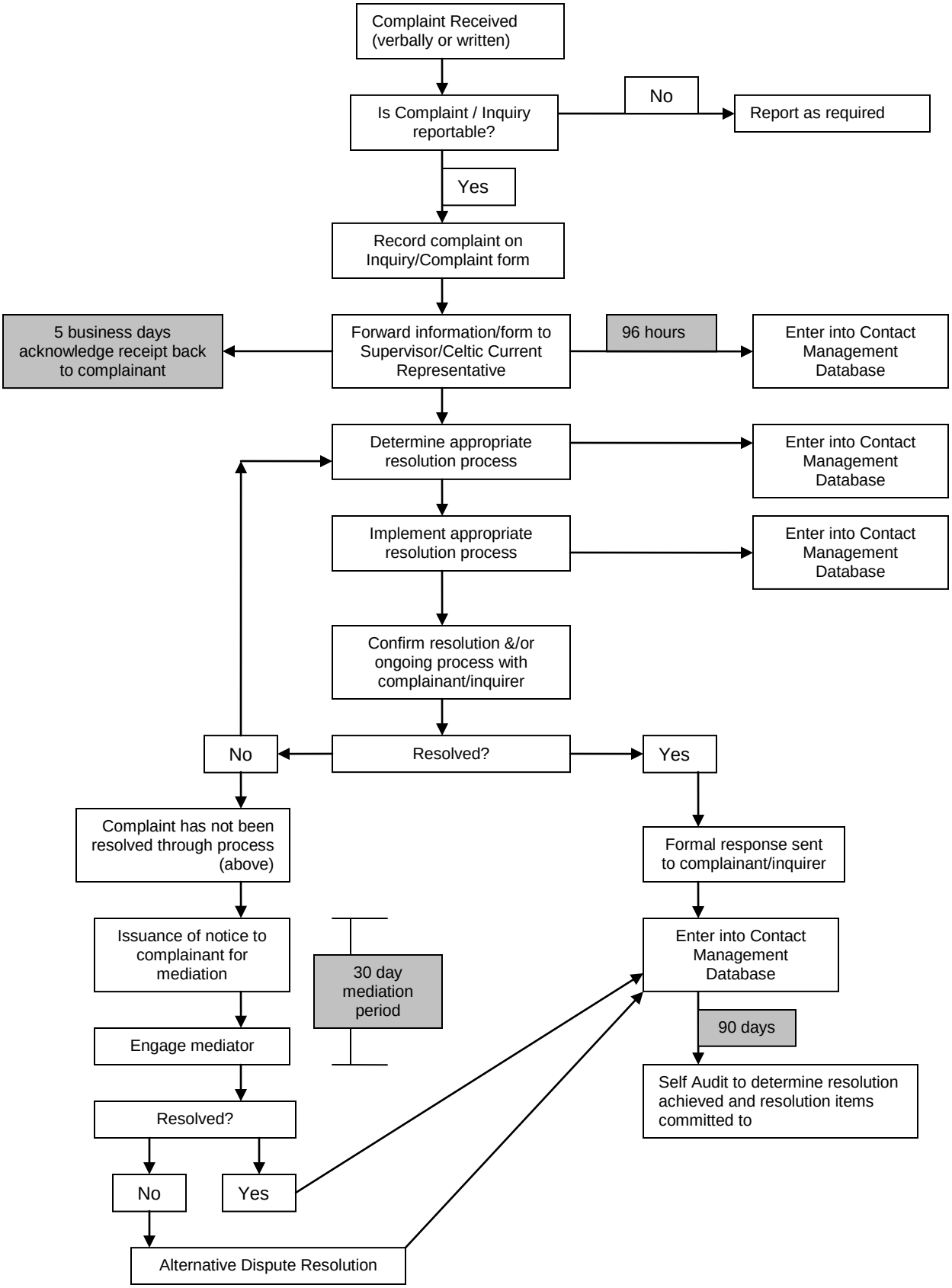
c) If non-binding arbitration is identified as the appropriate alternative dispute resolution mechanism, and unless otherwise agreed to and specified by Celtic Current and the complainant, only the provisions relating to timelines and selection, removal and misconduct of arbitrators, umpires and referees shall apply. To be clear, unless otherwise agreed to and specified by Celtic Current and the complainant, the decision or award made by an arbitrator or umpire shall not be final and binding on the parties and agreement to non-binding arbitration does not constitute "submission" under the *Arbitration Act*, R.S.N.S., c. 19, s. 1.

Contact Information Provided to the Public

The Celtic Current corporate website will provide advice on how to contact Celtic Current to register concerns and complaints.

Flow Chart

See following page.


Complaint Received (verbally or written)
Is Complaint / Inquiry reportable?
No
Report as required
Yes
Record complaint on Inquiry/Complaint form
5 business days acknowledge receipt back to complainant
Forward information/form to Supervisor/Celtic Current Representative
96 hours
Enter into Contact Management Database
Determine appropriate resolution process
Enter into Contact Management Database
Implement appropriate resolution process
Enter into Contact Management Database
Confirm resolution &/or ongoing process with complainant/inquirer
No
Resolved?
Yes
Complaint has not been resolved through process (above)
Formal response sent to complainant/inquirer
Issuance of notice to complainant for mediation
30 day mediation period
Enter into Contact Management Database
Engage mediator
90 days
Resolved?
Self Audit to determine resolution achieved and resolution items committed to
No
Yes
Alternative Dispute Resolution

APPENDIX I INQUIRY / COMPLAINT FORM

INQUIRY / COMPLAINT FORM	
Date of Inquiry:	Time:
Name of Person Taking Inquiry:	Title:

Name of Person(s) Making Inquiry/Complaint:
Mailing Address:
Phone Number of Person(s) making Inquiry:
Other Number (specify):
Email Address:

Inquiry or Complaint Details:

Inform the person that Celtic Current will respond within 5 business days.

CHAIN OF CUSTODY:

1. Person Taking Complaint: _____ Signature

2. Person Accepting Complaint form from #1.

Name **Signature** **Date**

3. Person Responsible for Resolution

Name **Signature** **Date**

Appendix II: Spill Report Form

Spill Report Form

AREA _____ LOCATION _____

LANDOWNER _____ PHONE # _____

OCCUPANT _____ PHONE # _____

INCIDENT DATE _____ SPILL TYPE _____

SOURCE OF SPILL _____ REASON FOR SPILL _____

SPILL VOLUME (m^3) _____ VOLUME RECOVERED (m^3) _____

ON-LEASE AREA AFFECTED (m^2) _____

OFF-LEASE AREA AFFECTED (m^2) _____

METHOD OF RECOVERY _____

DISPOSAL LOCATION _____

SPILL REPORT SUBMITTED TO REGULATORY AGENCY: q YES q NO DATE: _____

SPILL LOCATION AND DETAILS:

Appendix II. PRIORITY LIST OF SPECIES FOR FIELD ASSESSMENTS

Scientific Name	Common Name	COSEWIC	NSESA	NSDNR General Status	Preferred Habitat
Species with preferred habitat within the project area					
Accipiter gentilis	Northern Goshawk			YELLOW	BREEDING: Nests in a wide variety of forest types including deciduous, coniferous, and mixed forests. Has a complexity of habitat needs in the breeding season, which vary among forest types and region. Typically nests in mature or old-growth forests, and generally selects larger tracts of forest over smaller tracts
Chordeiles minor	Common Nighthawk	T	T	Red	Nest on the ground in a variety of habitats having little or no tree cover and a limited cover of taller shrubs and herbs, and then can also nest on flat gravel roofs in urban settings. Forest clearings created by forestry or fire are probably the most widely used habitats in the region, but sand dunes, river bars, open forests, commercial blueberry fields, mining and aggregate excavation sites, rocky outcrops and drier peatlands are all potential nesting habitats. Easily observable at dusk or dawn- as they forage in the air for insects.
Contopus cooperi	Olive-sided Flycatcher	T	Threatened	RED	Breeds throughout the maritime provinces. Is most associated with openings or edges in coniferous forest containing tall trees or snags for perching. Bog margins, river valleys, beaver ponds and meadows, slow moving streams with broad floodplains and cut over areas with some standing trees are frequently used habitats.
Contopus virens	Eastern Wood-Pewee			YELLOW	Breeds from eastern Great Plains to the Atlantic ocean, ranging from southern Canada to northern Florida, the gulf coast and central Texas. Winters in the tropics. Preferred habitats include northern hardwood, pine-oak, oak-hickory, bottomland hardwood, southern pine savannah, and Midwestern forests; also found in orchards, parks, roadsides and suburban areas.

Scientific Name	Common Name	COSEWIC	NSESA	NSDNR General Status	Preferred Habitat
Dendroica castanea	Bay-breasted Warbler			YELLOW	Breeds from northeastern B.C. east to Maritime provinces and south to the northern Great Lakes region and northern New England. Spends winters in the tropics. Preferred habitats include open spruce forests and deciduous woodlands.
Dendroica striata	Blackpoll Warbler			YELLOW	Breeds from Alaska and northern Canada to southern Canada and northern New England. Spends winters in the tropics. Preferred breeding habitat is coniferous forests; during migration found chiefly in tall trees.
Dendroica tigrina	Cape May Warbler			YELLOW	Breeds from southern Mackenzie, Manitoba, Ontario and Quebec south to North Dakota, Michigan, northern New York, Maine and Nova Scotia. Spends winters in southern Florida and the West Indies. Preferred habitats, but during migration also found in evergreen or deciduous woodlands, and often parks or suburban yards.
Dumetella carolinensis	Gray Catbird			RED	Breeds from southern Canada to central New Mexico, the Gulf states and Bermuda. Winters in the southeastern U.S., Panama, and the West Indie. Prefers low, dense vegetation or vine tangles at the edges of forests, marshes and streams; does not occur in forest interiors. Suburban landscapes often contain good habitat for this species.
Empidonax flaviventris	Yellow-bellied Flycatcher			YELLOW	Breeds from central Canada and Newfoundland south to Great Lakes region, northern New York, northern New England, and maritime provinces. Spends winters from Mexico to Panama.
Empidonax traillii	Willow Flycatcher			YELLOW	Breeds from southern B.C., Ab., North Dakota, New York, and Maine south to central California, Nevada, the southwest, Arkansas, and Virginia. Preferred habitats include swampy thickets, upland pastures, and old abandoned orchards; also occurs along wooded

Scientific Name	Common Name	COSEWIC	NSESA	NSDNR General Status	Preferred Habitat
					lakeshores and streams.
Icterus galbula	Baltimore Oriole			RED	Arrive in the northern states and Canada in April-May; males precede females by a few days. Southward migration begins in late July or early August. Habitat includes open woodland, deciduous forest edge, riparian woodland, and partly open situations with scattered trees, orchards, and groves of shade trees. In migration and winter this oriole also occurs in humid forest edge, second growth, and scrub; treetop level in coffee and cacao plantations, and savannah groves. Nests are placed in trees, an average of around 25-30 feet (8-9 meters) above ground, usually at the end of a drooping branch.
Molothrus ater	Brown-headed Cowbird			YELLOW	Habitat Comments: Breeding habitat includes woodland, forest (primarily deciduous), forest edge, city parks, suburban gardens, farms, and ranches. Cowbirds often are associated with forest-field edge habitat and clearings in forests. Feedlots, pastures, and fields with livestock also attract cowbirds, especially in predominately forested areas. Permanent resident in NS
Perisoreus canadensis	Gray Jay			YELLOW	Resident form Alaska east to Labrador and south across the northern U.S. Most commonly found in coniferous forests.

Scientific Name	Common Name	COSEWIC	NSESA	NSDNR General Status	Preferred Habitat
Pheucticus ludovicianus	Rose-breasted Grosbeak			YELLOW	Breeds from northeastern B.C. Manitoba, and Nova Scotia to southern Alberta, North Dakota, Oklahoma, and New Jersey, and as far south as Georgia; regular visitor on the west coast and winters from central into northern South America. Preferred habitats include moist woodlands, open fields and old, overgrown orchards.
Picoides arcticus	Black-backed Woodpecker			YELLOW	Resident in Alaska, Canada, and northern U.S. Preferred habitat includes coniferous forests in the boreal zone, especially where burned, logged, or swampy.
Pinicola enucleator	Pine Grosbeak			RED	Open coniferous (less commonly mixed coniferous-deciduous) forest and forest edge; in migration and winter also in deciduous forest, woodland, second growth and shrubbery. Nests in trees or shrubs in open coniferous woods, 2-9 m above ground Non breeding resident in NS
Poecile hudsonica	Boreal Chickadee			YELLOW	Boreal coniferous and mixed forests, muskeg bogs, vicinity of white cedar and hemlock swamps, birches and streamside willows. Nests in natural cavities or abandoned woodpecker holes, or in cavity dug by pair in rotten tree stub, usually within 1 m of ground. Permanent resident. Breeds from northern Alaska east to Labrador and Newfoundland, south to northern edge of U.S. Occasionally wanders southward during winter. Usually found in coniferous forests.
Pooecetes gramineus	Vesper Sparrow			RED	Habitats include plains, prairies, dry shrub lands, savannas, weedy pastures, fields, sagebrush, arid scrub, and woodland clearings. Breeding bird in northern NS

Scientific Name	Common Name	COSEWIC	NSESA	NSDNR General Status	Preferred Habitat
Regulus calendula	Ruby-crowned Kinglet			YELLOW	Breeds from Alaska east across Canada to Newfoundland, south California and New Mexico, and to the Great Lakes region and southern New England in the east. Spends winters south from southern B.C. and California across the southern tier of the states to southern New England. Preferred habitats include coniferous and deciduous forests.
Regulus satrapa	Golden-crowned Kinglet			YELLOW	Common from southern Alaska to central Canada and southeast to the Carolinas; spends winters south to Florida and the Gulf Coast. Preferred habitat includes dense conifer forests; also found in deciduous and mixed forests.
Sialia sialis	Eastern Bluebird	NAR		YELLOW	Breeding Bird- NS- northern portions only - towards Amherst and Pictou/Antigonish counties. Breeds east of the Rockies from southeast Canada to the Gulf of Mexico; winters in southern portion of breeding range. Inhabits open woodlands, clearings, farmlands, parks, orchards, gardens, fields, often seen along roadsides on utility wires and fences.
Spinus pinus	Pine Siskin			YELLOW	Breeds from southern Alaska, Mackenzie, Quebec, and Newfoundland south to California, Arizona, New Mexico, Texas, Great Lakes region, and northern New England; wanders southward throughout the U.S. during winter. Preferred habitats include coniferous and deciduous forests, woodlands, parks, alder thickets, and brushy pastures.
Tachycineta bicolor	Tree Swallow			YELLOW	Breeds from Alaska east through northern Manitoba to Newfoundland and south to California, Colorado, Nebraska, and Maryland. Preferred habitats include open areas near water, such as fields, marshes, meadows, shorelines, beaver ponds, and wooded swamps and standing dead trees.

Scientific Name	Common Name	COSEWIC	NSESA	NSDNR General Status	Preferred Habitat
Tyrannus tyrannus	Eastern Kingbird			YELLOW	Breeds from British Columbia across interior Canada to Maritime Provinces and south to Northern California, central Texas, the Gulf coast, and Florida. Spends winters in the tropics. Inhabits open woodlands, clearings, rural roadsides, farms, orchards, edges of fields, streams, and suburbs.
Vermivora peregrina	Tennessee Warbler			YELLOW	Breeds from Yukon, Manitoba, and Labrador south to B.C., Wisconsin, southern Ontario, and Maine. Spends winters in the tropics. Preferred habitats include open mixed woodlands in the breeding season; trees and bushes during migration.
Wilsonia canadensis	Canada Warbler	T	Endangered	RED	Found throughout the Maritimes- breeds in a variety of forest types- always in areas with a well-developed shrub layer and frequently in moist to wet sites. Forested swamps with some combination of white cedar, black spruce, red maple, and tamarack and dense mixed forests on steep river valley slopes are favoured habitat.
Wilsonia pusilla	Wilson's Warbler			YELLOW	Breeds from Alaska eastward to Newfoundland and south to southern California, New Mexico, central Ontario, and Nova Scotia. Spends winters in the tropics. Preferred habitats include moist thickets in woodlands and along streams as well as alder, willow thickets, and bogs.

Scientific Name	Common Name	COSEWIC	NSESA	NSDNR General Status	Preferred Habitat
Species with preferred habitat in proximity to the project area (primarily coastal species)					
Gavia immer	Common Loon	NAR		RED	Breeding habitat includes usually clear lakes containing both shallow and deep water areas. In studies comparing lakes with and without loons, higher turbidity was suggested as a factor influencing lack of occupancy
Branta bernicla	Brant			YELLOW	In winter, this species occurs primarily in marine situations that are marshy, along lagoons and estuaries, and on shallow bays, often in areas with eelgrass. Winter migration species. Tundra and coastal islands in the Arctic during breeding, and salt marshes & estuaries during winter.
Fratercula arctica	Atlantic Puffin			YELLOW	Nonbreeding: primarily pelagic. Most breeding colonies are on earthy islands where nests are in burrows (dug by puffin, rabbit, or other sea bird); in northern and central range large colonies occur among boulders; small populations may nest on cliff sites; usually uses nest site used in previous year. Tends to avoid areas used by great black-backed gull (preys on chicks and adults). Disperse in winter over open ocean, reaching as far south as the Azores and Canary Islands. During summer, frequents rocky cliffs no the North Atlantic and northern Europe
Pluvialis dominica	American Golden-Plover			YELLOW	Among the widest ranging birds in the world, this species breeds on tundra from Alaska east to Baffin Island and migrates south over the Atlantic Ocean from Canadian Maritimes to South America; some birds winter on islands in Pacific and appear along west coast during migration. Preferred habitat includes shores and prairies.

Scientific Name	Common Name	COSEWIC	NSESA	NSDNR General Status	Preferred Habitat
Charadrius melodus	Piping Plover	E	Endangered	RED	Breeds along the Atlantic coast from NFLD to south Carolina and winter along the coast of SC, FLA and the Caribbean. Plovers nest above the normal high water mark on exposed sandy or gravelly beaches. Nests are often associated with small cobbles and other small beach debris.
Falco peregrinus anatum	American Peregrine Falcon	SC	Vulnerable	RED	Breed around the Bay of Fundy shore, both in NB and NS on cliff ledges at sites where there is a steady supply of mid-sized birds such as small ducks or shorebirds. Ledges on tall buildings and bridges can also serve as suitable nest sites in urban areas.
Histrionicus histrionicus pop. 1	Harlequin Duck - Eastern pop.	SC	Endangered	RED	Breeds in northern Quebec and Labrador but few breed in turbulent rivers along the northern shores of Gulf of St. Lawrence, and northeast NB. Winter on sea coasts in the Maritimes
Hirundo rustica	Barn Swallow		Endangered	YELLOW	Breeds from Alaska east across Canada to Newfoundland and south throughout most of the U.S.; spends winters in the tropics and Eurasia. Preferred habitats include agricultural lands, suburban areas, marshes and lakeshores.
Actitis macularius	Spotted Sandpiper			YELLOW	Breeds from northern Alaska and Canada across most of the continent to southern U.S. Spends winters along the pacific coast from British Columbia and across southern states south to South America. Preferred habitats include ponds, streams, and other waterways, both inland and along coasts.
Dolichonyx oryzivorus	Bobolink	T	Vulnerable	YELLOW	Breeds from southern B.C. and across southern Canada to Nova Scotia and south to eastern Oregon, central Colorado, central Illinois, western Virginia, and western North Carolina. Preferred habitats include prairies and meadows; stay son marshes during migration.

Scientific Name	Common Name	COSEWIC	NSESA	NSDNR General Status	Preferred Habitat
Phalaropus fulicarius	Red Phalarope			YELLOW	Breeds in Alaska and northern Canada; migrates along both coasts, very rarely in the interior. Winters mainly at sea in Southern Hemisphere; irregular along Pacific coast.
Calidris pusilla	Semipalmated Sandpiper			YELLOW	Breeds in lower Arctic regions from western Alaska to Labrador. Migrates through the interior and along the Atlantic coast to reach its wintering grounds, which extend from the southern U.S. to South America. Preferred habitats include shorelines and mudflats.
Sterna hirundo	Common Tern	NAR		YELLOW	Breeds in North America along the Atlantic coast from the northern Maritime Provinces of Canada to South Carolina, and occasionally in the Gulf of Mexico or on large Island lakes. Spends winters from southernmost breeding areas on the Atlantic Coast to northern Ecuador and Brazil. Preferred habitats include sand and shell beaches, grassy uplands, and rocky inland shores.
Rissa tridactyla	Black-legged Kittiwake			YELLOW	Breeds in north Pacific, Arctic Ocean, and Atlantic south to Gulf of St. Lawrence. Spends winters from edge of sea ice southward, rarely to Gulf of Mexico, also in Eurasia. Nests on ledges of offshore islands, sea stacks, or inaccessible areas on coastal mainland.
Calidris maritima	Purple Sandpiper			YELLOW	Breeds on rocky tundra in far northern Canada, winters on rocky shorelines along the entire Atlantic coast.
Petrochelidon pyrrhonota	Cliff Swallow			RED	Cliff swallows inhabit open to semi wooded habitat, cliffs, canyons, and farm country, generally near meadows, marshes, and water. They build bottle-shaped mud nest in colonies on cliffs, under eaves of buildings, under bridges, and similar sites sheltered by an overhang. Many return to same nesting areas in successive years, but colonies tend to switch nesting sites between seasons, evidently due to a buildup of insect parasites in the nests. Cliff swallows commonly repair and use old nests.

Scientific Name	Common Name	COSEWIC	NSESA	NSDNR General Status	Preferred Habitat
Bucephala islandica	Barrow's Goldeneye (Eastern pop.)	SC		RED	Eastern population breeds in north-central Quebec and Labrador and winters along the Atlantic coast. Wintering concentrations are often found in areas where currents maintain ice free patches around estuary outlets, especially along the gulf of sty Lawrence. Group size along the Bay of Fundy and Atlantic Coast generally smaller. Late Oct and early April
Alca torda	Razorbill			YELLOW	Frequents coastal and oceanic waters; breeds on coastal cliffs and rock stacks in the summer
Riparia riparia	Bank Swallow			RED	Habitat includes open and partly open situations, frequently near flowing water. Nests are in steep sand, dirt, or gravel banks, in burrows dug near the top of the bank, along the edge of inland water, or along the coast, or in gravel pits, road embankments, etc.
Sterna dougallii	Roseate Tern	E	Endangered	RED	Islands along the Atlantic coast in NS from Yarmouth to Guysborough counties. Small colonies in Bay of Fundy and Gulf of St. Lawrence so any coastal tern colonies should be evaluated.
Catharus bicknelli	Bicknell's Thrush	T	Endangered	RED	Known to breed in Quebec, NB, NS and northeastern US. In the Maritimes, it has been recorded primarily at higher elevations (300m+) in northwestern and north central NB and Cape Breton. Highly exposed coastal habitats at lower elevations may also be used. Breeds in dense and stunted fir/spruce forests (including conifer plantations) with wet, cool micro-climates. Nesting starts in Early June and complete by late July

Scientific Name	Common Name	COSEWIC	NSESA	NSDNR General Status	Preferred Habitat
Tringa semipalmata	Willet			RED	Marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, and coastal lagoons, sandy or rocky shores, and, less frequently, open grassland.Nests along marshy lake margins in western North America, salt marshes in eastern North America. Nests on the ground in open places, coastal marshes, beaches, or islands; and inland in wet grassland by lakes, or short grass or bare ground by water.
Phalacrocorax carbo	Great Cormorant			YELLOW	Native of the Americas and Greenland. Prefers rocky coasts with sheltered inshore waters.
Sterna paradisaea	Arctic Tern			RED	Nests on ground on rocky, sandy, gravelly, or grass-covered coasts and islands, in far north on islands in lakes and ponds and in marshes and on riverine gravel bars, sometimes on open tundra Breeding Bird NS
Limosa haemastica	Hudsonian Godwit			YELLOW	Nests on mixed tundra/wetlands in northern Canada and Alaska. Migrates south off the Atlantic coast to South America for the winter. Preferred habitats include muddy, sandy or rocky shores, freshwater marshes, mudflats, and flooded fields.
Asio flammeus	Short-eared Owl	SC		RED	Open grassy habitats including open peat lands, coastal and inland marshes, dykeland, dunes, pastures hayfields, grain stubble, airports and young conifer plantations. Mainly in coastal maritime regions especially Upper Bay of Fundy dykelands, Acadian peninsula (NB) coastal bogs and saltmarshes and northern PEI dunes and saltmarshes.
Calidris canutus rufa	Red Knot rufa ssp	E	Endangered	RED	Occurs in migration in the Maritimes in mid-May to early June and between late July and early October- usually associated with other flocks of sandpipers on inter-tidal mudflats. Peak detectability between 2 hrs before high tide to high tide

Scientific Name	Common Name	COSEWIC	NSESA	NSDNR General Status	Preferred Habitat
Falco peregrinus	Peregrine Falcon			YELLOW	Breeds from Alaska and the Canadian arctic south locally through the mountainous west, and sparingly in the east. Spends winters on coasts north to B.C., and Massachusetts. Preferred habitats include tundra, savannas, coasts, mountains, and tall buildings.

Non-avian Vertebrates

Scientific Name	Common Name	COSEWIC	SARA	NSESA	NSDNR	Habitat
Culaea inconstans	Brook Stickleback				YELLOW	This species generally occupies cool, clear, heavily weeded, spring-fed creeks, small rivers, lakes, and ponds, usually in shallow, quiet to flowing pools and backwaters over sand or mud. Sometimes it burrows into soft bottoms. Occasionally this fish can be found in brackish water. In a lake in Manitoba, adults were most abundant at the outer margin of emergent vegetation (Moodie 1986). Eggs are deposited in a nest made of plant material by the male just above the bottom in shallow water
Lynx canadensis	Lynx			E	RED	elusive and have a large home range. Found where deep snow is present and good snowshoe hare populations

Scientific Name	Common Name	COSEWIC	SARA	NSESA	NSDNR	Habitat
Myotis lucifugus	Little Brown Bat	E			YELLOW	The little brown bat can be found in most of the United States and Canada except for the south central and south eastern United States and northern Alaska and Canada. The little brown bat lives along streams and lakes. It forms nursery colonies in buildings. In the winter it hibernates in caves and mines.
Myotis septentrionalis	Northern Long-eared Bat	E			YELLOW	The Northern Long-eared Bat (Myotis septentrionalis) is found in many regions of Canada. Although there are numerous records of its presence in eastern Canada and the United States, it has only been recorded sporadically in the west. This particular type of bat has two habitats: a winter hibernation habitat as well as a summer roosting and foraging habitat. The Northern Long-eared Bat hibernates in caves or abandoned mines during the cold winter months. During the summer months the Bats commonly use crevices behind peeling bark or cavities in partially-decayed trees as summer day roosts. Within thick forests, summer activity may be focused along watercourses and small ponds

Scientific Name	Common Name	COSEWIC	SARA	NSESA	NSDNR	Habitat
Perimyotis subflavus	Eastern Pipistrelle (Tri-colored Bat)	E			YELLOW	Prefers partly open country with large trees and woodland edges. Avoids deep woods and open fields. Probably roosts in the summer in tree foliage and occasionally in buildings; may use cave as night roost between foraging forays. Usually hibernates in caves and mines with high humidity. Generally, maternity colonies utilize manmade structures or tree cavities; often in open sites that would not be tolerated by most other bats
Anguilla rostrata	American Eel	SC			GREEN	Move from salt water into fresh water when quite young and spend their adult life in fresh water returning to spawn in tropical oceans up to several decades later. Widely distributed in freshwaters, estuaries and coastal marine waters connected to the Atlantic Ocean. Although small streams may be critical to the persistence of eels in a watershed, they may use these streams only once or twice a year, while moving to and from more preferred habitats.

Vegetation

Scientific Name	Common Name	COSEWIC	SARA	NSESA	NSDNR	Habitat
Conopholis americana	American Cancer-root				RED	hardwood forest
Cynoglossum virginianum	Wild Comfrey				RED	hardwood forest
Cypripedium	Yellow Lady's-slipper				YELLOW	hardwood and mixed wood forest

parviflorum			
Dirca palustris	Eastern Leatherwood	RED	hardwood, mixed wood
Goodyera oblongifolia	Menzies' Rattlesnake-plantain	YELLOW	hardwood, mixed wood and softwood forest
Goodyera pubescens	Downy Rattlesnake-plantain	RED	hardwood, mixed wood, and softwood forests
Solidago hispida	Hairy Goldenrod	RED	Woods and forest edges
Anemone americana	Round-lobed Hepatica	RED	rocky woods
Bistorta vivipara	Alpine Bistort	RED	Moist to wet spruce or mixed woods along shorelines, moist subalpine woods and meadows, alpine meadows, heaths, nutrient-rich sites
Ceratophyllum echinatum	Prickly Hornwort	RED	fresh water of lakes, ponds, marshes and swamps
Conioselinum chinense	Chinese Hemlock-parsley	YELLOW	coastal island, hardwood forest, headland, marsh, softwood forest, swamp
Eriophorum gracile	Slender Cottongrass	YELLOW	bog, field meadow, lakeshore wetland, swamp
Goodyera repens	Lesser Rattlesnake-plantain	YELLOW	coniferous swamps and bogs, cool, shady, moist coniferous forests with a mossy understory
Lactuca hirsuta	Hairy Lettuce	YELLOW	disturbed sites, lake or pond shore, mixedwood forest
Ophioglossum pusillum	Northern Adder's-tongue	YELLOW	field meadow, lake or pond shore, swamp
Triantha glutinosa	Sticky False Asphodel	RED	beach or coastal shore, bog, swamp
Fraxinus pennsylvanica	Red Ash	RED	bogs and seepages or bottomland forests or disturbed and weedy areas or mesic upland forests or mixed forest edges or suburban plantings
Persicaria arifolia	Halberd-leaved Tearthumb	YELLOW	swampy, calcareous or fen habitats
Triosteum aurantiacum	Orange-fruited Tinker's Weed	YELLOW	intervale (low tract of land along a river)

Ageratina altissima	White Snakeroot	RED	mixed wood forest, river or stream
Alopecurus aequalis	Short-awned Foxtail	YELLOW	river or stream
Anemone canadensis	Canada Anemone	RED	alluvial floodplain, field meadow
Anemone multifida	Cut-leaved Anemone	RED	river or stream
Anemone quinquefolia	Wood Anemone	YELLOW	intervale, river or stream
Anemone virginiana	Virginia Anemone	YELLOW	cliff or talus slope, intervale, river or stream
Antennaria parlinii	Parlin's Pussytoes	RED	hard wood, mixed wood, river or stream
Asplenium trichomanes	Maidenhair Spleenwort	YELLOW	cliff or talus slope, river or stream
Bidens beckii	Water Beggarticks	YELLOW	aquatic, river or stream
Campanula aparinoides	Marsh Bellflower	YELLOW	field meadow, river or stream
Cardamine maxima	Large Toothwort	RED	hardwood forest, river or stream
Carex bebbii	Bebb's Sedge	RED	Wet meadows and streamsides
Carex garberi	Garber's Sedge	RED	fen, river or stream
Caulophyllum thalictroides	Blue Cohosh	RED	alluvial floodplain, hardwood forest, intervale
Cinna arundinacea	Sweet Wood Reed Grass	RED	alluvial floodplain
Clematis occidentalis	Purple Clematis	RED	mixed wood forest, river or stream
Desmodium canadense	Canada Tick-trefoil	RED	river or stream
Desmodium glutinosum	Large Tick-trefoil	RED	hardwood forest, intervale
Eleocharis ovata	Ovate Spikerush	YELLOW	sandy freshwater margins, including lakes, ponds and rivers
Elymus hystrix	Spreading Wild Rye	RED	river or stream
Elymus wiegandii	Wiegand's Wild Rye	RED	field meadow, river or stream
Epilobium hornemannii	Hornemann's Willowherb	YELLOW	river or stream
Equisetum pratense	Meadow Horsetail	YELLOW	river or stream
Floerkea proserpinacoides	False Mermaidweed	YELLOW	hardwood forest, intervale
Galium boreale	Northern Bedstraw	RED	woodlands, fields, edges of streams and lakes
Gratiola neglecta	Clammy Hedge-hyssop	YELLOW	marsh, river or stream

Halenia deflexa	Spurred Gentian	YELLOW	edges of moist forest, and wet, forest road ditches
Hieracium robinsonii	Robinson's Hawkweed	YELLOW	cliff or talus slope, river or stream
Hypericum majus	Large St. John's-wort	RED	wet meadows, shores, ditches, fens
Impatiens pallida	Pale Jewelweed	YELLOW	alluvial floodplain, coastal island, intervale
Juncus alpinoarticulatus	Alpine Rush	RED	Wet meadows, sandy and gravelly, often calcareous shores, fens, and clayey pools over rock
Juncus marginatus	Grass-leaved Rush	YELLOW	disturbed sites, field meadows, river or stream
Laportea canadensis	Canada Wood Nettle	YELLOW	alluvial floodplain, hardwood forest, intervale, mixed wood forest
Lilium canadense	Canada Lily	YELLOW	field meadow, river or stream
Limosella australis	Southern Mudwort	YELLOW	beach or coastal shore, coastal island, lake or pond shore, river or stream
Montia fontana	Water Blinks	RED	beach or coastal shore, river or stream
Myriophyllum farwellii	Farwell's Water Milfoil	YELLOW	lake or pond shore, lakeshore wetland, river or stream
Phleum alpinum	Alpine Timothy	RED	river or stream
Pilea pumila	Dwarf Clearweed	RED	hardwood, mixed wood, river or stream
Pinguicula vulgaris	Common Butterwort	RED	coastal island, cliff or talus slope, river or stream
Podostemum ceratophyllum	Horn-leaved Riverweed	RED	river or stream
Rumex triangulivalvis	Triangular-valve Dock	YELLOW	beach or coastal shore, river or stream
Sanicula odorata	Clustered Sanicle	RED	alluvial flood plain only
Silene acaulis	Moss Campion	RED	long streams, river terraces, tundra, slopes, ridges, cliffs; on seepage slopes, or dry, or moderately well drained areas; calcareous; gravel, sand, silt, till; with low organic content
Silene antirrhina	Sleepy Catchfly	RED	roadsides, railways, pastures, fields

			wastegrounds, alluvial woods
Spiranthes lucida	Shining Ladies'-tresses	RED	saturated, calcareous, usually gravelly or sandy soils. Typical habitats include stream and river banks or floodplain terraces, fens, and old quarries or gravel pits
Spiranthes ochroleuca	Yellow Ladies'-tresses	YELLOW	barrens, disturbed sites, field meadow, river or stream
Stellaria crassifolia	Fleshy Stitchwort	RED	Fens, fen meadows, meadows, springs, waterside meadow shores that are prone to flooding, seashore kelp banks
Stellaria longifolia	Long-leaved Starwort	YELLOW	coastal island, field meadow, river or stream
Tiarella cordifolia	Heart-leaved Foamflower	YELLOW	hardwood forest, intervale
Trisetum melicoides	Purple False Oats	RED	river or stream
Viburnum edule	Squashberry	YELLOW	hardwood forest, mixed wood forest, river or stream
Woodsia glabella	Smooth Cliff Fern	YELLOW	cliff or talus slope, river or stream
Zizia aurea	Golden Alexanders	RED	field meadow, lake or pond shore, river or stream
Betula michauxii	Newfoundland Dwarf Birch	YELLOW	Sphagnum bogs, around pools, and wet peaty meadows
Coeloglossum viride	Long-bracted Frog Orchid	RED	Alluvial floodplain, bog, coastal island, mixed and softwood forests
Empetrum eamesii	Pink Crowberry	YELLOW	barrens, beach or coastal shore, bog, exposed rock or sand, headland
Galium labradoricum	Labrador Bedstraw	YELLOW	Bogs, mossy thickets, woods. [Conifer forest (forest, upland)]
Listera australis	Southern Twayblade	RED	Bog, mixed wood forest
Lobelia kalmii	Brook Lobelia	RED	bog, cliff or talus slope, field meadow
Rhamnus alnifolia	Alder-leaved Buckthorn	YELLOW	bog, field meadow, swamp
Salix pedicellaris	Bog Willow	YELLOW	bog, lake or pond shore, lakeshore wetland, marsh

Vaccinium uliginosum	Alpine Bilberry	YELLOW	barrens, beach or coastal shore, bog, exposed rock or sand, headlands, field meadow
Symphyotrichum boreale	Boreal Aster	YELLOW	bogs, fens
Botrychium lanceolatum	Triangle Moonwort	YELLOW	field meadow, hardwood forest, swamp
Carex gynocrates	Northern Bog Sedge	RED	bog, coastal island, swamp
Eleocharis fallax	Creeping Spikerush	RED	marsh, lakeshore wetlands
Eleocharis flavescens	Yellow Spikerush	YELLOW	lakeshore wetland, swamp
Fraxinus nigra	Black Ash	YELLOW	swamp
Galium obtusum	Blunt-leaved Bedstraw	RED	swamps, swampy grounds, wet areas of prairies, wet woods and thickets, roadside ditches.
Adiantum pedatum	Northern Maidenhair Fern	RED	hardwood forest, intervale
Allium tricoccum	Wild Leek	RED	hardwood forest, intervale
Boehmeria cylindrica	Small-spike False-nettle	RED	Moist and shady ground, in deciduous woods, swamps, bogs, marshes, wet meadows and ditches
Botrychium simplex	Least Moonwort	YELLOW	beach or coastal shore, field meadow, lake or pond shore, river or stream, swamp
Caltha palustris	Yellow Marsh Marigold	YELLOW	field meadow, river or stream, swamp
Carex capillaris	Hairlike Sedge	YELLOW	calcium-rich, wet habitats, including ledges, talus slopes, ditches, cedar swamps, and bogs
Carex castanea	Chestnut Sedge	RED	cliff or talus slope, field meadow, swamp
Carex haydenii	Hayden's Sedge	RED	open habitats of bogs/poor fens, moist meadows, and seasonally wet soils
Carex hystericina	Porcupine Sedge	RED	wet prairies, swamps, grassy fens, sedge meadows, calcareous seeps, edges of marshes (sandy & non-sandy),

			and ditches
Carex pellita	Woolly Sedge	RED	moist to wet prairies and dolomite prairies, prairie swales, sedge meadows, seeps and calcareous seeps, swamps and openings in floodplain woodlands, poorly drained fields, and roadside ditches
Carex prairea	Prairie Sedge	RED	disturbed sites, swamps
Carex rostrata	Narrow-leaved Beaked Sedge	RED	wet meadows, marshes, edges of lakes, ponds, and streams, and other riparian areas
Carex swanii	Swan's Sedge	YELLOW	Boggy pastures, dry peaty barrens, forests, clearings and the edges of woods.
Carex tenera	Tender Sedge	YELLOW	wet prairies, swamps, and floodplain woods
Carex tenuiflora	Sparse-flowered Sedge	RED	fen and mixed wood forest
Carex tincta	Tinged Sedge	RED	disturbed sites, hardwood forests
Carex tuckermanii	Tuckerman's Sedge	RED	field meadow, marsh, river or stream
Carex wiegandii	Wiegand's Sedge	RED	bogs and poor fens, disturbed sites, swamps
Cypripedium reginae	Showy Lady's-slipper	RED	bog, swamp
Decodon verticillatus	Swamp Loosestrife	YELLOW	lakeshore wetland, river or stream
Eleocharis quinqueflora	Few-flowered Spikerush	RED	sparsely vegetated wet habitats found in graminoid fens, shorelines of ponds and small lakes, and occasionally in wet prairie openings
Equisetum palustre	Marsh Horsetail	RED	cold streams, ponds, and lakeshores; in fens and marshes; wooded swamps. Not often actually growing in water.
Erigeron hyssopifolius	Hyssop-leaved Fleabane	YELLOW	cliff or talus slope, river or stream
Festuca subverticillata	Nodding Fescue	RED	alluvial floodplain, hardwood forest
Isoetes acadiensis	Acadian Quillwort	YELLOW	aquatic, lake or pond shore, rivers and

			stream
Juncus subcaudatus	Woodland Rush	YELLOW	Marshes, edges of streams, and peaty acidic and basic wetlands including fens
Najas gracillima	Thread-like Naiad	RED	riparian, swamp, marsh, lakeshore wetlands
Platanthera flava	Tubercled Orchid	YELLOW	bog, field meadow, lake or pond shore, lakeshore wetland, river or stream, swamp
Proserpinaca intermedia	Intermediate Mermaidweed	RED	sandy bogs and savannas, and especially along the periphery of sandy, acid ponds, lakes, streams, ditches, and also in wet pine savannas and flat woods, cypress-black gum ponds, swamps, and damp clearings
Proserpinaca pectinata	Comb-leaved Mermaidweed	YELLOW	shallow waters of bogs, marshes, swamps, and along the muddy shores and banks of ponds and streams
Rudbeckia laciniata	Cut-leaved Coneflower	YELLOW	intervale, lake or pond shore
Salix sericea	Silky Willow	RED	lake or pond shore, river or stream
Saxifraga cernua	Nodding Saxifrage	RED	seepage areas, moist crevices, and along streambanks, creeks and lakeshores, on moist ledges and in exposed dry sites
Selaginella selaginoides	Low Spikemoss	RED	bog, river or stream
Utricularia resupinata	Inverted Bladderwort	RED	lake or pond shore, river or stream
Viola nephrophylla	Northern Bog Violet	YELLOW	barrens, bog, river or stream
Woodwardia areolata	Netted Chain Fern	YELLOW	bog, river or stream, swamp

Appendix III. AVIAN STUDIES

Celtic Current LP

Baseline Avian Use Assessment

Bateston Community Wind Power Project

McCallum Environmental Ltd.
December 5, 2013

Contents

TABLES

FIGURES

Site Description

The proposed Bateston Community Feed-In Tariff (COMFIT) Wind Power Project ("Project") is located on the south side of Main-a-Dieu Road, in Cape Breton County, Nova Scotia. The Project is defined by PID 15619596, which is 47.8 acres in size, and extends approximately 1km southeast from Main-a-Dieu Road. The Project area encompasses 47.8 acres. The approximate centre of the Project Area is referenced (UTM NAD 83) as 274555 m E and 5097742 m N (Zone 21 T). A single turbine is proposed to be located at approximately 274806 m E and 5097351 m N.

The Project lands range in elevation from 25 to 70 m above sea level and consist of a one primary northwestern facing slope. The majority of the property has been cleared for timber harvesting, with the exception of several small patches. One main forestry road extends through the property, providing access for timber harvesting, as well as a MET tower, which is located near the proposed turbine location.

The predominant habitat type inside the Project Area is clear-cut forestry operations. Adjacent properties are dominated by black-spruce in the lowlands, with mature yellow birch on the slopes and uplands. A treed fen (black spruce dominated) and its associated watercourse exist within the Project Area at the base of the northwest facing slope, close to the Main-a-Dieu Road.

The proposed wind power project is expected to consist of a single 2.3 MW turbine to be placed near the current MET tower location. No previous bird surveys have been conducted on this site to date.

The Bateston area is not known to be a major migration pathway through the province. The topography in this area is moderately undulating, with no major topographic features (e.g. ridges or peninsulas) that would strongly channel migrants.

Habitat

In 2013 the entire property and much of the surrounding lands show signs of disturbance, past and present logging and the construction of the access road running the length of the property. What forest remains is mostly off-property and is either even–aged dense conifers (some hardwood), more mature mixed conifer/yellow birch, or stands of mature yellow birch. Forest "peninsulas" intrude on both sides where a culvert and wet areas exist, just north-west of hill with the MET tower. Refer to the vegetation surveys for more accurate forest descriptions.

Point Count 1:

Easting	**Northing**
274209	5098056

This is an open low-lying damp area near the western corner of the property. A belt of maturing conifers and some hardwoods is located about 50m to the NW, before the Main-a-Dieu Road. Forest is also located to the southwest, greater than 50m away.

A stream is located southeast of the Point Count, and flows northeast. Trees, living and dying/dead, line the banks. There is evidence of past logging around point, which includes ruts, old decaying slash, stumps, and little or no transitional edge to forest stands. There are scattered single or small clumps of

young trees, standing deadwood, ferns, mosses, rushes, aster, and bare, peaty ground. Conditions were somewhat drier in the summer, early fall.

Point Count 2:

Easting	Northing
274383	5098236

This point count is located in a forested area northeast of a stream flowing across the property. There is much standing/fallen deadwood, maturing spruce/fir, and some hardwood. Mixed mature yellow birch is present on a north and north-east facing slope across the stream. Mostly mosses and ferns are underfoot. A logged open area is nearby (within 100m) to the north.

Point Count 3:

Easting	Northing
274407	5097822

Point Count 3 is on an exposed hillside southwest of the access road. During 2013, the hill was logged and material was removed, for construction of access road. A forest of conifers and yellow birch is located along the southwest edge of the point count location, just over 50m away. A few younger trees and fallen slash is located at the forest edge.

Point Count 4:

Easting	Northing
274648	5097813

Point Count 4 is on a northeast facing slope. It was newly logged in the spring of 2013. Scattered remnant trees remain. Mature mixed/birch forest is present to the northeast, east and south of the point count location.

Point Count 5:

Easting	Northing
274766	5097348

Point Count 5 lies near the south corner of property. Half of the point count is cutover with slash, and the remaining area includes forest stand, with predominately even aged conifers. There are good views are of the MET tower and proposed turbine site as well as distant areas to south (around corner of forest stand) are present. A forest stand is located approximately 100m away to southeast.

Point Count 6:

Easting	Northing
274890	5097520

Point Count 6 lies in a recent clear cut on the east-facing slope of a hill that has the MET tower on it. There is an abundance of slash and scattered small remnants of trees. A stand of young yellow birch is present to the north leading to older forest of yellow birch and some conifer. There are good views of MET and area to east toward coast. Forest (>100m away) is present southeast of the cutblock.

Site Sensitivity and Level of Concern

There are five Important Bird Areas (IBA) within 25km of the Project area. (Bird Studies Canada, 2012)

1. Northern Head and South Head (IBA NS 053) is located 9 km north of the Study Area. The steep, rocky cliffs found in Northern & Southern head range from 15m to 30m in height. They provide colonial breeding habitat for the Great Cormorant, and for the Black-legged Kittiwake (Bird Studies Canada, 2012a). Both of these species are listed as yellow under the NSDNR General Status of Wild Species, but lack Provincial or Federal designation as species at risk.
2. Scatarie Island (IBA NS052) is located 10km east of the Project area. Scatarie Island has rocky shores leading to stunted forests of spruce and balsam fir, along with sphagnum bogs and heath barrens. It is protected under Nova Scotia's Protected Areas program as a Designated Wilderness Area. According to Bird Studies Canada, Scatarie Island is thought to hold between 10-25 territorial male Bicknell's Thrushes, although no systematic survey has been conducted (Bird Studies Canada, 2012b). The Bicknell's Thrush is listed as Threatened under the Federal Species at Risk Act, Vulnerable under the Provincial Endangered Species Act, and Red under NSDNR's General Status of Wild Species. This neo-tropical migrant breeds in high elevation, dense and stunted fir/spruce forests.
3. The Portnova Islands (IBA NS006) is located approximately 11km southeast of the Project area. It is a remote island, surrounded by rough waters, with a relatively undisturbed breeding colony of Great Cormorants (Bird Studies Canada, 2012c).
4. Big Glace Bay Lake (IBA NS007) is located approximately 17km north of the Project area. It is a coastal lagoon with a sandy barrier beach (one of very few in this area). During low tide, expansive mudflats are exposed. Due to the input of warm wastewater from nearby industrial facilities, this site typically remains ice free during the winter. The Big Glace Bay Lake IBA is a Federal Migratory Bird Sanctuary, primarily due to the important feeding grounds provided by the mud flats. Canada Geese are known to use this area during spring migration (Bird Studies Canada, 2012d).
5. Harbour Rocks (IBA NS049) is located approximately 23km south of the Project area. Similar to the Portnova Islands, Harbour Rocks is an isolated island which provides breeding habitat for colonial Great Cormorants.

The habitats provided within these aforementioned IBAs is not consistent with habitat available within the Project Area. The Project Area is predominantly cleared of timber, surrounded by mixed forest and softwood forest. The IBAs are mainly associated with coastal colonial nesting species and shorebirds dependant on exposed mudflats.

The Project Area is not used as primary habitat for any of the species listed above within the IBA sections. The Project Area may be used by passing migrants en route to the Important Bird Areas but the site does not contain major islands, peninsulas, or ridgelines which may funnel bird movement.

The Project will not disrupt large contiguous wetland or forest habitat that may be of importance to birds. The closest significant migration staging area for waterfowl and shorebirds is Big Glace Bay Lake, approximately 17 km north of the Project area. At this time, there is no knowledge of a large heron, gull or tern colony located near the site. Several colonial nesting locations for the Great Cormorant are found 9 and 11km away from the Project area (Northern Head & South Head, and Portnova Islands, respectively). McVicar's Lake is the nearest water body, located approximately 500m southeast of the site, and the Atlantic coastline is 1.3km to the north.

A priority list of species was compiled to identify potential species of conservation concern and Species at Risk which may be using the Project Area and surrounding lands. The list is divided into two main sections. The first section includes species which may be using the actual project lands for breeding, migration stopover, or over-wintering. This section is based on the habitat available *within* the project area. The second section of the list includes species which may use the project area as a stopover location en route to their preferred habitat nearby. These are primarily shorebirds and coastal nesting species. While the construction of a single turbine and associated infrastructure within the Project Area are not expected to have an impact on breeding habitat for these species, it is important to consider these species based on potential impact on passing migrants, or those en route to their breeding habitat.

A review of Atlantic Canada Conservation Data Centre findings confirms the presence of several priority species in proximity to the Project area. A summary of Federally and Provincially protected species identified within 20km of the Project area (along with preferred nesting habitat) is listed below. Breeding status as documented in the Maritime Breed Bird Atlas square summary (square 21TL79) is also included. If the species was observed during atlas surveys, with no breeding evidence noted, this is indicated below as well.

- Piping Plover - NS Endangered, COSEWIC& SARA Endangered. 14 km
    - Nests on sandbars, barrier beaches and shorelines
    - MBBA – observed, no breeding evidence noted
- Red Knot - NS Endangered, COSEWIC & SARA Endangered, 13 km
    - Nests on tundra, tidal flats, rocky shores and beaches
    - MBBA – not observed during atlas surveys
- Chimney Swift - NS Endangered, COSEWIC & SARA Threatened, 14 km
    - Nests and roosts in chimneys
    - MBBA – observed, no breeding evidence noted
- Common Nighthawk – NS Threatened, COSEWIC & SARA Threatened, 4 km
    - Nests in gravelly substrates, and even on rooftops
    - MBBA – observed, no breeding evidence noted
- Canada Warbler – NS Endangered, COSEWIC & SARA Threatened, 6 km
    - Nests in cool, moist woodlands in a nest of dried leaves, often at the base of a stump
    - MBBA – observed, no breeding evidence noted
- Barn Swallow – NS Endangered, COSEWIC Threatened, 4 km
    - Agricultural lands, suburban areas, marshes & lakeshores, nests in buildings
    - MBBA – confirmed breeder

- Olive-sided Flycatcher – NS Threatened, COSEWIC & SARA Threatened, 9 km
    - Softwood forests, near openings such as burns, ponds, and bogs
    - MBBA – observed, probable breeder
- Bobolink – NS Vulnerable, COSEWIC Threatened, 6 km
    - Prairies and meadows, stays on marshes during migration, nests in grassland
    - MBBA – observed, no breeding evidence noted
- Bicknell's Thrush – NS Endangered, COSEWIC & SARA Threatened, 8 km
    - High elevation, alpine areas, dense, shrubby softwood stands
    - MBBA – observed, no breeding evidence noted
- Harlequin Duck - Eastern pop. NS Endangered, COSEWIC & SARA Special Concern, 17 km
    - Prefers swift-moving streams in summer.
    - MBBA – not observed during atlas surveys
- Peregrine Falcon - NS Vulnerable, COSEWIC & SARA Special Concern, 17 km
    - Prefers tundra, savannas, coasts, mountains and tall buildings
    - MBBA – not observed during atlas surveys
- Short-eared Owl - COSEWIC & SARA Special Concern, 16 km
    - Prefers open spaces such as grasslands, prairies, fields, salt marshes and meadows
    - MBBA – observed, no breeding evidence noted
- Rusty Blackbird – NS Endangered, COSEWIC & SARA Special Concern, 14 km
    - Prefers beaver ponds, roadsides, landfills, wet meadows and shrubby shorelines
    - MBBA – observed, no breeding evidence noted

Using the matrix provided in the *Wind Turbines and Birds. A Guidance Document for Environmental Assessment.* (Environment Canada, 2006), the overall level of concern category associated with the Project was determined. The matrix matches the sensitivity of the site and the size of the proposed facility to rank projects into one of four possible categories. Generic guidance is then provided on the nature and extent of baseline information and follow-up requirements for each category. The "level of concern" is therefore relative to other wind energy projects and does not reflect the threat to birds/bats posed by wind energy in comparison to other types of projects.

The characteristics of the region/area resulted in a potential sensitivity of "High" (Environment Canada, March 2006). The criteria for a potential sensitivity of "High" are as follows:

- having landform factors that concentrate species (e.g., shoreline, ridge, peninsula or other landform that may funnel bird movement) or significantly increase the relative height of the turbines;
- a coastal island, or less than 5 km inland from coastal waters;
- an area of large local bird movements (between habitats) or is close to significant migration staging or wintering area for waterfowl or shorebirds;
- an area recognized as provincially or nationally significant for habitat conservation and/or protection;
- Having increased bird activity from the presence of an area recognized as nationally and/or provincially important habitat for birds (e.g., a National Wildlife Area, Migratory Bird Sanctuary, Important Bird Area, National Park , or similar area protected provincially or territorially because of its importance to birds); and

- Containing species of high conservation concern (e.g. Species listed as 'Yellow' under NS General Status of Wild Species.).

TABLE 1. FACILITY SIZE

Size	Definition
Very Large	Contain more than 100 turbines
Large	Contain 41-100 turbines
Medium	Contain 11-40 turbines
Small	**Contain 1-10 turbines**

TABLE 2. PROJECT CATEGORY

	Site Sensitivity			
Facility Size	Very High	High	Medium	Low
Very Large	Category 4	Category 4	Category 3	Category 2
Large	Category 4	Category 3	Category 2	Category 2
Medium	Category 4	Category 3	Category 2	Category 1
Small	Category 4	**Category 2**	Category 1	Category 1

Based on the parameters identified above the Project should be classified as high (EC, 2006b). The primary reasoning behind defining this Project as highly sensitive is the proximity to several Important Bird Areas and a Migratory Bird Sanctuary. It should be noted, however, that the habitat within the Project area is not suitable for those species which depend on the Important Bird Areas (for instance, colonial nesting species such as the Great Cormorant, or coastal nesting species such as the Piping Plover or Red Knot).

With a high site sensitivity and small size (1 turbine), the Level of Concern Category for this Project, according to the Environment Canada CWS Wind Turbines and Birds EA Guide (EC, 2007), will be Category 2. Projects in this category present a moderate level of potential risk to wild species and/or their habitat(s), and require basic surveys, usually spread over a one year period, to obtain quantitative information on wild species and habitats on the site and to identify any potential mitigation measures to minimize environmental impacts during construction.

Based on the Project level of concern and the Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds (EC 2007), it has been determined that the baseline surveys at the Project included the following programs:

- Winter Assessment
- Spring and Fall Migration
- Breeding Bird Survey
- On-going assessment for potential species at risk[1]

Methodologies

The methodology for the annual baseline bird surveys was based on the Environment Canada Canadian Wildlife Service (CWS) documents titled *Wind Turbines and Birds: A Guidance Document for Environmental Assessment April 2007 and Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds*, April 2007.

Winter Assessment

A non-standardized area search was completed on March 26, 2013. This area search assessed all habitat types and locations within the study area in order to generate a list of species present and to establish how they use the site. No attempt was made to predict total wintering population numbers of each species; however records were kept of all observations which can be used for relative comparisons during post construction.

This method was chosen because it was predicted that the numbers of birds would likely not be significant, especially given the fact that this project area has been recently clear cut. In addition, it is believed that data generated by conducting the less extensive and more time consuming transect surveys would not be useful in presenting an overall picture of how birds use this area in winter.

Spring and Fall Migration

Spring migration monitoring was conducted on ten dates between April 5, 2013 and May 29, 2013. Fall migration was conducted on seventeen dates between August 23, 2013 and October 30, 2013. Spring and fall migration followed the same methodology. Three fixed-width transect have been established to provide a vantage point of major habitat types represented within the Project area. This method is based on a modified standardized area search.

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[1] Given that the Study Area is small (47.8 acres) and after a review of the priority species list and known species from ACCDC, any Species at Risk or species of conservation concern are expected to be detected during routine surveys, and therefore no specific surveys for Species at Risk were conducted. The species with the greatest likelihood of breeding within the Project area is the Olive-sided flycatcher, based on documented observations and availability of suitable habitat. Transect 1, and point counts 1 and 2 are located in habitat suitable for the Olive-sided flycatcher.

Each transect was surveyed once per week during migration periods. During the peak of spring migration (approximately May 1 – May 15), surveys were conducted twice per week. The surveys were completed early in the morning (1/2 hour prior to sunrise to 4 hours after sunrise). All birds seen or heard were recorded, with an estimation of the actual distance to the bird (0-50m, 50-100m and 100m+). As recommended by CWS methodology (EC, 2006a), transects were not surveyed on very windy or rainy days.

Along each transect, two point count locations were established (located a 0 m and 250 m). The same point counts were surveyed during breeding season (described in detail below). All point count, transect, and passage migration count locations are shown in Figure 1 attached to this report. Point count surveys were completed at each location along each transect during the early morning. The point count surveys were 10 minutes long, with the observer recording all species seen or heard, along with an estimate of the number of individuals of each species. The observer spent a total of half an hour per transect (including time to complete two point counts). General observations including the temperature, visibility, wind speed, presence/absence of fog, date, start and end time and point count were recorded.

Fall migration surveys were of three types, 10-minute point counts at six different locations, three 250m transects crossing the property, and 2hour minimum passage watch counts in the vicinity of the MET tower. Transects and points were completed eleven times each, an exception being transect 2 with points 3 and 4. These were missed once due to road construction activity on September 11. Passage watches were completed nine times at various times of day. Surveys were distributed between August 23 and October 30 and as much as possible, conducted when weather was best for migrants.

Passage migration counts were completed at the location of the MET tower in order to estimate the number of birds flying through the area. The MET tower is located at approximately 70 m above sea level on an open hill top. The entire project lands and much of the surrounding landscape are observable from this vantage point. The surveys commenced at varying times of the day, in order to detect migrants later in the day. Start times ranged from 7:30am to 1:00pm, and bird activity was recorded continuously for 2-3 hours (depending on the level of bird activity). Observations were divided into one-hour blocks, and the species, height and flight direction were recorded for all passing birds. Passage migration counts were completed once per week during the spring and fall migration monitoring. Passage migration were only completed on days where weather conditions are favourable (no precipitation and light to moderate tail winds).

Breeding Season

A combination of point counts and area searches were used to assess the usage of the project lands by breeding birds for nesting, foraging, or raising young. Point counts and area searches attempted to confirm breeding status of species at risk, particularly the priority species listed above.

CWS recommends that 20 point counts per major habitat be surveyed during the breeding season. These should be at least 250m apart in a forested landscape, and 500m apart in a cleared landscape. Given the small size of the project area (47.8 acres), it was neither possible nor necessary to follow

these recommendations. Instead, 6 point count locations were established which are representative of the habitat available within, and directly adjacent to, the Project area. Three of these point counts are located within the Project area, while three are on a directly adjacent property. These have been established as control sites, and because they will likely be more representative of bird usage of the surrounding intact forest.

All point count surveys were completed in the early morning between dawn (one half hour before sunrise) and about four hours after sunrise. Point counts were only completed when the wind is light, to allow for the observer to hear the birds (3 or less on the Beaufort scale), and were not completed if it was raining. Each breeding bird point count was surveyed twice during the breeding bird survey, once in mid-June and once in late June-early July.

Point counts were ten minutes long, and all species hear or seen were recorded, along with an estimate of the number of individuals of each species. The observer recorded estimated distance to each bird (0-50m, 50-100m, and 100m+). Birds that are observed flying over without stopping were recorded separately as “flyovers”. Breeding evidence was also recorded when observed. Other information including the date and time of day, weather conditions (temperature, wind speed, percent cloud cover, and presence of any precipitation), GPS coordinates of the point count location, and the name of the observer doing the work were recorded.

Non-standardized area searches were conducted to complement the list of breeding birds identified during point counts, through intensive searches of habitat hot-spots. Two one-hour non-standardized area searches were completed within the breeding season. Data recorded included a description of the level of effort and the area searched, a complete list of species observed, number of individuals observed, and breeding evidence observed for each species.

Results & Discussion

The following table (Table 3) provides a list of all site visits and relevant weather data along with the total number of birds identified per day. A total of 2,751 minutes (45.85 hours) of surveys were completed over the 4 seasons.

TABLE 3. SUMMARY OF DAILY SURVEY CHARACTERISTICS

	Date	Start	End	Total minutes	Average Temp (^{0}C)	Dominant Wind Direction	Average Wind speed (Beaufort Scale)	Dominant Weather	# Birds
Spring PC / Transects	05/04/2013	5:35 AM	7:45 AM	130	3.5	N	2	clear to 50% cloud	56
Spring PC / Transects	18/04/2013	6:05 AM	8:08 AM	123	1	N	3	clear	52
Spring - Passage / PC / Transect	21/04/2013	9:00 AM	11:00 AM	120	6	NW	3	Cloudy	280
Spring PC / Transects	28/04/2013	6:02 AM	8:42 AM	160	2	N	4	drizzle	29
Spring - Passage / PC / Transect	30/04/2013	9:00 AM	11:00 AM	120	6	N	2	fog	12
Spring - Passage / PC / Transect	05/05/2013	12:45 PM	3:45 PM	180	14	S	3.5	clear	24
Spring PC / Transects	08/05/2013	5:10 AM	7:25 AM	135	10	W/N	1	clear	77
Spring - Passage / PC / Transect	11/05/2013	5:45 AM	1:00 PM	470	12	S	1	thin fog	94
Spring PC / Transects	16/05/2013	5:25 AM	8:10 AM	165	6	S	2	clear	78
Spring - Passage / PC / Transect	22/05/2013	7:12 AM	12:15 PM	303	9.5	NE	2	overcast	109
Spring - Passage / PC / Transect	29/05/2013	6:22 AM	12:15 PM	353	10	N	1	clear	127
Breeding bird survey	20/06/2013	5:43 AM	10:00 AM	257	11	NW	2	clear	80
Breeding bird survey	14/07/2013	6:00 AM	9:55 AM	235	16	SSW	1	clear	76

Correlation analyses were conducted to determine the effect of temperature and wind speed on bird detections. While there was a slight positive relationship between temperature and bird detections (more birds were detected on warmer days) and a slight negative relationship between wind speed and bird detections (fewer birds were detected on windier days), these relationships were not statistically significant (R^2=0.0689 and R2=0.1075, respectively).

TABLE 4. DIVERSITY AND ABUNDANCE OF SPECIES OBSERVED PER POINT COUNT LOCATION

Point Count	Diversity	Abundance
1	28	135
2	17	49
3	23	52
4	24	60
5	12	30
6	20	59
T1	20	58
T2	16	44
T3	10	15
Average	19	56
Minimum	10	15
Maximum	28	135

In total, 1289 individual birds, representing 70 known species were identified within the Project area. A list of species observed, along with their species codes, seasonal, and total abundance is provided in Table 5, and is presented graphically in Figure 2. *List of species, seasonal & total* abundance.

TABLE 5. LIST OF SPECIES, SEASONAL & TOTAL ABUNDANCE

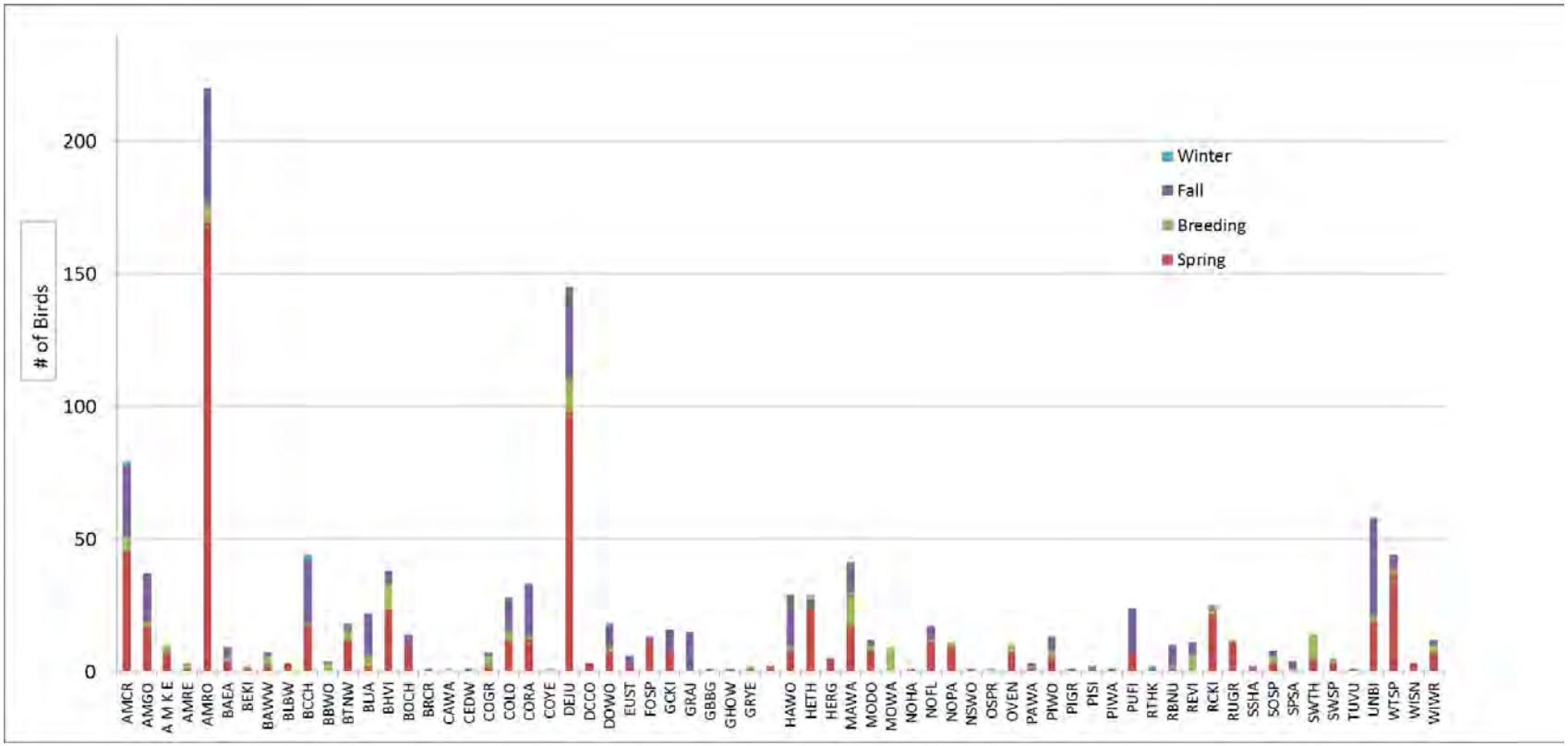
Species	Code	Spring	Breeding	Fall	Winter	Total
American crow	AMCR	45	6	27	1	79
American goldfinch	AMGO	17	2	18		37
American kestrel	A M K E	7	3			10
American Redstart	AMRE	1	2			3
American robin	AMRO	169	7	44		220
Bald eagle	BAEA	4	1	4		9
Belted Kingfisher	BEKI	1	1			2
Black-and-white warbler	BAWW	2	4	1		7
Blackburnian warbler	BLBW	3				3
Black-capped chickadee	BCCH	17	1	24	2	44
Blacked Backed woodpecker	BBWO		3	1		4

Species	Code	Spring	Breeding	Fall	Winter	Total
Black-throated green warbler	BTNW	12	4	2		18
Blue jay	BLJA	2	4	16		22
Blue-headed vireo	BHVI	23	10	5		38
Boreal chickadee	BOCH	9		5		14
Brown Creeper	BRCR			1		1
Canada warbler	CAWA		1			1
Cedar Waxwing	CEDW			1		1
Common grackle	COGR	2	4	1		7
Common loon	COLO	12	4	12		28
Common raven	CORA	12	1	20		33
Common yellowthroat	COYE		1			1
Dark-eyed junco	DEJU	98	12	35		145
Double-crested cormorant	DCCO	3				3
Downy woodpecker	DOWO	7	2	9		18
European starling	EUST	2		4		6
Fox sparrow	FOSP	12		1		13
Golden-crowned kinglet	GCKI	8		8		16
Gray Jay	GRAJ			15		15
Great Black Backed Gull	GBBG	1				1
Great Horned Owl	GHOW			1		1
Greater Yellowlegs	GRYE	1	1			2
Gull sp		2				2
Hairy woodpecker	HAWO	8	1	20		29
Hermit thrush	HETH	27	2			29
Herring gull	HERG	4		1		5
Magnolia warbler	MAWA	17	13	11		41
Mourning dove	MODO	8	2	2		12
Mourning warbler	MOWA		9			9

Species	Code	Spring	Breeding	Fall	Winter	Total
Northern Harrier	NOHA	1				1
Northern flicker	NOFL	11	1	5		17
Northern parula	NOPA	9	2			11
Nothern Saw-whet owl	NSWO	1				1
Osprey	OSPR		1			1
Ovenbird	OVEN	7	3			10
Palm Warbler	PAWA	1	1	1		3
Pileated woodpecker	PIWO	5	3	5		13
Pine Grosbeak	PIGR			1		1
Pine Siskin	PISI			2		2
Pine Warbler	PIWA			1		1
Purple finch	PUFI	7		17		24
Red Tailed Hawk	RTHK			1	1	2
Red-breasted nuthatch	RBNU	1	1	8		10
Red-eyed vireo	REVI		6	5		11
Ruby-crowned kinglet	RCKI	22	1	2		25
Ruffed grouse	RUGR	11	1			12
Sharp-shinned hawk	SSHA	1		1		2
Song sparrow	SOSP	3	3	2		8
Spotted sandpiper	SPSA		1	3		4
Swainson's thrush	SWTH	5	9			14
Swamp sparrow	SWSP	3	2			5
Turkey Vulture	TUVU			1		1
Unidentified SP	UNBI	19	2	37		58
White-throated sparrow	WTSP	37	2	5		44
Wilson's snipe	WISN	3				3
Winter wren	WIWR	7	3	2		12
Woodpecker - unidentified sp		1				1

Species	Code	Spring	Breeding	Fall	Winter	Total
Yellow-bellied flycatcher	YBFL		8			8
Yellow-rumped warbler	YRWA	43	1	34		78
TOTALS		**734**	**152**	**422**	**4**	**1312**

FIGURE 1. LIST OF SPECIES, SEASONAL & TOTAL ABUNDANCE

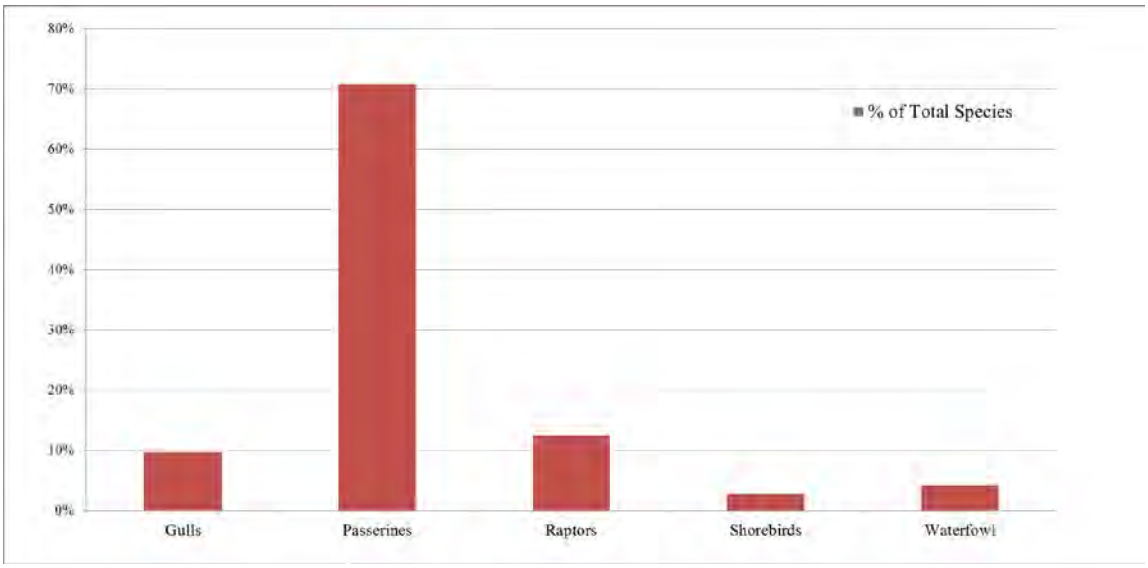


Bird species were identified based on functional bird groups to understand how each group of birds is using the Project area. These functional groups include gulls, passerines (songbirds), raptors, shorebirds and waterfowl. (Table 6) The most abundant group observed on site is passerines, which account for 75% of all species, and 94.3% of all individuals.

TABLE 6. SPECIES GROUP ABUNDANCE

Species Group	Number of Species	% of Total Species	Number of Individuals	% of Total Individuals
Gulls	7	10%	8	0.6%
Passerines	51	71%	1158	94.1%
Raptors	9	13%	26	2.1%
Shorebirds	2	3%	6	0.5%
Waterfowl	3	4%	33	2.7%
TOTAL	72		1231	

FIGURE 2. RELATIVE ABUNDANCE BY SPECIES GROUP TYPE – BASED ON NUMBER OF INDIVIDUALS OF EACH GROUP



Spring migration

During spring migration, 734 individuals, representing 52 species, were observed. The most abundant species were American Robin and Dark-eyed Junco. Abundance of species observed in spring migration is shown in Table 5. *List of species, seasonal & total abundance*.

Based on the lack of diverse habitats available within, the Project area does not offer many obvious attractants to passing migrants. Despite this, several obvious migrants were observed during spring. Obvious migrants were primarily solitary, and were not observed in long flight paths or flocks, with the exception of a flock of 24 Blue Jays observed on May 15, 2013. No obvious concentration of sea ducks or shorebirds were observed.

The following species at risk (SAR) and species of conservation interest (SOCI) were observed during spring migration surveys, and their relative abundance is also noted.

TABLE 7. SAR AND SOCI SPECIES IDENTIFIED DURING SPRING MIGRATION AND RELATIVE ABUNDANCE

Species	Code	Listing	Number of Individuals	Relative Abundance to all species identified
Boreal chickadee	BOCH	Yellow (NSDNR)	9	1.23%
Common Loon	COLO	Red (NSDNR) Not at Risk (COSEWIC)	12	1.63%
Golden-crowned kinglet	GCKI	Yellow (NSDNR)	8	1.09%
Ruby-crowned kinglet	RCKI	Yellow (NSDNR)	22	3.00%

Bird species were identified based on functional bird groups to understand how each group of birds is using the Project area. These functional groups include gulls, passerines, raptors, shorebirds and waterfowl. The most abundant group observed on site was passerines, which account for 78% of all species, and 94.7% of all individuals.

TABLE 8. SPECIES GROUP ABUNDANCE

Species Group	Number of Species	% of Total Species	Number of Individuals	% of Total Individuals
Gulls	2	4%	7	1.0%
Passerines	39	78%	677	94.7%
Raptors	5	10%	14	2.0%
Shorebirds	1	2%	1	0.1%
Waterfowl	3	6%	16	2.2%
TOTAL	50		715	

Breeding season

A total of 152 individuals representing 45 species were observed during the breeding season; the three most abundant of which were Magnolia Warbler, Dark-eyed Junco, and Blue-headed Vireo.

Throughout the summer breeding season, observations of breeding evidence were recorded as described by the Maritime Breeding Bird Atlas breeding evidence coding sheet (MBBA, 2013). This coding sheet identifies possible, probable and confirmed breeders based on behavioral observations. With the consistent level of survey effort over an extended period of time within the breeding season, it was possible to establish permanent breeding territory or higher evidence for several species. *Table 5. List of species, seasonal & total abundance* outlines species observed during assessments.

Since the site surveyed is a relatively small part of the surrounding area, however, it is not possible to confirm that all species listed were actually nesting within the boundaries of the site. For instance, for a bird that was observed carrying food (confirmed breeding evidence), it is possible that the bird was nesting on an adjacent parcel of land.

All of the species identified are native species expected to be found in this area of Nova Scotia and the province in general, and within the typical and common habitat associated with the Project and surrounding landscape. Abundance of species observed in the summer breeding season is shown in Figure 4.

The following species at risk (SAR) and species of conservation interest (SOCI) were observed during surveys, and their relative abundance is also noted (Table 9).

TABLE 9. SAR & SOCI SPECIES IDENTIFIED DURING BREEDING BIRD SURVEYS AND RELATIVE ABUNDANCE

Species	Code	Listing	Number of Individuals	Relative Abundance to all species identified
Black backed woodpecker	BBWO	Yellow (NSDNR)	3	2%
Canada Warbler	CAWA	Endangered (NSESA)	1	0.7%

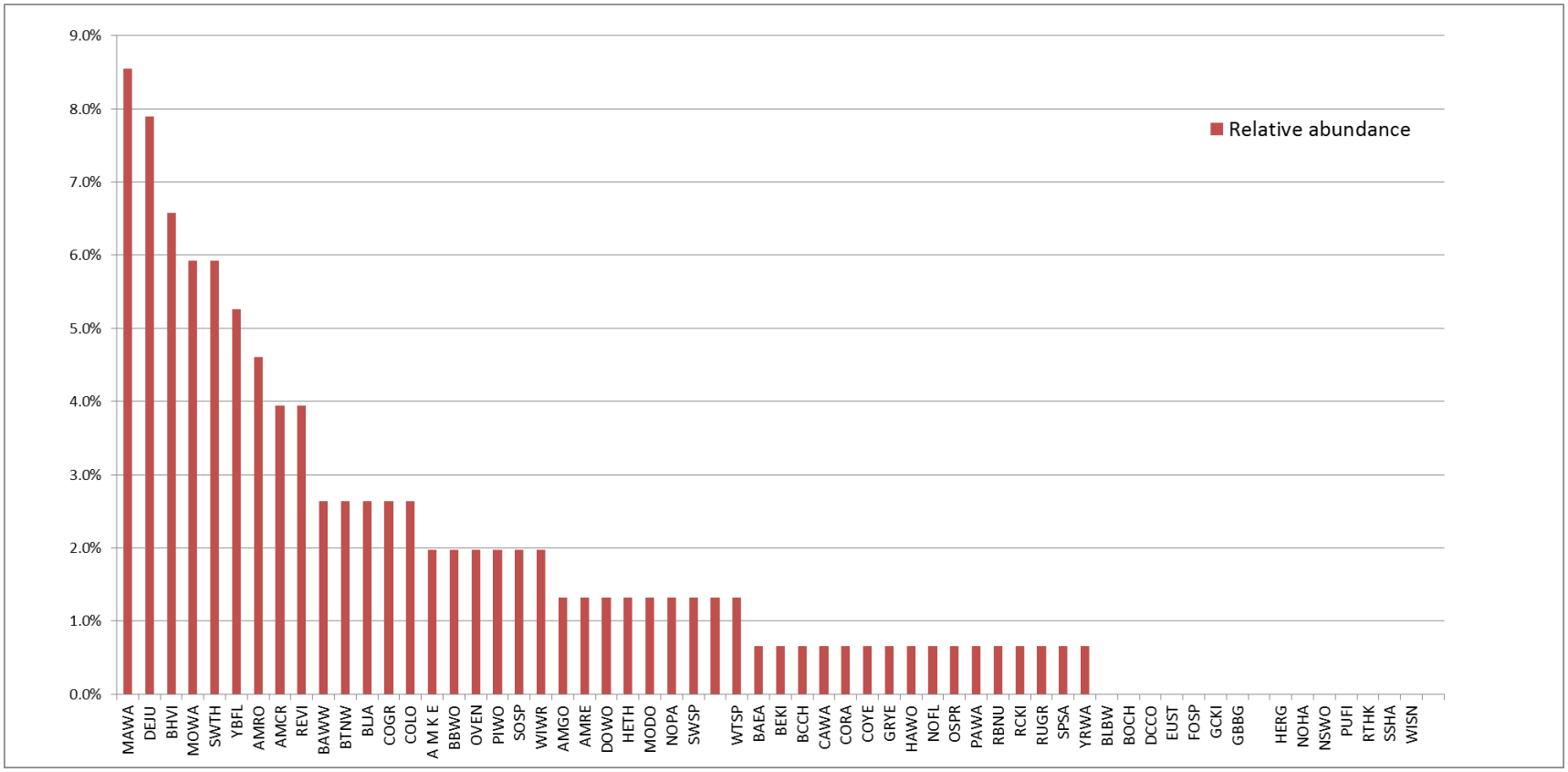
Species	Code	Listing	Number of Individuals	Relative Abundance to all species identified
		Red (NSDNR)		
Common Loon	COLO	Red (NSDNR)	4	2.6%
Ruby-crowned kinglet	RCKI	Yellow (NSDNR)	1	0.7%
Spotted Sandpiper	SPSA	Yellow (NSDNR)	1	0.7%
Yellow-bellied flycatcher	YBFL	Yellow (NSDNR)	8	5.3%

Bird species were identified based on functional bird groups to understand how each group of birds is using the Project area. These functional groups include gulls, passerines (songbirds), raptors, shorebirds and waterfowl. The most abundant group observed on site was passerines, which account for 71% of all species, and 63.8% of all individuals. Raptor species were the next most abundant by number of individuals. However with respect to raptors, it cannot be determined if there were a total of 35 individual birds in the area or a single bird of each species of raptor identified numerous times.

TABLE 10. SPECIES GROUP ABUNDANCE

Species Group	Number of Species	% of Total Species	Number of Individuals	% of Total Individuals
Gulls	3	7%	11	7.2%
Passerines	32	71%	97	63.8%
Raptors	6	13%	35	23.0%
Shorebirds	1	2%	4	2.6%
Waterfowl	3	7%	5	3.3%
TOTAL	45		152	

FIGURE 3. RELATIVE ABUNDANCE OF SPECIES OBSERVED DURING BREEDING BIRD SURVEYS



Fall migration

During fall migration, a total of 422 individuals were observed, representing 46 species. The most abundant species observed were the American Robin, Dark-Eyed Junco, and Yellow-rumped Warbler (Table 5. List of species, seasonal & total abundance). The abundance of species observed during fall migration is shown in Table 11 and Figure 5.

The following table shows the relative abundance of species at risk (SAR) and species of conservation interest (SOCI) that were identified during fall migration surveys.

TABLE 11. SAR & SOCI SPECIES IDENTIFIED DURING FALL SURVEYS AND RELATIVE ABUNDANCE

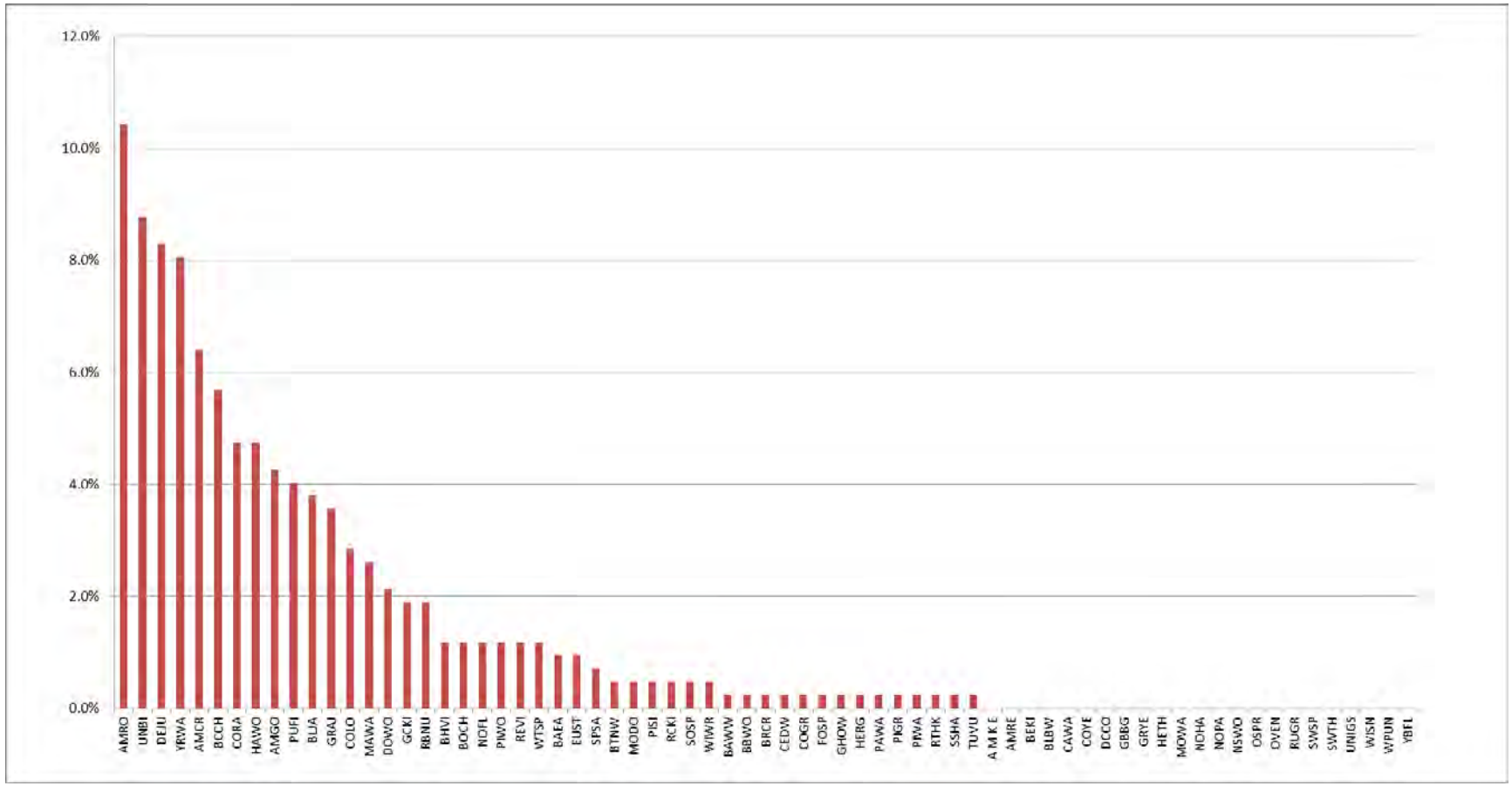
Species	Code	Listing	Number of Individuals	Relative Abundance to all species identified
Black backed woodpecker	BBWO	Yellow (NSDNR)	1	0.2%
Boreal chickadee	BOCH	Yellow (NSDNR)	5	1.2%
Common Loon	COLO	Red (NSDNR)	12	2.8%
Golden-crowned kinglet	GCKI	Yellow (NSDNR)	8	1.9%
Gray Jay	GRAJ	Yellow (NSDNR)	15	3.6%
Pine Grosbeak	PIGR	Red (NSDNR)	1	0.2%
Pine Siskin	PISI	Yellow (NSDNR)	2	0.5%
Ruby-crowned kinglet	RCKI	Yellow (NSDNR)	2	0.5%
Spotted Sandpiper	SPSA	Yellow (NSDNR)	3	0.7%

Bird species were identified based on functional bird groups to understand how each group of birds is using the Project area. These functional groups include gulls, passerines (songbirds), raptors, shorebirds and waterfowl. The most abundant group observed on site was passerines, which account for 82% of all species, and 92% of all individuals. Raptor species were the next most abundant by number of individuals but dropped significantly from numbers found during the breeding bird survey.

TABLE 12. SPECIES GROUP ABUNDANCE

Species Group	Number of Species	% of Total Species	Number of Individuals	% of Total Individuals
Gulls	1	2%	1	0.3%
Passerines	37	82%	361	93.8%
Raptors	5	11%	8	2.1%
Shorebirds	1	2%	3	0.8%
Waterfowl	1	2%	12	3.1%
TOTAL	45		385	

FIGURE 4. RELATIVE ABUNDANCE OF SPECIES OBSERVED DURING FALL SURVEYS



Winter

One visit was made to the Project Area during the winter season in March of 2013. A total of 4 individuals representing 3 species were observed during the transect surveys. The following species were observed:

American Crow – 1 individual

Black-Capped Chickadee – 2 individuals

Red Tailed Hawk – 1 individual

This site does not support a diverse or abundant community of winter resident species. Species noted are typical winter species in Nova Scotia.

Flight Characteristics

In this study, flight height was estimated, however only limited conclusions can be made with respect to risks posed to birds flying at turbine height. Instead, birds identified as flyovers are being assessed to determine the level of passing migrants. Birds observed as flyovers during all Point Counts and transect surveys were recorded as such, to provide an indication of the usage of this airspace by passing migrants.

During spring and fall migration, 25 different species of birds were observed flying over the Project Area. This represents 37% of all species observed over the course of the avian assessment. Of the 25, the mean height of 12 species noted flight height was below 60 metres, and the mean flight height of 13 species was estimated between 60 metres and 140 metres, which is within the Rotor Swept Arc ("RSA"). Only a single Bald Eagle was observed over 140 metres.

TABLE 13. FLIGHT HEIGHT CHARACTERISTICS BY SPECIES - SPRING MIGRATION

Species	Mean Flight Indicator	Relation to Rotor Swept Arc*		
		(1) Below <60m	(2) Within (60m to 140m)	(3) Above >140m
American Crow	1	X		
American goldfinch	1	X		
American kestrel	1	X		
American robin	1	X		
Belted kingfisher	1	X		
Dark-eyed junco	1	X		
Greater yellowlegs	1	X		
Northern harrier	1	X		
Yellow-rumped warbler	1	X		
Duck Species	1	X		
Northern flicker	1	X		
Common Grackle	1	X		

Species	Mean Flight Indicator	Relation to Rotor Swept Arc*		
		(1) Below <60m	(2) Within (60m to 140m)	(3) Above >140m
American crow	1.428		X	
American goldfinch	1.22		X	
American robin	1.4		X	
Bald eagle	2		X	
Blue jay	2		X	
Common loon	1.83		X	
Common raven	1.33		X	
Double-crested cormorant	2		X	
Great black-backed gull	2		X	
Gull sp	2		X	
Herring gull	1.5		X	
Purple Finch	1.6		X	
Red-tailed hawk	2		X	

*Mean Flight Indicator – species heights were observed and estimated by the observer and categorized into 1 of 3 flying heights. All flight indicator numbers were then averaged. The flight indicator number correlates to the height boundaries identified in the adjacent 3 columns.

Species at Risk and Species of Conservation Interest

Eleven (11) species of conservation interest (SOCI) were identified within the Project area during the baseline avian use assessment. A Species at Risk is one which is legally protected under the federal Species at Risk Act (SARA) or the provincial Nova Scotia Endangered Species Act (NSESA), while a species of conservation interest is one which is listed by the Committee on the Status of Endangered Wildlife In Canada (COSEWIC) or one which is classified as red or yellow by the Nova Scotia Department of Natural Resources (NSDNR) general status of wild species (Province of Nova Scotia, 2011). A listing of 'yellow' under NSDNR's general status ranks means the species is known to be, or believed to be, particularly sensitive to human activities or natural events and has been flagged as 'early watch' species by the Province, but are not currently protected by the NSESA (Province of Nova Scotia, 2011). As some of these species are potentially in decline, they will remain priority species for all future monitoring within the Project area. The 'red' species are considered at risk by NSDNR, but it is not protected under the NSESA. As some of the species listed as 'yellow' under NSDNR's general status ranks are potentially in decline, they will remain priority species for all future monitoring within the Project area.

TABLE 14. SPECIES AT RISK/CONSERVATION CONCERN IDENTIFIED DURING AVIAN SURVEYS

Species	Code	Listing
Canada Warbler	CAWA	Threatened (SARA & COSEWIC) Endangered (NSESA) Red (NSDNR)
Common Loon	COLO	Red (NSDNR) Not at Risk (COSEWIC)
Pine Grosbeak	PIGR	Red (NSDNR)
Black-backed Woodpecker	BBWO	Yellow (NSDNR)
Boreal Chickadee	BOCH	Yellow (NSDNR)
Golden-crowned Kinglet	GCKI	Yellow (NSDNR)
Gray Jay	GRAJ	Yellow (NSDNR)
Pine Siskin	PISI	Yellow (NSDNR)
Ruby-crowned Kinglet	RCKI	Yellow (NSDNR)
Spotted Sandpiper	SPSA	Yellow (NSDNR)
Yellow-bellied flycatcher	YBFL	Yellow (NSDNR)

TABLE 15. INDIVIDUAL SPECIES COUNTS OF LISTED SPECIES BY SEASON

Species	Code	Group	Spring	Breeding	Fall	Winter	Total
Black-backed Woodpecker	BBWO	Passerines		3	1		4
Boreal Chickadee	BOCH	Passerines	9		5		14
Canada Warbler	CAWA	Passerines		1			1
Common Loon	COLO	Waterfowl	12	4	12		28
Golden-crowned Kinglet	GCKI	Passerines	8		8		16
Gray Jay	GRAJ	Passerines			15		15
Pine Grosbeak	PIGR	Passerines			1		1
Pine Siskin	PISI	Passerines			2		2
Ruby-crowned Kinglet	RCKI	Passerines	22	1	2		25
Spotted Sandpiper	SPSA	Shorebirds		1	3		4
Yellow-bellied Flycatcher	YBFL	Passerines		8			8

The most abundant of the listed species was a ‘Red’ species – the Common Loon. The Common loon was most abundant during migration, suggesting the species was not an abundant resident to the area and this is due to the fact no lakes or waterbodies are located within the Project area. The Common Loon is classified as ‘red’ under NSDNR’s general status ranks. It is not currently protected under the NSESA, SARA, or listed by COSEWIC. In total, 28 individuals were observed through the spring, summer and fall surveys. They are most susceptible to activity in and around lakes (for example, boating and shoreline development), so construction of turbines is not likely to impact their breeding habitat, particularly within this Project area which is free of waterbodies. As such the construction of a single turbine is not expected to pose a significant risk to Common Loons as they pass over the Project area.

A single Canada Warbler was identified during the breeding bird survey and is listed as Threatened under the Federal Species at Risk Act and by the Committee on the Status of Endangered Wildlife In Canada. This species is listed as Endangered under the Nova Scotia Endangered Species Act. It is not expected that the Canada Warbler uses the Project area for breeding, as it was not observed more than once within the Project area during June and July, when the species is typically nesting. The species was identified during area searches, and was noted to be approximately 50 metres from the observer near a stream, located north east of the existing access road.

The second most abundant was the “Yellow” listed Ruby-crowned Kinglet, with a total of 25 individuals observed during all baseline surveys, with the most observed during spring surveys. These species are fairly common in coniferous and deciduous forests throughout Nova Scotia. The Project area does not offer any rare or unique habitat types upon which these species rely.

Conclusion

A total of 2,751 minutes (45.85 hours) of surveys were completed over 4 seasons. Avian usage of the Project area was found to contain species consistent with expectations based on habitat and location. The species observed during baseline assessments are consistent with expectations of forested elevated sites throughout Nova Scotia. The Project area provides nesting habitat for an assemblage of native, common species. The Project area does not provide rare or unique habitat types, and does not provide unique or critical habitat for Species at Risk, species of conservation interest or colonial species.

The group with the greatest diversity of species, across all seasons, were the passerines. They accounted for 71% of all species identified. The passerine group also accounted for 94% of all individuals across all seasons.

There was a noted increase in the number of raptor sightings during the breeding bird survey. During spring migration 5 different species of raptors were identified, and this increased to 6 species in the breeding season. The number of individuals in the raptor class increased from 14 to 35. However with respect to raptors, it cannot be determined if there were a total of 35 individual birds in the area or a single bird of each species of raptor identified numerous times. Further assessment of the Project area did not reveal the presence of stick nests so it is only known they were not nesting in the Project area.

Although 72 different species were identified during all seasons, 45 species were identified during breeding bird surveys. As such, approximately 38% of species were migrating through the area (or not identified during breeding surveys). What is more important to note is that during all seasons, 1231 individual birds were identified. But during breeding season, only 152 were found in the Project area. The 152 is only 12% of this total.

Only four individual birds were identified during the winter survey, suggesting the Project area does not support a significant number of overwintering birds.

The species with highest conservation interest observed during baseline assessments were the Canada Warbler and the Common Loon.

We do not expect that the Canada Warbler uses the Project area for breeding, as it was not observed more than once within the Project area during June and July, when the species is typically nesting.

The Common Loon is most susceptible to activity in and around lakes (for example, boating and shoreline development), so construction of turbines is not likely to impact their breeding habitat, particularly within this Project area, as it has no water bodies. Loons were commonly observed as flyovers, likely moving over the Project area.

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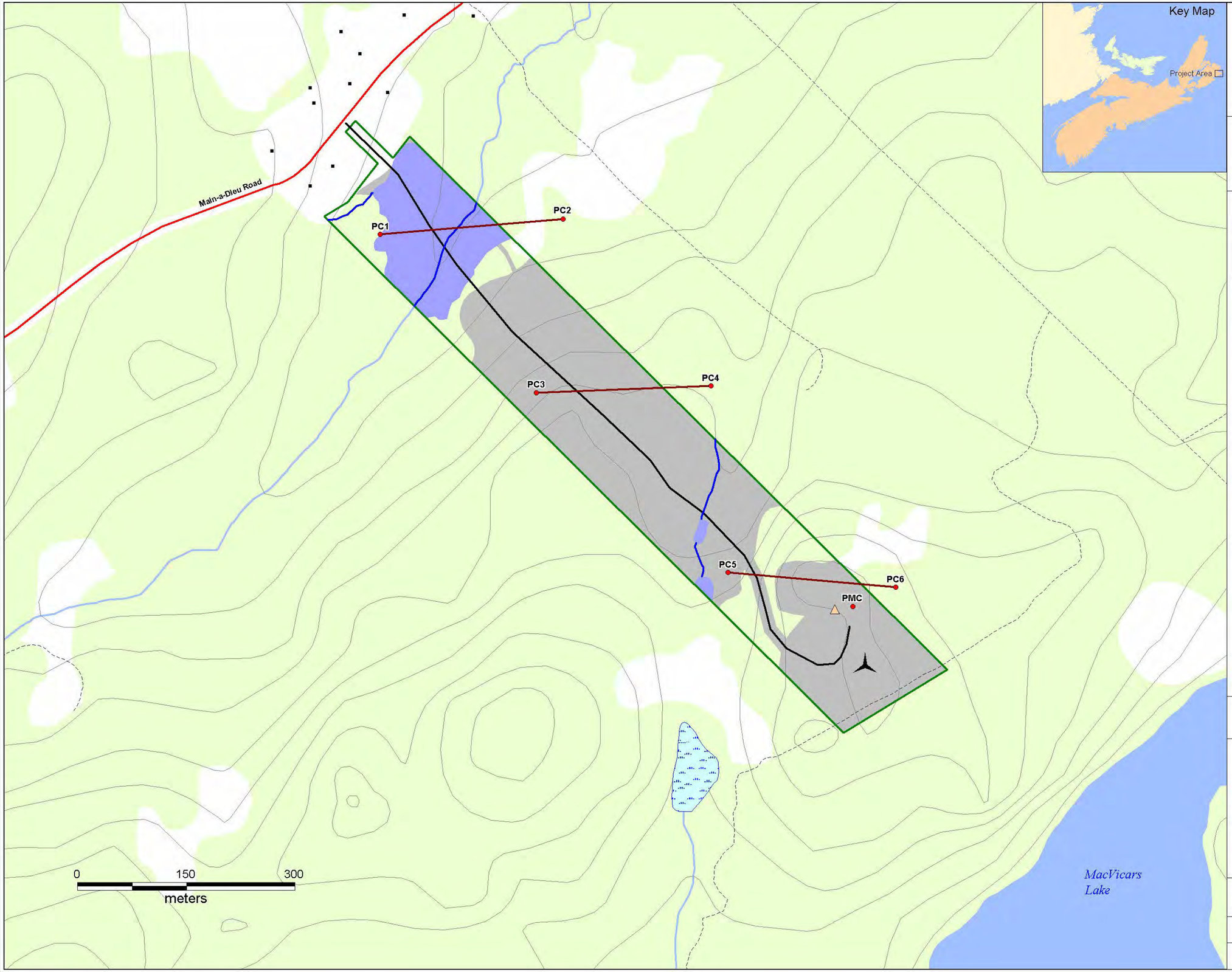


CELTIC CURRENT
COMMUNITY WIND DEVELOPMENT

Bateston Community Wind Project

Figure 1
Avian Survey Locations
Bateston, Nova Scotia

Legend:

Avian Surveys
- Point Count Location
- Transect Location

Project Features
- Project Area
- Existing Access Road
- Met Tower
- Proposed E92 Turbine

Existing Features
- Road
- Trail
- Stream
- Contour
- Water
- Swamp
- Wetland
- Forest
- Recent Harvest

McCallum Environmental Ltd.

Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW

TN

Scale: 1: 5,000

Source:	Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographical Database (NSTDB)	
Dec 16, 2013	Coordinate System: NAD 1983 UTM Zone 20N	Version: 1.1

GIS By: Nortek Resource Solutions Inc.

Appendix IV. ATLANTIC CANADA CONSERVATION DATA CENTER DOCUMENTED SPECIES OBSERVATIONS

Atlantic Canada Conservation Data Centre
Centre de données sur la conservation du Canada Atlantique

DATA REPORT 4983: Bateston, NS

Prepared 25 March, 2013
by S.L. Robinson, Data Manager

CONTENTS OF REPORT

1.0 PREFACE

The Atlantic Canada Conservation Data Centre (ACCDC) is part of a network of circa 85 NatureServe data centres and heritage programs in 50 states, 10 provinces and 1 territory, plus several Central and South American countries. The NatureServe network is more than 30 years old and shares a common conservation data methodology. The ACCDC was founded in 1997, and maintains data for the jurisdictions of New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador. Although a non-governmental agency, the ACCDC is supported by 6 federal agencies, plus 4 provincial governments, outside grants and data processing fees. URL: www.ACCDC.com.

Upon request and for a fee, the ACCDC reports known observations of rare and endangered flora and fauna, in and near a specified study area. As a supplement to that data, the ACCDC includes locations of managed areas with some level of protection, and also known sites of ecological interest. Data summarised in each report is attached as DBF files which may be opened from within data software (Excel, Access) or mapped in GIS (ArcView, MapInfo, AutoCAD).

1.1 RESTRICTIONS

The ACCDC makes a strong effort to verify the accuracy of all the data that it manages, but it shall not be held responsible for any inaccuracies in data that it provides. By accepting ACCDC data, recipients assent to the following limits of use:

a.) Data is restricted to use by trained personnel who are sensitive to landowner interests and the potential threat of the information contained here to rare and/or endangered flora and fauna.
b.) Data is restricted to use by the specified Data User; any third party requiring data must make its own data request.
c.) The ACCDC requires Data Users to cease using and delete data 12 months after receipt.
d.) ACCDC data responses are restricted to that data in our Data System at the time of the data request.
e.) Data is qualified in regard to locational uncertainy and period of observation; cf Data Dictionary for details.
f.) ACCDC data responses are not to be construed as exhaustive inventories of taxa in an area.
g.) The non-occurrence of a taxon cannot be inferred by its absence in an ACCDC data response.

1.2 ADDITIONAL INFORMATION

Please direct biological questions about ACCDC data to: Sarah Robinson, ACCDC: (506) 364-2664, and technical data queries to: Samara Eaton, CWS (NB and PE): (506) 364-5060 or Julie McKnight, CWS (NS): (902) 426-4196.

For provincial information on rare taxa and protected areas, or information on game animals, deer yards, old growth forest, archeological sites, fish habitat etc, please contact Sherman Boates, NSDNR: (902) 679-6146.

2.0 RARE AND ENDANGERED TAXA

A 100km buffer around the study area contains 3035 records of 335 taxa from 63 sources, a relatively low-to-moderate density of records (quintile 2): 0.10 rec/km2.

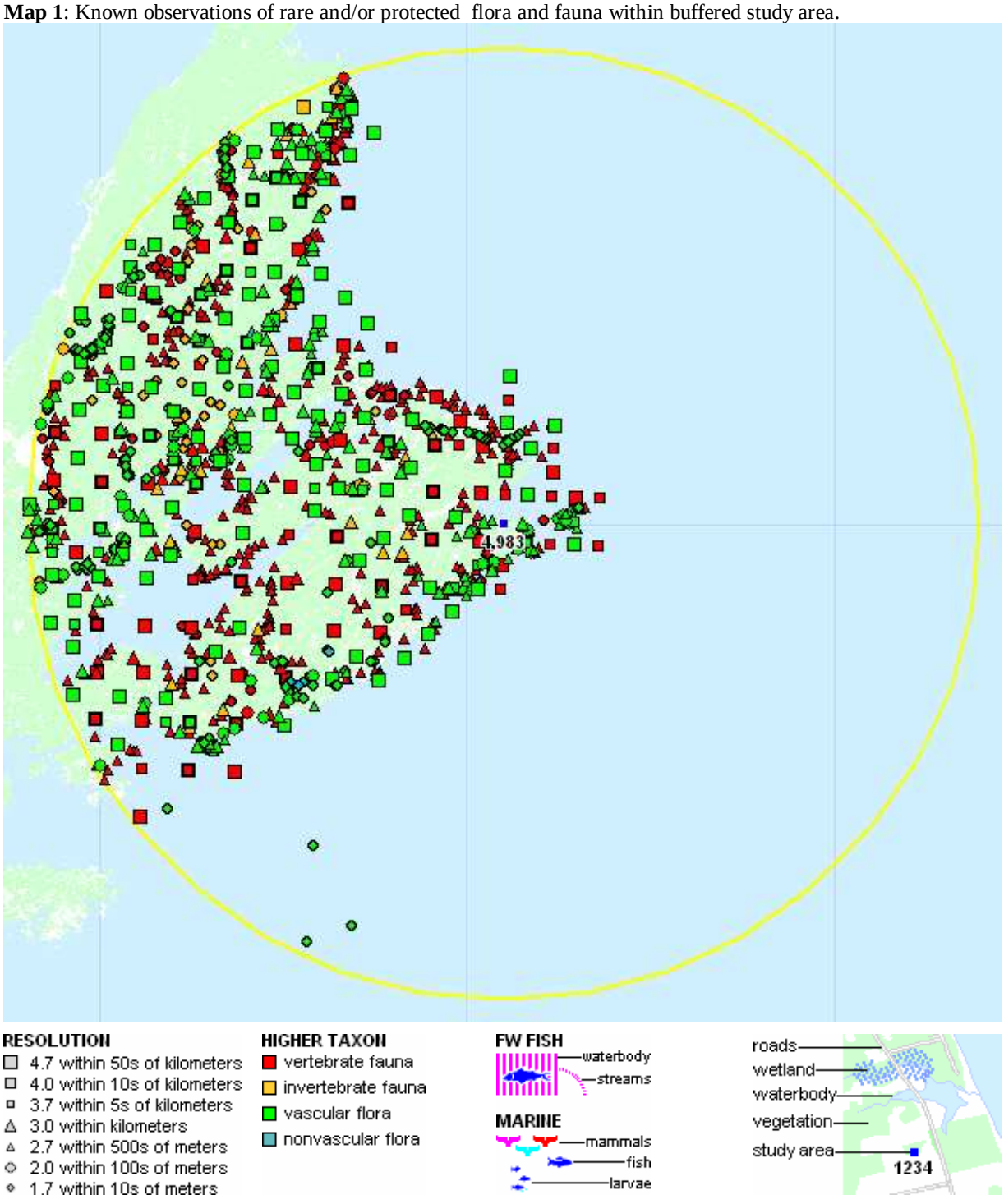
2.1 FLORA

A 100km buffer around the study area contains 752 records of 185 vascular, 15 records of 12 nonvascular flora (see attached *ob.dbf).

2.2 FAUNA

A 100km buffer around the study area contains 2131 records of 100 vertebrate, 137 records of 38 invertebrate fauna (cf attached *ob.dbf). Sensitive data: Peregrine Falcons are POTENTIALLY present in the study area (cf attached PEFA.rtf).

Map 1: Known observations of rare and/or protected flora and fauna within buffered study area.



3.0 SPECIAL AREAS

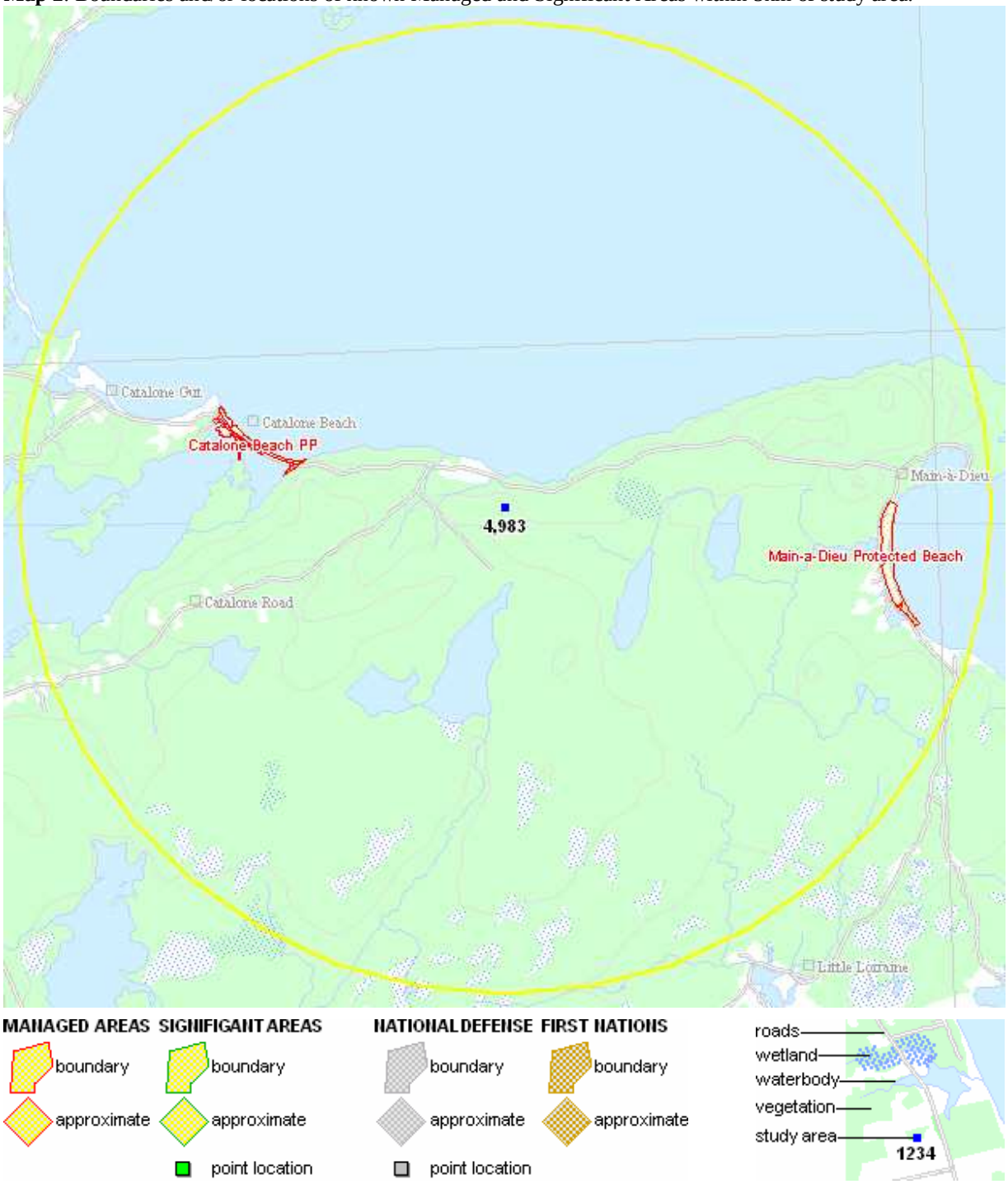
3.1 MANAGED AREAS

The GIS scan identified 3 Managed Areas with some degree of protected status, in the vicinity of the study area (see attached *ma.dbf).

3.2 SIGNIFICANT AREAS

No biologically significant sites were identified.

Map 2: Boundaries and/or locations of known Managed and Significant Areas within 5km of study area.



4.0 TAXON LISTS

Rare and/or endangered taxa within the buffered area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation. [p] = vascular plant, [n] = nonvascular plant, [a] = vertebrate animal, [i] = invertebrate animal, [c] = community.

4.1 FLORA

	scientific name	common name	prov. rarity	prov. status	COSEWIC	obs	dist.km
p	Juncus caesariensis	New Jersey Rush	S2	Vulnerable	SC	23	31 ±0
n	Degelia plumbea	Blue Felt Lichen	S2		SC	3	46 ±0
p	Floerkea proserpinacoides	False Mermaidweed	S2		NAR	5	93 ±0.1
p	Cystopteris laurentiana	Laurentian Bladder Fern	S1			3	80 ±5
p	Cryptogramma stelleri	Steller's Rockbrake	S1			2	95 ±5
p	Trisetum melicoides	Purple False Oats	S1			2	65 ±1
p	Torreyochloa pallida var. pallida	Pale False Manna Grass	S1			1	42 ±10
p	Phleum alpinum	Alpine Timothy	S1			2	93 ±0
p	Elymus wiegandii	Wiegand's Wild Rye	S1			5	27 ±1
p	Juncus bulbosus	Bulbous Rush	S1			6	10 ±1
p	Iris prismatica	Slender Blue Flag	S1			1	28 ±10
p	Rhynchospora capillacea	Slender Beakrush	S1			2	71 ±0.1
p	Carex wiegandii	Wiegand's Sedge	S1			7	16 ±0
p	Carex viridula var. elatior	Greenish Sedge	S1			1	81 ±0
p	Carex tenuiflora	Sparse-Flowered Sedge	S1			1	79 ±0.5
p	Carex saxatilis	Russet Sedge	S1			3	84 ±10
p	Carex rariflora	Loose-flowered Alpine Sedge	S1			4	8 ±0.5
p	Carex livida var. radicaulis	Livid Sedge	S1			8	10 ±5
p	Carex livida	Livid Sedge	S1			2	77 ±0
p	Carex granularis	Limestone Meadow Sedge	S1			1	81 ±0
p	Scrophularia lanceolata	Lance-leaved Figwort	S1			1	67 ±10
p	Pedicularis palustris	Marsh Lousewort	S1			1	8 ±0.5
p	Polygonum viviparum	Alpine Bistort	S1			1	85 ±1
p	Utricularia ochroleuca	Yellowish-white Bladderwort	S1			1	79 ±1
p	Pinguicula vulgaris	Common Butterwort	S1			1	93 ±10
p	Diapensia lapponica	Diapensia	S1			1	93 ±10
p	Hypericum majus	Large St John's-wort	S1			2	71 ±0.1
p	Lobelia kalmii	Brook Lobelia	S1			6	31 ±10
p	Draba norvegica var. clivicola	Norwegian Whitlow-Grass	S1			1	88 ±10
p	Cardamine pratensis var. angustifolia	Cuckoo Flower	S1			2	94 ±10
p	Cardamine pratensis	Cuckoo Flower	S1			2	80 ±0.1
p	Betula glandulosa	Glandular Birch	S1			3	87 ±10
p	Bidens hyperborea	Estuary Beggarticks	S1			1	99 ±10
p	Arnica lonchophylla	Northern Arnica	S1			1	89 ±10
p	Sanicula odorata	Clustered Sanicle	S1			1	71 ±1
n	Parmeliella parvula	Poor-man's Shingles Lichen	S1?			2	55 ±0
p	Dichanthelium acuminatum var. lindheimeri	Woolly Panic Grass	S1?			1	93 ±1
p	Triglochin gaspensis	Gaspé Arrowgrass	S1?			1	94 ±1
p	Schoenoplectus robustus	Sturdy Bulrush	S1?			2	65 ±5
p	Spiraea septentrionalis	Northern Meadowsweet	S1?			1	90 ±0.5
p	Rubus flagellaris	Northern Dewberry	S1?			1	18 ±1
p	Chenopodium rubrum	Red Pigweed	S1?			1	23 ±10
p	Atriplex acadiensis	Maritime Saltbush	S1?			1	29 ±10
n	Cavernularia hultenii	Powdered Honeycomb Lichen	S1S2			1	6 ±10
n	Nephroma arcticum	Arctic Kidney Lichen	S1S2			1	60 ±10
p	Woodsia alpina	Alpine Cliff Fern	S1S2			3	58 ±0.5
p	Sparganium hyperboreum	Northern Burreed	S1S2			7	10 ±0.1
p	Calamagrostis stricta ssp. stricta	Slim-stemmed Reed Grass	S1S2			1	71 ±1
p	Juncus stygius ssp. americanus	Moor Rush	S1S2			9	10 ±0.1
p	Juncus stygius	Moor Rush	S1S2			2	35 ±0
p	Carex bebbii	Bebb's Sedge	S1S2			4	41 ±5
p	Ranunculus sceleratus	Cursed Buttercup	S1S2			3	4 ±1
p	Anemone virginiana var. alba	Virginia Anemone	S1S2			3	64 ±0.1
p	Utricularia resupinata	Inverted Bladderwort	S1S2			1	63 ±0.1
p	Cornus suecica	Swedish Bunchberry	S1S2			15	6 ±0.5
p	Arabis hirsuta var. pycnocarpa	Western Hairy Rockcress	S1S2			4	40 ±0.1
p	Solidago multiradiata	Multi-rayed Goldenrod	S1S2			1	8 ±0.1
p	Equisetum pratense	Meadow Horsetail	S2			5	80 ±0
p	Woodsia glabella	Smooth Cliff Fern	S2			4	61 ±10
p	Polystichum lonchitis	Northern Holly Fern	S2			8	70 ±1
p	Dryopteris fragrans var. remotiuscula	Fragrant Wood Fern	S2			6	65 ±10
p	Asplenium trichomanes-ramosum	Green Spleenwort	S2			6	51 ±5
p	Asplenium trichomanes	Maidenhair Spleenwort	S2			10	44 ±1
p	Piptatherum canadense	Canada Rice Grass	S2			1	89 ±0.1
p	Spiranthes lucida	Shining Ladies'-Tresses	S2			1	58 ±1
p	Listera australis	Southern Twayblade	S2			2	18 ±0
p	Cypripedium reginae	Showy Lady's-Slipper	S2			15	36 ±1
p	Cypripedium parviflorum var. pubescens	Yellow Lady's-slipper	S2			1	61 ±0.1
p	Allium schoenoprasum var. sibiricum	Wild Chives	S2			5	6 ±0.1
p	Allium schoenoprasum	Wild Chives	S2			1	25 ±10
p	Juncus trifidus	Highland Rush	S2			4	85 ±5
p	Vallisneria americana	Wild Celery	S2			1	23 ±10
p	Eleocharis quinqueflora	Few-flowered Spikerush	S2			7	32 ±10
p	Carex scirpoidea	Scirpuslike Sedge	S2			3	21 ±10
p	Carex hystericina	Porcupine Sedge	S2			2	48 ±10
p	Carex castanea	Chestnut Sedge	S2			6	65 ±10

p	Carex atratiformis	Scabrous Black Sedge	S2	5	65 ±1
p	Carex atlantica ssp. capillacea	Atlantic Sedge	S2	12	10 ±0.1
p	Viola nephrophylla	Northern Bog Violet	S2	1	94 ±0.1
p	Saxifraga paniculata ssp. neogaea	White Mountain Saxifrage	S2	3	64 ±0.1
p	Parnassia palustris var. parviflora	Marsh Grass-of-Parnassus	S2	3	51 ±10
p	Comandra umbellata	Bastard's Toadflax	S2	7	51 ±10
p	Galium labradoricum	Labrador Bedstraw	S2	8	15 ±0.5
p	Caltha palustris	Yellow Marsh Marigold	S2	5	57 ±10
p	Anemone quinquefolia	Wood Anemone	S2	2	79 ±10
p	Pyrola minor	Lesser Pyrola	S2	7	8 ±0.1
p	Primula mistassinica	Mistassini Primrose	S2	1	95 ±1
p	Rumex salicifolius var. mexicanus	Triangular-valve Dock	S2	4	15 ±5
p	Myriophyllum verticillatum	Whorled Water Milfoil	S2	1	65 ±10
p	Vaccinium uliginosum	Alpine Bilberry	S2	18	6 ±0.5
p	Vaccinium caespitosum	Dwarf Bilberry	S2	8	42 ±10
p	Vaccinium boreale	Northern Blueberry	S2	21	8 ±0.5
p	Shepherdia canadensis	Soapberry	S2	9	57 ±1
p	Crassula aquatica	Water Pygmyweed	S2	5	7 ±0.1
p	Triosteum aurantiacum	Orange-fruited Tinker's Weed	S2	7	77 ±10
p	Stellaria humifusa	Saltmarsh Starwort	S2	4	6 ±0.5
p	Draba arabisans	Rock Whitlow-Grass	S2	3	65 ±10
p	Cardamine parviflora var. arenicola	Small-flowered Bittercress	S2	6	16 ±0.5
p	Arabis drummondii	Drummond's Rockcress	S2	3	44 ±1
p	Betula michauxii	Newfoundland Dwarf Birch	S2	2	6 ±0.5
p	Betula borealis	Northern Birch	S2	1	68 ±0.1
p	Caulophyllum thalictroides	Blue Cohosh	S2	2	92 ±0
p	Impatiens pallida	Pale Jewelweed	S2	2	61 ±10
p	Senecio pseudoarnica	Seabeach Ragwort	S2	8	8 ±10
p	Iva frutescens ssp. oraria	Big-leaved Marsh-elder	S2	1	31 ±10
p	Hieracium robinsonii	Robinson's Hawkweed	S2	7	65 ±5
p	Erigeron philadelphicus	Philadelphia Fleabane	S2	5	43 ±10
p	Osmorhiza longistylis	Smooth Sweet Cicely	S2	3	93 ±0
n	Syntrichia ruralis	a Moss	S2?	1	66 ±1
n	Scorpidium scorpioides	Hooked Scorpion Moss	S2?	1	78 ±10
n	Paludella squarrosa	Tufted Fen Moss	S2?	1	71 ±5
p	Juncus dudleyi	Dudley's Rush	S2?	1	80 ±0
p	Amelanchier fernaldii	Fernald's Serviceberry	S2?	3	10 ±10
p	Symphyotrichum boreale	Boreal Aster	S2?	4	31 ±10
p	Hieracium kalmii	Kalm's Hawkweed	S2?	1	81 ±0.1
n	Peltigera collina	Tree Pelt Lichen	S2S3	1	46 ±0
n	Flavocetraria nivalis	Crinkled Snow Lichen	S2S3	1	94 ±10
p	Potamogeton zosteriformis	Flat-stemmed Pondweed	S2S3	3	54 ±0.5
p	Potamogeton obtusifolius	Blunt-leaved Pondweed	S2S3	3	91 ±10
p	Stuckenia filiformis ssp. alpina	Thread-leaved Pondweed	S2S3	10	54 ±10
p	Poa glauca	Glaucous Blue Grass	S2S3	3	59 ±1
p	Alopecurus aequalis	Short-awned Foxtail	S2S3	5	62 ±0
p	Cypripedium parviflorum	Yellow Lady's-slipper	S2S3	15	36 ±10
p	Lilium canadense	Canada Lily	S2S3	5	67 ±10
p	Carex hirtifolia	Pubescent Sedge	S2S3	2	80 ±0
p	Carex adusta	Lesser Brown Sedge	S2S3	5	86 ±5
p	Veronica serpyllifolia ssp. humifusa	Thyme-Leaved Speedwell	S2S3	4	24 ±1
p	Polygonum raii	Sharp-fruited Knotweed	S2S3	6	6 ±5
p	Polygala sanguinea	Blood Milkwort	S2S3	1	72 ±10
p	Fraxinus nigra	Black Ash	S2S3	10	26 ±10
p	Hedeoma pulegioides	American False Pennyroyal	S2S3	1	29 ±1
p	Halenia deflexa	Spurred Gentian	S2S3	12	5 ±0.1
p	Empetrum eamesii ssp. eamesii	Pink Crowberry	S2S3	1	96 ±1
p	Empetrum eamesii ssp. atropurpureum	Pink Crowberry	S2S3	2	95 ±1
p	Suaeda calceoliformis	Horned Sea-blite	S2S3	3	4 ±0.5
p	Betula pumila	Bog Birch	S2S3	3	79 ±10
p	Symphyotrichum ciliolatum	Fringed Blue Aster	S2S3	1	95 ±10
p	Asclepias incarnata ssp. pulchra	Swamp Milkweed	S2S3	3	84 ±1
p	Equisetum variegatum	Variegated Horsetail	S3	2	17 ±0
p	Sparganium natans	Small Burreed	S3	4	3 ±0.5
p	Platanthera orbiculata	Small Round-leaved Orchid	S3	7	23 ±0
p	Platanthera hookeri	Hooker's Orchid	S3	1	88 ±0
p	Platanthera grandiflora	Large Purple Fringed Orchid	S3	3	7 ±1
p	Goodyera repens	Lesser Rattlesnake-plantain	S3	10	13 ±0.1
p	Goodyera oblongifolia	Menzies' Rattlesnake-plantain	S3	8	61 ±10
p	Corallorhiza trifida	Early Coralroot	S3	5	18 ±0
p	Juncus subcaudatus var. planisepalus	Woodland Rush	S3	3	17 ±0
p	Schoenoplectus torreyi	Torrey's Bulrush	S3	2	90 ±0
p	Eleocharis nitida	Quill Spikerush	S3	1	12 ±0.5
p	Cyperus dentatus	Toothed Flatsedge	S3	1	79 ±0
p	Carex eburnea	Bristle-leaved Sedge	S3	5	60 ±0.1
p	Verbena hastata	Blue Vervain	S3	1	95 ±0.1
p	Laportea canadensis	Canada Wood Nettle	S3	3	94 ±0
p	Limosella australis	Southern Mudwort	S3	7	4 ±1
p	Geocaulon lividum	Northern Comandra	S3	9	13 ±0.5
p	Salix petiolaris	Meadow Willow	S3	3	18 ±0
p	Galium kamtschaticum	Northern Wild Licorice	S3	4	72 ±5
p	Agrimonia gryposepala	Hooked Agrimony	S3	6	81 ±0
p	Rhamnus alnifolia	Alder-leaved Buckthorn	S3	6	28 ±0
p	Ranunculus gmelinii	Gmelin's Water Buttercup	S3	5	60 ±0
p	Pyrola asarifolia	Pink Pyrola	S3	1	60 ±0
p	Primula laurentiana	Laurentian Primrose	S3	1	81 ±10

p	Polygonum pensylvanicum	Pennsylvania Smartweed	S3		1	95 ±0.1
p	Epilobium strictum	Downy Willowherb	S3		3	71 ±1
p	Epilobium hornemannii	Hornemann's Willowherb	S3		7	73 ±10
p	Decodon verticillatus	Swamp Loosestrife	S3		2	93 ±5
p	Teucrium canadense	Canada Germander	S3		1	76 ±0
p	Proserpinaca palustris var. crebra	Marsh Mermaidweed	S3		2	80 ±0
p	Bartonia virginica	Yellow Bartonia	S3		1	85 ±0.1
p	Empetrum eamesii	Pink Crowberry	S3		5	80 ±10
p	Viburnum edule	Squashberry	S3		2	93 ±0
p	Campanula aparinoides	Marsh Bellflower	S3		1	95 ±5
p	Packera paupercula	Balsam Groundsel	S3		3	60 ±0
p	Megalodonta beckii	Water Beggarticks	S3		2	33 ±1
p	Erigeron hyssopifolius	Hyssop-leaved Fleabane	S3		12	60 ±0
p	Asclepias incarnata	Swamp Milkweed	S3		10	46 ±0.1
n	Collema furfuraceum	Blistered Tarpaper Lichen	S3?		1	60 ±10
n	Nephroma bellum	Naked Kidney Lichen	S3?		1	60 ±10
n	Sticta fuliginosa	Peppered Moon Lichen	S3?		1	57 ±0
p	Potamogeton praelongus	White-stemmed Pondweed	S3?		7	29 ±1
p	Elodea canadensis	Canada Waterweed	S3?		1	99 ±0
p	Carex cryptolepis	Hidden-scaled Sedge	S3?		1	81 ±0
p	Equisetum scirpoides	Dwarf Scouring-Rush	S3S4		4	60 ±0
p	Equisetum hyemale var. affine	Common Scouring-rush	S3S4		6	32 ±10
p	Cystopteris bulbifera	Bulblet Bladder Fern	S3S4		11	41 ±1
p	Trisetum spicatum	Narrow False Oats	S3S4		3	65 ±0.5
p	Liparis loeselii	Loesel's Twayblade	S3S4		6	40 ±0.5
p	Luzula parviflora	Small-flowered Woodrush	S3S4		9	49 ±0
p	Juncus acuminatus	Sharp-fruited Rush	S3S4		1	98 ±0
p	Carex argyrantha	Silvery-flowered Sedge	S3S4		2	18 ±0
p	Polygonum robustius	Stout Smartweed	S3S4		1	99 ±0
p	Sanguinaria canadensis	Bloodroot	S3S4		9	25 ±0
p	Utricularia gibba	Humped Bladderwort	S3S4		2	19 ±0
p	Atriplex franktonii	Frankton's Saltbush	S3S4		1	59 ±0.1
p	Angelica atropurpurea	Purple-stemmed Angelica	S3S4		2	18 ±0
p	Poa alpina	Alpine Blue Grass	SH		1	57 ±0.5
p	Eleocharis erythropoda	Red-stemmed Spikerush	SH		1	89 ±0

4.2 FAUNA

	scientific name	common name	prov. rarity	prov. status	COSEWIC	obs	dist.km
a	Charadrius melodus melodus	Piping Plover melodus ssp	S1B	Endangered	E	21	14 ±0.1
a	Calidris canutus rufa	Red Knot	S2S3M	Endangered	E	7	13 ±0.5
a	Rangifer tarandus pop. 2	Woodland Caribou (Atlantic-Gaspésie pop.)	SX	Extirpated	E	1	82 ±0.5
a	Myotis lucifugus	Little Brown Myotis	S1		E	9	30 ±10
a	Morone saxatilis	Striped Bass	S1		E,E,SC	3	38 ±10
a	Chaetura pelagica	Chimney Swift	S2S3B	Endangered	T	14	14 ±5
a	Chordeiles minor	Common Nighthawk	S3B	Threatened	T	16	4 ±5
a	Catharus bicknelli	Bicknell's Thrush	S1S2B	Vulnerable	T	30	8 ±0.1
a	Glyptemys insculpta	Wood Turtle	S3	Vulnerable	T	14	31 ±1
a	Acipenser oxyrinchus	Atlantic Sturgeon	S1?		T	1	38 ±10
a	Wilsonia canadensis	Canada Warbler	S3B		T	21	6 ±5
a	Hirundo rustica	Barn Swallow	S3B		T	75	4 ±5
a	Contopus cooperi	Olive-sided Flycatcher	S3B		T	62	9 ±0.5
a	Dolichonyx oryzivorus	Bobolink	S3S4B		T	34	6 ±5
a	Anguilla rostrata	American Eel	S5		T	1	30 ±10
a	Histrionicus histrionicus pop. 1	Harlequin Duck - Eastern pop.	S2N	Endangered	SC	1	17 ±10
i	Lampsilis cariosa	Yellow Lampmussel	S1	Threatened	SC	4	26 ±10
a	Falco peregrinus pop. 1	Peregrine Falcon - anatum/tundrius	S1B	Vulnerable	SC	1	17 ±10
a	Bucephala islandica (Eastern pop.)	Barrow's Goldeneye - Eastern pop.	S1N		SC	1	43 ±10
a	Asio flammeus	Short-eared Owl	S1S2		SC	3	16 ±5
i	Danaus plexippus	Monarch	S2B		SC	2	67 ±0.1
a	Euphagus carolinus	Rusty Blackbird	S2S3B		SC	36	14 ±5
a	Contopus virens	Eastern Wood-Pewee	S3S4B		SC	23	36 ±5
a	Chelydra serpentina	Snapping Turtle	S5		SC	1	40 ±10
a	Puma concolor pop. 1	Cougar - Eastern pop.	SH		DD	37	6 ±1
a	Lynx canadensis	Canadian Lynx	S1	Endangered	NAR	35	44 ±1
a	Sorex dispar	Long-tailed Shrew	S1		NAR	8	52 ±10
a	Accipiter cooperii	Cooper's Hawk	S1?B,SNAN		NAR	1	26 ±5
a	Aegolius funereus	Boreal Owl	S1B		NAR	2	16 ±5
a	Hemidactylium scutatum	Four-toed Salamander	S3		NAR	4	57 ±10
a	Sialia sialis	Eastern Bluebird	S3B		NAR	1	60 ±5
a	Sterna hirundo	Common Tern	S3B		NAR	88	6 ±5
a	Gavia immer	Common Loon	S3B,S4N		NAR	163	4 ±5
a	Accipiter gentilis	Northern Goshawk	S3S4		NAR	23	16 ±5
a	Martes americana	American Marten	S1	Endangered		14	61 ±10
i	Leptodea ochracea	Tidewater Mucket	S1			2	30 ±0.1
i	Coenagrion interrogatum	Subarctic Bluet	S1			1	72 ±0.1
i	Leucorrhinia patricia	Canada Whiteface	S1			1	90 ±0.1
i	Somatochlora williamsoni	Williamson's Emerald	S1			2	65 ±0.1
i	Somatochlora albicincta	Ringed Emerald	S1			3	83 ±0.1
i	Oeneis jutta	Jutta Arctic	S1			2	93 ±1
i	Polygonia gracilis	Hoary Comma	S1			1	67 ±1
i	Polygonia satyrus	Satyr Comma	S1			1	27 ±1
a	Vireo gilvus	Warbling Vireo	S1?B			2	87 ±5
a	Tringa solitaria	Solitary Sandpiper	S1?B,S4S5M			2	13 ±0.5
a	Larus delawarensis	Ring-billed Gull	S1?B,S5N			6	13 ±0.5
a	Gallinula chloropus	Common Moorhen	S1B			2	15 ±5
a	Alca torda	Razorbill	S1B,S4N			7	19 ±5

a	Fratercula arctica	Atlantic Puffin	S1B,S4S5N	4	50 ±5
a	Calidris minutilla	Least Sandpiper	S1B,S5M	16	11 ±0.5
a	Picoides dorsalis	American Three-toed Woodpecker	S1S2	3	85 ±5
i	Nymphalis vaualbum j-album	Compton Tortoiseshell	S1S2	1	78 ±1
i	Papilio brevicauda	Short-tailed Swallowtail	S1S2	3	61 ±1
a	Eremophila alpestris	Horned Lark	S1S2B,S4N	1	22 ±5
a	Charadrius semipalmatus	Semipalmated Plover	S1S2B,S5M	17	11 ±0.5
a	Martes pennanti	Fisher	S2	1	89 ±10
a	Microtus chrotorrhinus	Rock Vole	S2	6	66 ±10
a	Salmo salar	Atlantic Salmon	S2	42	6 ±10
a	Asio otus	Long-eared Owl	S2	1	87 ±5
i	Lampsilis radiata	Eastern Lampmussel	S2	3	31 ±0.1
i	Somatochlora septentrionalis	Muskeg Emerald	S2	5	79 ±0.1
i	Somatochlora forcipata	Forcipate Emerald	S2	3	69 ±1
i	Gomphus descriptus	Harpoon Clubtail	S2	1	99 ±0.1
i	Aglais milberti	Milbert's Tortoiseshell	S2	1	67 ±1
i	Boloria chariclea	Arctic Fritillary	S2	8	74 ±0.1
i	Satyrium calanus	Banded Hairstreak	S2	1	60 ±0.1
i	Lycaena dorcas	Dorcas Copper	S2	1	79 ±0.5
i	Pieris oleracea	Mustard White	S2	12	62 ±0.5
a	Vireo philadelphicus	Philadelphia Vireo	S2?B	1	45 ±5
a	Piranga olivacea	Scarlet Tanager	S2B	1	86 ±5
a	Empidonax traillii	Willow Flycatcher	S2B	1	76 ±0.5
a	Anas strepera	Gadwall	S2B	1	39 ±0.1
a	Anas clypeata	Northern Shoveler	S2B	1	39 ±0.1
a	Anas acuta	Northern Pintail	S2B	2	8 ±10
i	Pantala hymenaea	Spot-Winged Glider	S2B	3	64 ±0.5
a	Rissa tridactyla	Black-legged Kittiwake	S2B,S4S5N	25	6 ±5
a	Bucephala clangula	Common Goldeneye	S2B,S5N	17	15 ±10
a	Molothrus ater	Brown-headed Cowbird	S2S3B	9	6 ±5
a	Pooecetes gramineus	Vesper Sparrow	S2S3B	1	92 ±5
a	Tringa semipalmata	Willet	S2S3B	33	6 ±5
a	Phalaropus fulicarius	Red Phalarope	S2S3M	1	33 ±0.5
a	Phalaropus lobatus	Red-necked Phalarope	S2S3M	1	13 ±0.5
a	Poecile hudsonica	Boreal Chickadee	S3	90	4 ±5
a	Phalacrocorax carbo	Great Cormorant	S3	45	6 ±5
i	Amphiagrion saucium	Eastern Red Damsel	S3	8	25 ±1
i	Sympetrum danae	Black Meadowhawk	S3	7	26 ±1
i	Somatochlora tenebrosa	Clamp-Tipped Emerald	S3	2	61 ±10
i	Gomphaeschna furcillata	Harlequin Darner	S3	1	99 ±0.1
i	Boyeria grafiana	Ocellated Darner	S3	1	20 ±1
i	Ophiogomphus carolus	Riffle Snaketail	S3	14	22 ±1
i	Lanthus parvulus	Northern Pygmy Clubtail	S3	8	56 ±1
i	Polygonia faunus	Green Comma	S3	6	74 ±0.1
i	Euphydryas phaeton	Baltimore Checkerspot	S3	4	67 ±1
i	Hesperia comma laurentina	Laurentian Skipper	S3	3	67 ±1
i	Hesperia comma	Common Branded Skipper	S3	12	36 ±0
a	Dendroica tigrina	Cape May Warbler	S3?B	7	14 ±5
a	Coccyzus erythropthalmus	Black-billed Cuckoo	S3?B	3	26 ±5
a	Pinicola enucleator	Pine Grosbeak	S3?B,S5N	43	4 ±5
a	Mimus polyglottos	Northern Mockingbird	S3B	5	14 ±5
a	Dumetella carolinensis	Gray Catbird	S3B	14	16 ±5
a	Petrochelidon pyrrhonota	Cliff Swallow	S3B	25	14 ±0.1
a	Riparia riparia	Bank Swallow	S3B	50	6 ±5
a	Sterna paradisaea	Arctic Tern	S3B	23	13 ±0.5
a	Anas discors	Blue-winged Teal	S3B	27	6 ±5
a	Podilymbus podiceps	Pied-billed Grebe	S3B	8	16 ±5
i	Polygonia interrogationis	Question Mark	S3B	2	67 ±1
a	Tringa melanoleuca	Greater Yellowlegs	S3B,S5M	45	6 ±5
a	Mergus serrator	Red-breasted Merganser	S3B,S5N	37	4 ±5
a	Calidris pusilla	Semipalmated Sandpiper	S3M	16	11 ±0.5
a	Limosa haemastica	Hudsonian Godwit	S3M	7	13 ±0.5
a	Numenius phaeopus hudsonicus	Hudsonian Whimbrel	S3M	5	15 ±10
a	Pluvialis dominica	American Golden-Plover	S3M	9	13 ±0.5
a	Calidris maritima	Purple Sandpiper	S3N	4	9 ±10
a	Synaptomys cooperi	Southern Bog Lemming	S3S4	5	66 ±10
a	Cardinalis cardinalis	Northern Cardinal	S3S4	1	78 ±5
a	Perisoreus canadensis	Gray Jay	S3S4	68	4 ±5
a	Picoides arcticus	Black-backed Woodpecker	S3S4	14	4 ±5
a	Cepphus grylle	Black Guillemot	S3S4	43	4 ±5
i	Polygonia progne	Grey Comma	S3S4	4	67 ±1
i	Speyeria aphrodite	Aphrodite Fritillary	S3S4	1	93 ±10
i	Callophrys polios	Hoary Elfin	S3S4	2	24 ±0.5
i	Satyrium liparops	Striped Hairstreak	S3S4	1	62 ±0.1
a	Passerella iliaca	Fox Sparrow	S3S4B	43	7 ±0.1
a	Pheucticus ludovicianus	Rose-breasted Grosbeak	S3S4B	17	6 ±5
a	Wilsonia pusilla	Wilson's Warbler	S3S4B	21	4 ±5
a	Dendroica striata	Blackpoll Warbler	S3S4B	52	4 ±5
a	Dendroica castanea	Bay-breasted Warbler	S3S4B	36	8 ±0.5
a	Vermivora peregrina	Tennessee Warbler	S3S4B	33	4 ±5
a	Tyrannus tyrannus	Eastern Kingbird	S3S4B	14	6 ±5
a	Sayornis phoebe	Eastern Phoebe	S3S4B	7	47 ±5
a	Empidonax flaviventris	Yellow-bellied Flycatcher	S3S4B	125	7 ±0.5
a	Gallinago delicata	Wilson's Snipe	S3S4B	32	13 ±0.5
a	Actitis macularius	Spotted Sandpiper	S3S4B	104	4 ±5
a	Charadrius vociferus	Killdeer	S3S4B	26	13 ±0.5

a	Botaurus lentiginosus	American Bittern	S3S4B	12	16 ±5
a	Carduelis pinus	Pine Siskin	S3S4B,S5N	50	4 ±5
a	Morus bassanus	Northern Gannet	SHB,S5M	8	13 ±0.5
a	Aythya americana	Redhead	SHB,SNAM	2	15 ±10

4.3 RANGE MAPS

The legally protected taxa listed below are linked to the study area by predictive range maps based upon expert estimates of distribution. Taxa listed here but not in the observation data above, are unknown within the study area but perhaps present. Ranges of rank 1 indicate possible occurrence, those of rank 2 and 3 increasingly less probable.

	scientific name	common name	prov. rarity	prov. status	COSEWIC	range
a	Glyptemys insculpta	Wood Turtle	S3	Vulnerable	T	1
p	Listera australis	Southern Twayblade	S2			1
p	Isoetes prototypus	Prototype Quillwort	S2	Vulnerable	SC	1
a	Bucephala islandica	Barrow's Goldeneye (Eastern pop.)	S1N		SC	2
n	Erioderma pedicellatum	Boreal Felt Lichen (Atlantic pop.)	S1S2	Endangered	E	1
p	Eriocaulon parkeri	Parker's Pipewort			NAR	2
p	Juncus caesariensis	New Jersey Rush	S2	Vulnerable	SC	1

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Appendix V. ARCHAEOLOGICAL REPORT

BATESON WIND FARM:
ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT

Heritage Research Permit A2013NS016

May 2013

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BATESTON WIND FARM:
ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT

Heritage Research Permit A2013NS016
Category C

Davis MacIntyre & Associates Limited
Project No.: 13-011.01

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Cover: Meteorological tower and pad at Bateston.

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EXECUTIVE SUMMARY

In March 2013, Davis MacIntyre & Associates (DM&A) Ltd. was contracted by McCallum Environmental Ltd. to conduct an archaeological resource impact assessment of the proposed Bateston Wind Farm. The purpose of the assessment was to determine the potential for historic and precontact period archaeological resources within the development zone (turbine candidate site and access roads) and to provide any recommendations for further mitigation, if deemed necessary. The assessment consisted of a desk-based assessment and field reconnaissance of the study area.

The field reconnaissance was conducted in May 2013. At the time of the field survey, the study area had already undergone impact from tree harvesting, the construction of portions of the access road for meteorological tower installation, the construction of a meteorological tower pad and the installation of the meteorological tower itself. While no cultural activity or areas of heightened archaeological potential were noted, the level of ground disturbance already present in the study area limited the comprehensiveness and ability of the reconnaissance team to identify archaeological resources.

In the event that any archaeological material is encountered during further ground disturbance, all activity should cease and the Coordinator of Special Places (902-424-6475) should be contacted immediately to determine a suitable method of mitigation.

1.0 INTRODUCTION

In March 2013, Davis MacIntyre & Associates (DM&A) Ltd. was contracted by McCallum Environmental Ltd. to conduct an archaeological resource impact assessment of the proposed Bateston Wind Farm.

The purpose of the assessment was to determine the potential for archaeological resources within the development zone (turbine candidate site and access roads) and to provide recommendations for further mitigation, if deemed necessary. The assessment consisted of a desk-based assessment conducted by consulting historical maps and manuscripts and published literature as well as a field reconnaissance of the study area.

The impact assessment was completed under Category C Heritage Research Permit A2013NS016 issued by the Nova Scotia Department of Communities, Culture and Heritage, Culture and Heritage Development Division. This report conforms to the standards required by the Heritage Division under the Special Places program.

2.0 STUDY AREA

The proposed Bateston wind farm is located approximately 3 kilometers outside of Bateston on the Main-A-Dieu Road. The proposed turbine location was indicated as approximately 200m southeast of the recently erected meteorological (MET) tower, which is located at N45 59.639 W59 54.491 (UTM 21 T 274791 5097491, NAD83). A map showing the basic access road was provided (Figure 2.0-1). However, the final access road as built has varied from this plan, most likely due to steep topography (Figure 2.0-2).

The study area is located in the Till Plain sub-Unit of the Atlantic Coast (Natural Theme Region #870) (Figure 2.0-3). This region is characterized by poor drainage leading to numerous bogs, swamps, lakes and streams. Soils are predominately imperfectly drained (particularly in the Mira area) and are derived from sandstones, quartzites and shales. These soils are deeply deposited over highly eroded bedrock. Characteristic arboreal species include the White Spruce along the coast, with Balasm Fir becoming dominant inland. Black Spruce and larch are found in wet areas. Hemlock was originally a common species; however selective logging by early settlers is stated as a potential cause of their rarity today. Animals commonly found in the area include dear, several species of seabirds, and Harbour Seals along the coast. Freshwater species within the district include White Perch, Banded Killifish, sticklebacks and Brook Trout, in addition to a unique population of Lake Whitefish within the Mira River system.[1]

[1] Davis and Browne, 1996:219-221.

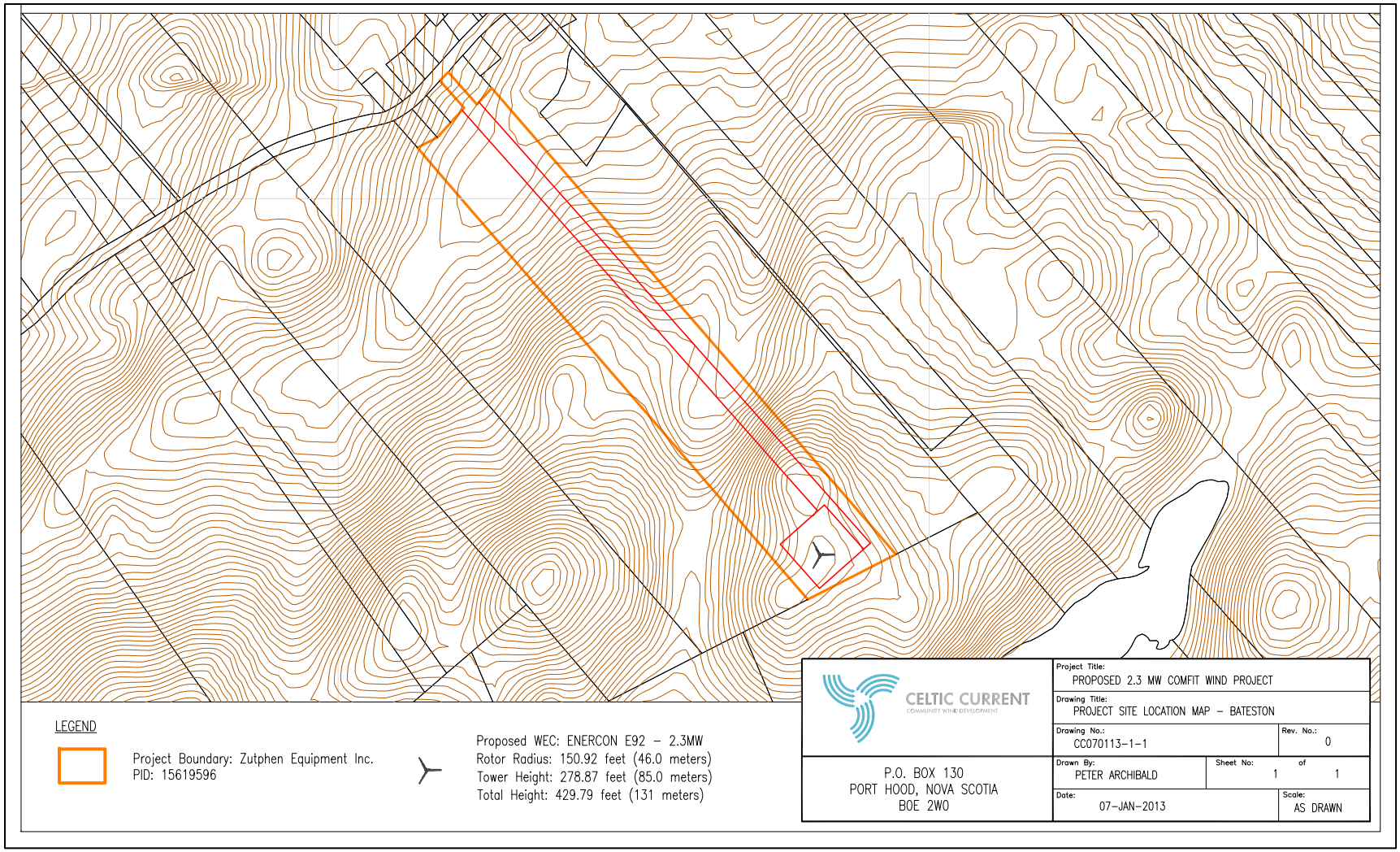

Figure 2.0- 1: Original project mapping showing the proposed turbine site and access road. Courtesy McCallum Environmental / Celtic Current.

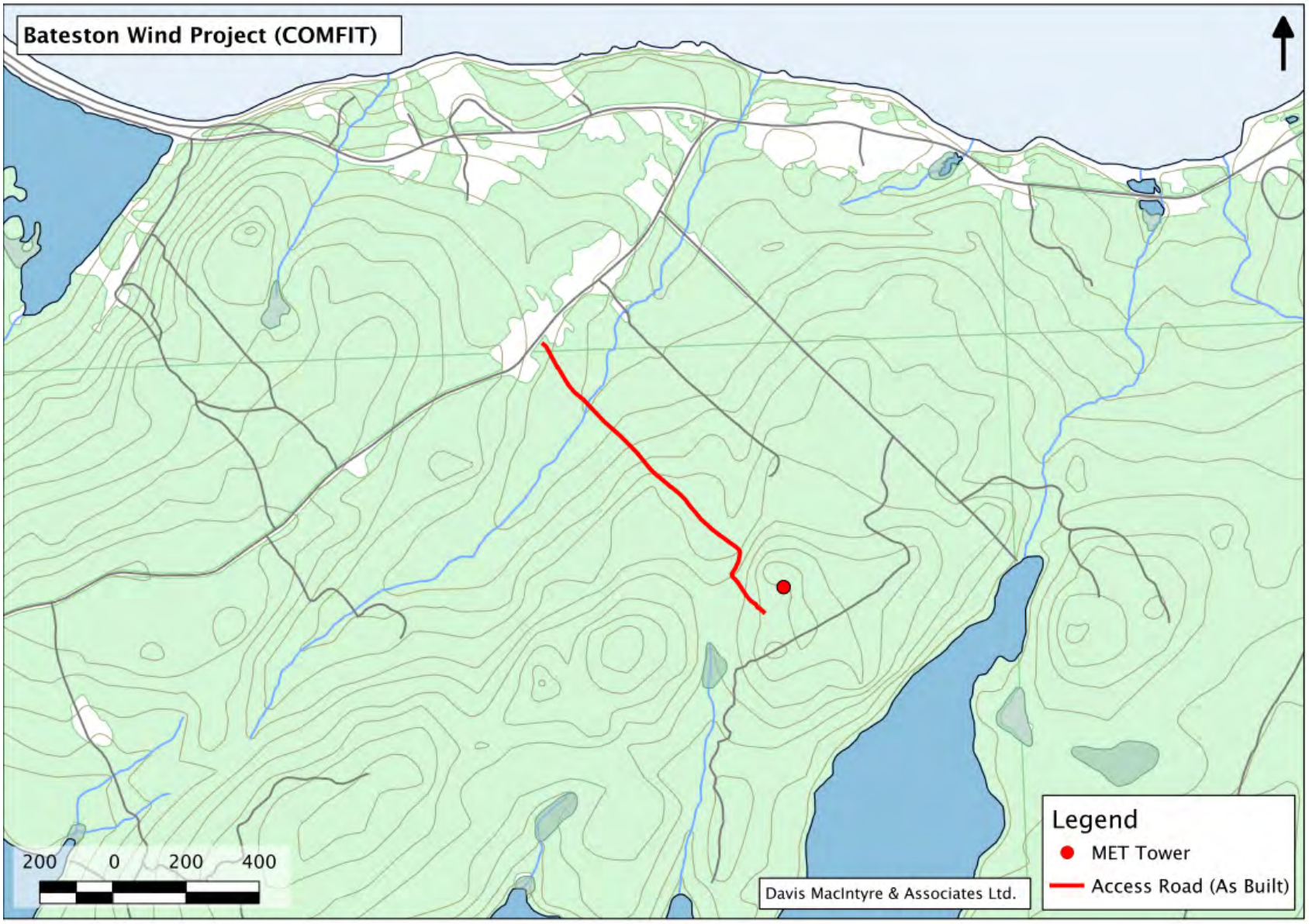

Figure 2.0- 2: A topographic map depicting the MET tower and proposed access road, observed as built during the field reconnaissance.

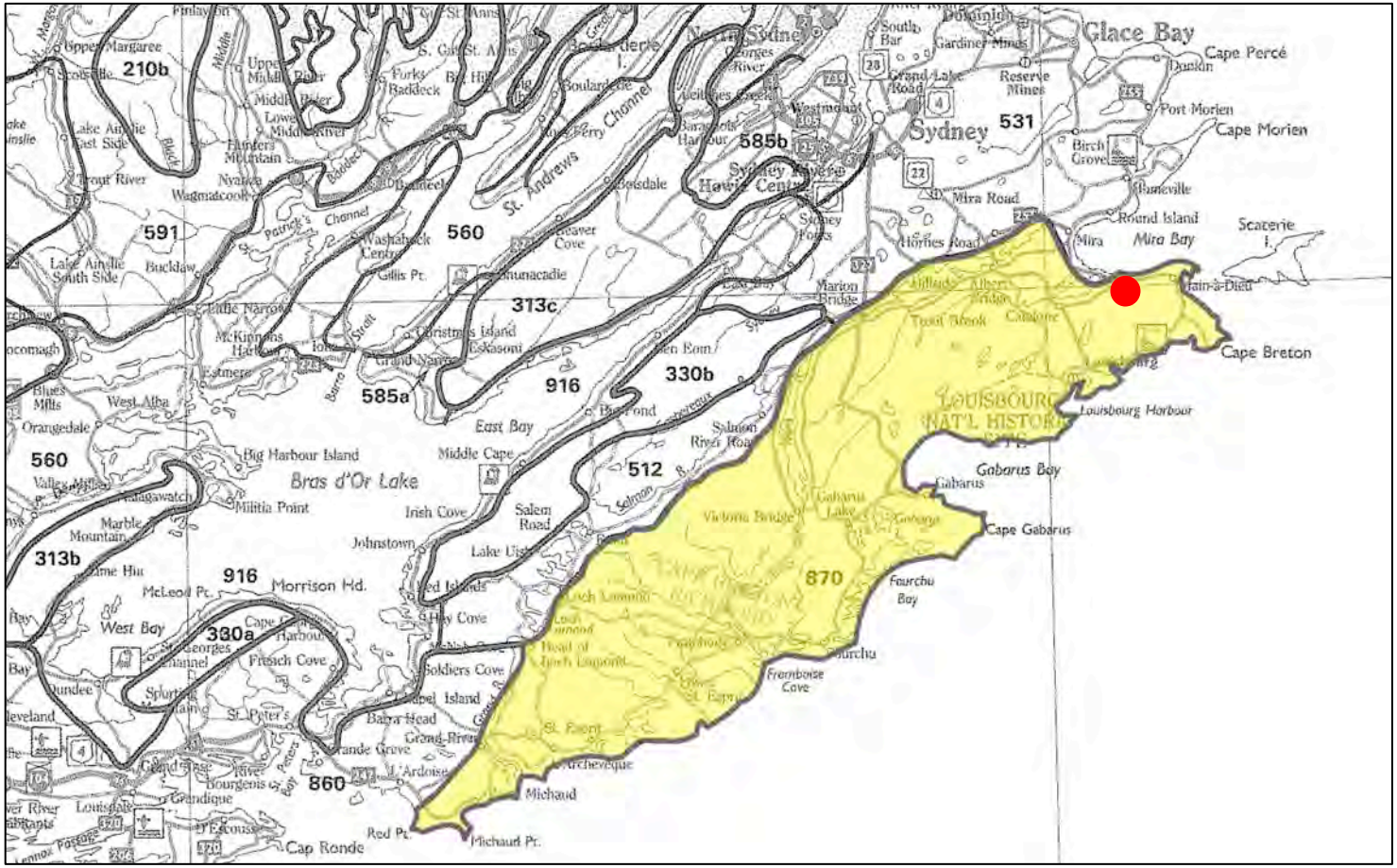

Figure 2.0- 3: Map of Natural Theme Region #870 with Bateston wind farm study area marked in red.[2]

[2] Davis and Browne, 1996:219-222.

3.0 METHODOLOGY

A historic background study was conducted by Davis MacIntyre & Associates Limited in March and May 2013. Historical maps and manuscripts and published literature were consulted. The Maritime Archaeological Resource Inventory, held at the Nova Scotia Museum's Heritage Division, was searched to understand prior archaeological research and known archaeological resources neighbouring the study area.

A field reconnaissance of the impact area was supervised by Stephen Davis on 8 May 2013. The access road and turbine candidate site, where a meteorological tower was installed, were visited.

3.1 Maritime Archaeological Resource Inventory

The Maritime Archaeological Resource Inventory, managed by the Nova Scotia Culture and Heritage Development Division, was consulted in May 2013 to determine if known archaeological resources exist near the study area.

Historic cellar depressions are known at Baleine Cove, part of the former Ochiltree settlement (BlBx-01). More historic cellar depressions have been recorded at Catalone Lake, possibly related to eighteenth century French occupation (BlBx-02).

Rectangular depressions or cellar features possibly related to late eighteenth or early nineteenth century Scottish settlement are found on the south shore of Little Lorraine Harbour (BlBx-03).

There are signs of eighteenth century Acadian activity at Mira Gut, at the site of the Brothers of Charity Monastery, hospital, and farm compound (CaBx-01).

A rectangular stone-filled feature, possibly related to the fishing industry, is known on Scatarie Island (CaBw-01). Two nineteenth century cellar depressions are also found on the island (CaBw-02).

The famous wreck of *Le Chameau* is known to lie on the bedrock bottom of Kelpy Cove off Chameau Rock (BlBw-01). Another wreck, *H. M. Feversham,* lies between Cape Breton Sunker and the little Sunker near Scatarie Island (BlBw-02). There are signs of the possible remains of wrecks including the *Gulf Gull* (1970s) and the *Angola* (1906) as well as other earlier wrecks between Baleine Harbour and Chameau Rock (BlBw-03). Finally, the T-192 Claims area (BlBw-04) off Scatarie Island contains redeposited artifacts scatters from a wreck that was destroyed by harsh marine conditions.

3.2 Historical Background

3.2.1 The Precontact Period

The history of human occupation in Nova Scotia has been traced back approximately 11, 000 years ago, to the Palaeo-Indian period or *Saqiwe'k L'nu'k* (11,000 – 9,000 years BP). The only significant evidence of Palaeo-Indian settlement in the province exists at Debert/Belmont in Colchester County.

The *Saqiwe'k Lnu'k* was followed by the *Mu Awsami Kejihaw'k L'nu'k* (Archaic period) (9,000 – 2,500 years BP), which included several traditions of subsistence strategy. The Maritime Archaic people exploited mainly marine resources while the Shield Archaic concentrated on interior resources such as caribou and salmon. The Laurentian Archaic is generally considered to be a more diverse hunting and gathering population.

The Archaic period was succeeded by the Woodland/Ceramic period of *Kejihawek L'nu'k* (2,500 – 500 years BP). Much of the Archaic way of subsistence remained although it was during this period that the first exploitation of marine molluscs is seen in the archaeological record. It was also during this time that ceramic technology was first introduced.

The Woodland period ended with the arrival of Europeans and the beginning of recorded history. The initial phase of contact between First Nations people and Europeans, known as the Protohistoric period, was met with various alliances particularly between the Mi'kmaq and the French.

The Mi'kmaq inhabited the territory known as *Mi'kma'ki* or *Megumaage*, which included all of Nova Scotia including Cape Breton, Prince Edward Island, New Brunswick (north of the Saint John River), the Gaspé region of Quebec, part of the Maine and southwestern Newfoundland. The Mi'kmaq name for Cape Breton was *Unama'kik aq Ktaqmkuk* meaning "Foggy lands and Land Across the water".[3] The Mi'kmaq name for Mira Bay was *Sula'qatik*.[4]

3.2.2 European Settlement

The earliest documented historic activity around Cape Breton Island began in the early 16th century with visits by fishermen to the fishing banks off the island. Prior to the founding of Louisbourg, the harbour there was known as English Harbour, indicating the presence of English fisherman in the region.[5] Sydney Harbour was

[3] Confederation of Mainland Mi'kmaq, 2007:11.
[4] Sylliboy <url>
[5] Fergusson, 1967:373-378.

known to the French as the *baie des Espagnols* ("Spanish Bay").[6] Early French fishermen tended to congregate at St. Ann's Bay (known to them as Grand Cibou).[7] Fur traders and fisherman continued to visit Cape Breton throughout the 16th century.

Some historians have argued that the first permanent settlement in Cape Breton was a 16th century Portuguese settlement.[8] Ingonish and Mira Bay have both been suggested as possible sites for this settlement.[9] Similarly, it has been suggested that some place names in Cape Breton are derived from the Portuguese exploration of the island, including Mira Bay. Although some have argued that Mira was named after a French officer, as was the case for Lake Catalone, no French officer with the name of *Mira, Miré* or *Miray* was stationed at Louisbourg. Mira Bay appears on early French maps as *Miray, Mira, Miré, Myre* and *Mirée*. [10]

In 1629, a Scottish fort was built in Cape Breton, at Baleine Cove by James Stuart. This site was captured in the same year by the French under the command of Captain Daniel of Dieppe and the Scottish inhabitants of Baleine Cove were taken prisoner. Daniel took advantage of the labour provided by these prisoners to build a new French fort at St. Anne's Bay. This settlement was the first French settlement on the island and was known as St. Anne or Port Dauphin. In 1632, under the Saint Germain en Laye Treaty, Cape Breton and Acadia were officially under control of the French. At this time, the settlement of Saint Anne in Cape Breton was considered of little importance when compared to Quebec, Montreal, Tadoussac, Three Rivers and Port Royal.[11] In 1636, a second French settlement was established in Cape Breton, at Saint Pierre (St. Peter's), which was later known as Port Toulouse.

Although the possession of mainland Nova Scotia fluctuated between the French and the English, Cape Breton remained under French control. Saint Anne continued to be the main French settlement on Cape Breton. In 1713, the Treaty of Utrecht formally gave mainland Nova Scotia to the British while Prince Edward Island and Cape Breton continued to remain under control of the French.[12]

The French response to this treaty was to consolidate control in their territories and plans were made to construct a main fortification in Cape Breton. Although other areas of the Island were considered as candidates for the principal settlement and fortification, the addition of six guns to Louisbourg in 1719 cemented the prominence of the fortress.[13] Cape Breton was renamed *Île Royale* and the French began a period of fortification and colonization. Settlers in Cape Breton were mainly

[6] Murdoch, 1865:217.
[7] Landry, <url>
[8] Allison, 1916:111; Murdoch, 1865:131; Landry <url>
[9] Newfoundland and Labrador Heritage <url>
[10] Bourinot, 1892:98.
[11] Murdoch, 1865:72-87, 125.
[12] Murdoch, 1865:132, 333.
[13] Fergusson, 1967:373-378.

located in the area surrounding Louisbourg. Most of them were from France with only a few Acadians settled on the island.[14] French fisherman settled in the area around Bateston and Main-a-dieu shortly after the founding and the Mira area was one of the few places in Cape Breton where the French attempted intense cultivation of the soil.[15] The Brothers of Charity had a large farm which was located at Mira and from which they produced wheat and cereals.[16]

A 1717 French map depicts the island with the three major ports – Louisbourg, Dauphin and Toulouse. Three other places are labeled, including *Miray*. This may indicate that Mira Bay was more known to the French or occupied by them than other parts of the island (Figure 3.2-1).

In 1723, a soldier and engineer Gédéon de Catalogne was sent to Louisbourg to supervise the building of its fortifications, as he had similarly done at Quebec and *Trois Rivières*. Catalogne was given property in Louisbourg itself and other land was granted to him in the Mira Bay area, along the *Barachois de Catalogne* (today Catalone Lake).[17] Catalogne recognized the potential for agriculture at Mira, noting the good soil and limestone of his grant, and predicted that 500 families could be supported by the area. He wrote in 1727 to Jéan-Frédéric Maurepas, the minister of marine, describing some agricultural experiments that he had conducted, including growing melons, vegetables and tobacco, as well as wheat barley and oats which had been grown on his farm at Mira.[18]

The Mira Bay area is depicted in an undated map of Louisbourg and the surrounding area (Figure 3.2-2). The area where Catalogne has cleared land is noted, as is a lime kiln located along the coast. To the north of Lake Catalogne, the land is identified as belonging to *Les frerres de la charité* or Brothers of Charity, a monastery. A "second settlement" is noted on the northern shores of the lake. In the approximate study area nothing is depicted, aside from vegetation.

During the first siege of Louisbourg in 1745, it is mentioned in several sources that a force of three thousand French and Mi'kmaq gathered in the Mira area with French officer M. de Boishébert. English troops were sent out to intercept this group and accounts of the travel across the area describe their encounter with French inhabitants of the countryside. They describe encountering large houses, barns, gardens and fields, as well as a salmon fishery. Although it is not clear exactly where the English forces were encountering these inhabitants, they were travelling west by north-west, in the approximately direction of Mira Bay.[19] It is likely that the area described was somewhere on the Mira River, located to the north and northwest of the study area.

[14] Murdoch, 1865:341.
[15] Bourinot, 1892:33.
[16] Donovan, 2006.
[17] Fergusson, 1967:114.
[18] Donovan, 2006.
[19] Gow, 1893:204.

A 1758 French map also depicts settlement in the Mira area, showing land belonging to the Brothers of Charity Monastery on the north side of Lake Catalogne (Figure 3.2-3). According to the map's legend, the land belonging to Catalogne has been sold to M. de Laur Marchand. Unlike the undated map of Mira Bay, this map does not depict Catalogne's settlement on the shores of Catalogne Lake. It does, however, indicate a settlement or a building further east along the shore of the lake.

During the second and final siege of Louisbourg in 1758, it was reported that there were 300 men for the French at the *Mire* ready to cross the river with boats and make their way to Louisbourg.[20] This siege was also successful and the British once again took control of Louisbourg. After the Seven Year's War, the fortress continued to remain in British control. This war culminated in the Treaty of Paris, which saw France lose control to the French colonies in North America, including Cape Breton. Cape Breton became part of mainland Nova Scotia administratively under the British government.[21]

In 1788, a large grant of 100 000 acres called the Mira Grant was issued to 120 Loyalist families from New Hampshire. The northern edge of the study area falls on the border of this grant (Figure 3.2-4). The majority of this grant was not inhabited and within a short period of time, it reverted to the crown.[22] This land was parceled into lots and re-granted. The study area was part of the land granted to Paul Burnaby Buckley in 1803 as part of a 300 acre plot (Figure 3.2-5). Buckley did settle on this portion of the land and instead built along the beach of Catalone Lake.[23]

In the late 19th century, the area became known as Bateston, after the Bates family who came to hold numerous properties in the area.[24] These families are clearly seen on the 1877 A.F. Church map of the county of Cape Breton (Figure 3.2-6). This map also depicts properties held by Johnsons' and a McVicar, in the same vicinity as the Johnson Lake and MacVicars Lake are located in today.

The Geological Survey of Canada (GSC) map for the Bateston area is dated to 1879 and shows less detail than the 1877 Church map (Figure 3.2-7). It does depict the two lakes located just outside the study area but labels them as the Johnson Lakes.

[20] Gow, 1893:264.
[21] Landry, <url>
[22] Gow, 1893:344.
[23] Fergusson, 1967:40.
[24] Fergusson, 1967:40.

Figure 3.2- 1: 1717 French map of Isle Royale (Cape Breton) depicting the major settlements at this time: Louisbourg, Port Toulouse and Port Dauphin. In addition, Mira Bay has been depicted and labeled as "Miray."[25] North is roughly to the right on this map.

[25] Anon., 1717.

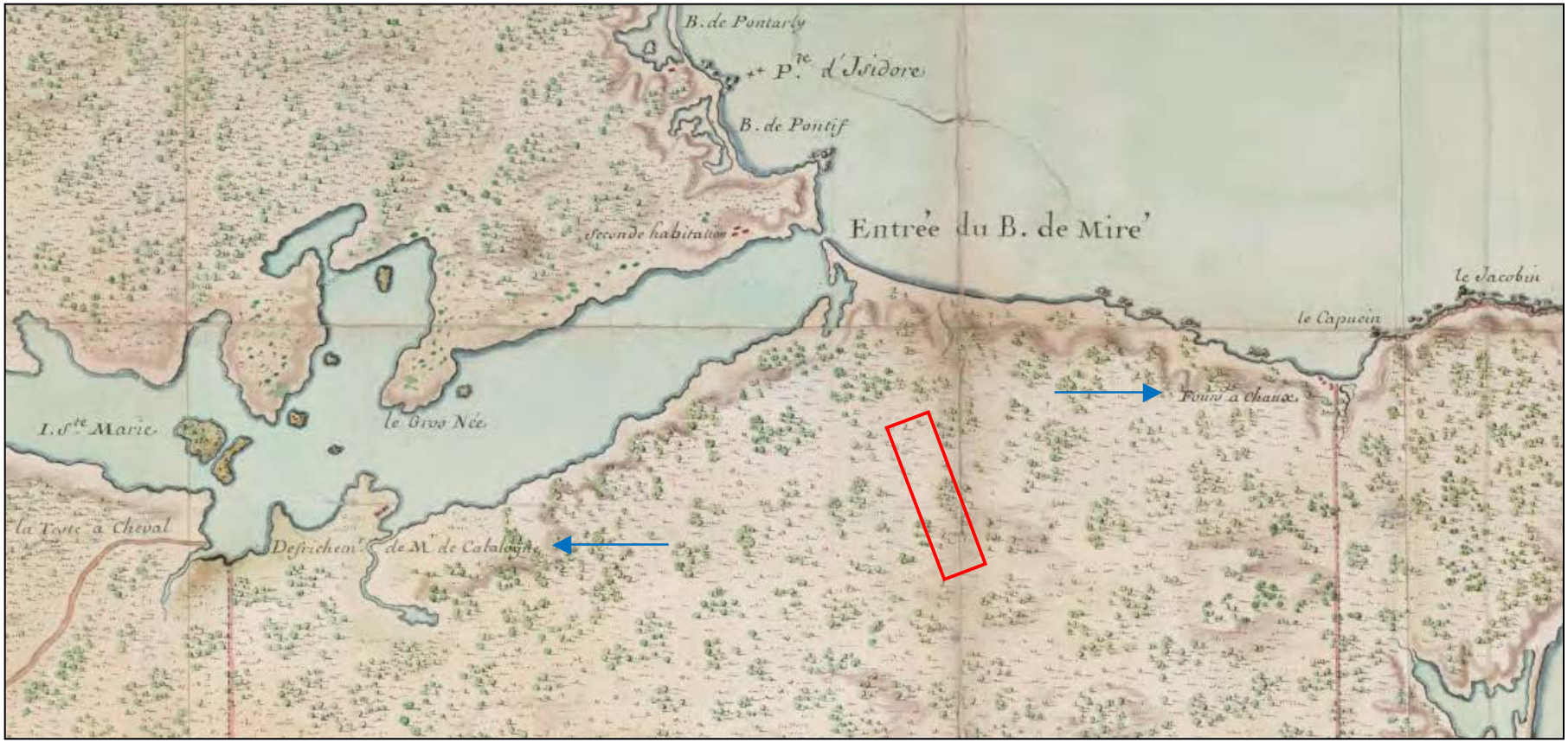

Figure 3.2- 2: Detail of an undated French map of Louisbourg and surrounding area. Gideon Catalogne's settlement is shown, as is a lime kiln (*fours a chaux*) both highlighted here in blue. A habitation belonging to "*Les frerres de la charité*" is noted on the north side of the lake. The approximate study area is shown in red. [26]

[26] Boucher, no date.

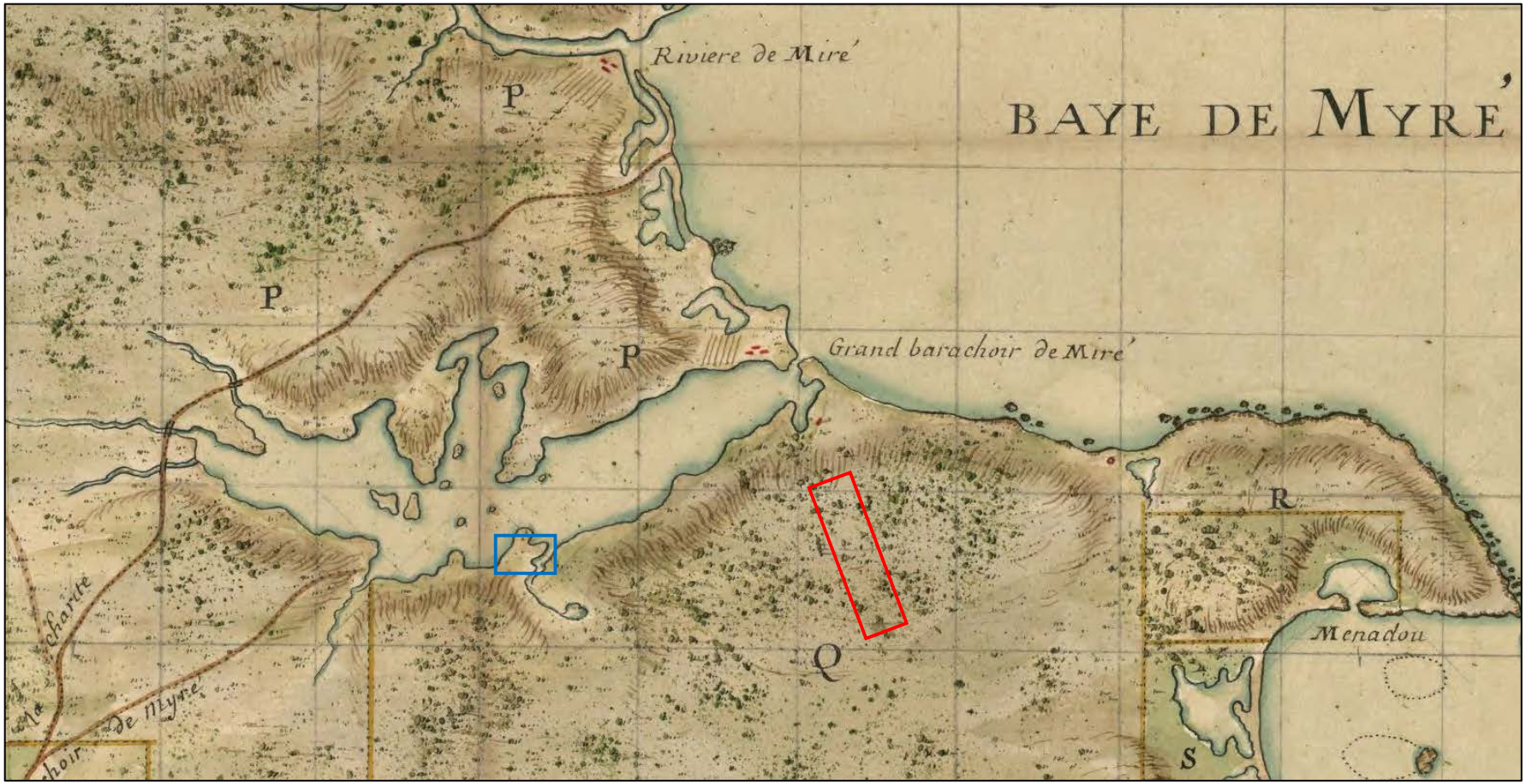

Figure 3.2- 3: Excerpt of 1758 map of Louisbourg and surrounding area with land belonging to "*Les frerres de la charité*" identified by "P." Land sold by M. Catalogne to M. de Laur Marchand is identified with "Q." Note the absence of Catalogne's settlement (blue box). Approximate study area shown in red.[27]

[27] Anon. 1758.

Figure 3.2- 4: Excerpt of an 1831 map of Cape Breton, which shows the extent of the Old Miré Grant issued to 120 New Hampshire Loyalists families. Approximate study area shown in red.[28]

[28] Johnston, 1831.

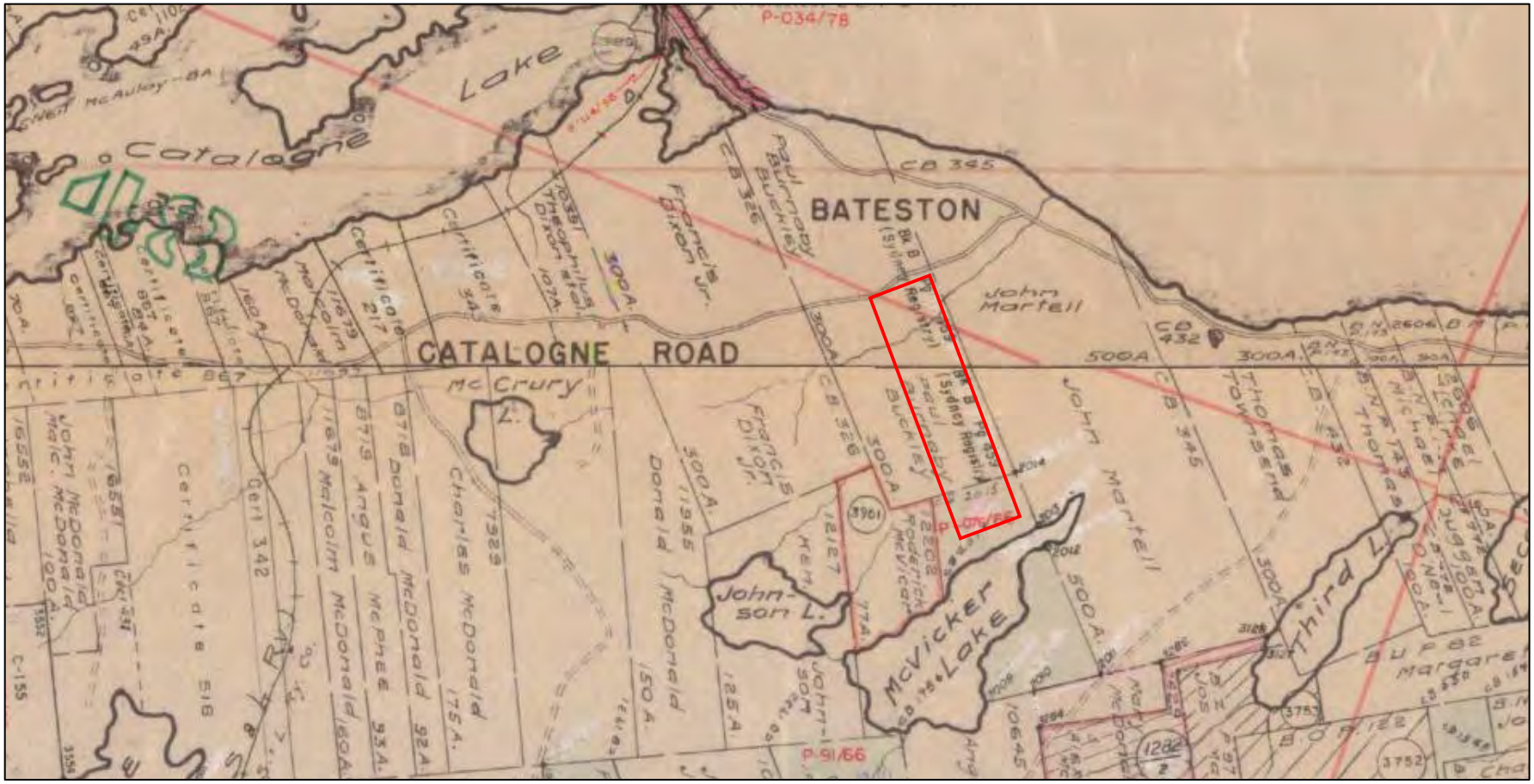

Figure 3.2- 5: Excerpt of the Crown Land Grants map showing the land granted since 1763. The approximately study area is shown in red.[29]

[29] Nova Scotia Department of Lands and Forests, 1948.

Figure 3.2- 6: Excerpt of A.F. Church's 1877 map of Cape Breton County. Note the numerous Bates' properties, as well as the A. McVicar property and several Johnson properties in the vicinity of study area, where the Johnson Lake and MacVicar Lake are located. Study area approximately shown in red.[30]

[30] Church, 1877.

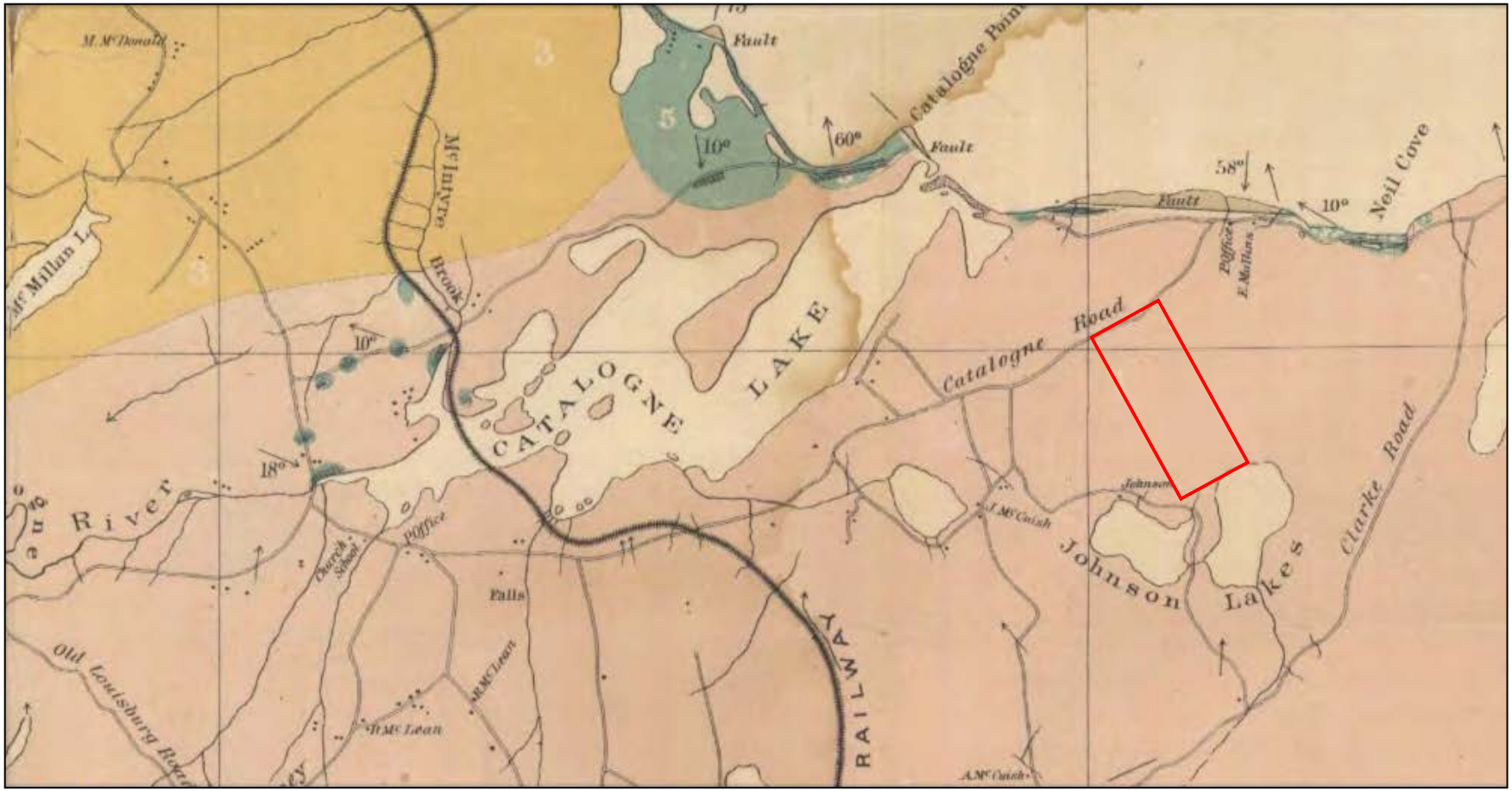

Figure 3.2- 7: Excerpt from 1879 Geological Survey of Canada map. Catalogne Lake and Road are shown, as are two lakes labeled as Johnson Lakes. One of these lakes is now known as MacVicars Lake. The approximate study area is shown in red.[31]

[31] Faribault, 1879.

3.3 Field Reconnaissance

The study area was situated within a Black Spruce swamp and a higher area of predominately softwood forest. Very recent clear cutting was evident throughout the study area. Only one watercourse was identified, a brook, which was too shallow for navigation. A brief consultation with a local fireman indicated that some small trout are occasionally found here.

Field reconnaissance was undertaken on 8 May 2013. Access to the study area was gained via Main-A-Dieu Road. A tree harvesting staging area was noted by the field crew in the northwest end of the study area, just below the main road. A member of the logging crew was encountered here and provided information regarding the path that the access road would take through the study area. The field crew walked this area to the turbine candidate site where a meteorological tower had already been erected on a leveled surface.

The north end of the study area closest to the road had been logged in recent months. This end of the study area would have originally been a Black Spruce swamp and the area was very wet (Plate 1). Due to the logging and resulting brush and debris on the ground, visibility of the surface topography was poor. A brook runs east-west through the study area and the access road will cross the brook. The large black PVC culvert which will be used to divert the brook under the access road was at the site, marking the area where the road would cross the brook (Plate 2). At this location, the watercourse was approximately 2 meters wide and 30 to 40 centimeters deep (Plate 3). It did not appear to be navigable even if seasonal flooding increased its size.

The terrain to the south of the brook continued to be a logged Black Spruce forest, although the area was slightly drier. Proceeding farther southeast along the access road, the terrain begins to incline steeply. This area had also been logged and the ground had been disturbed to create the access road, which at the time of reconnaissance began abruptly above a small clump of standing spruce saplings (Plate 4). The road winds up the hill, forming part of the access road constructed for the MET tower installation, and in turn avoiding some of the steepest inclines (Plate 5). The road was constructed with what appeared to be imported grey gravelly fill. The soil native to the area was an orange colour which appeared to have been leached by humic acid. Disturbed natural soil could be seen around the edges of the road (Plate 6). No cultural material was observed in this exposed soil.

The top of the road has not been completely constructed, although the area has been logged and cleared of trees, again making visibility an issue and impacting the ground in some areas (Plate 7). The constructed road skirts the edge of a gravel pad constructed for the MET tower, though it will eventually proceed slightly farther into the harvested forest to the final turbine site. The MET area had been leveled and covered with fill to create a pad (Plates 8 and 9).

It was noted that the surface of the meteorological tower pad has been contoured somewhat to the bedrock and in some areas, as the bedrock was observed protruding from the surface (Plate 10). The area surrounding the turbine site to the south had been extensively logged and logging was ongoing at the time of the survey (Plate 11). The edges of the meteorological tower pad were examined (Plate 12); however the level of ground disturbance and impact greatly affected the ability of the reconnaissance team to identify any cultural features or areas of archaeological potential.

The area around the meteorological tower pad appeared to have originally been mainly a softwood forest, although some hardwood was also noted, in particularly a hardwood tree which appeared to be several hundred years old, located close to the tower pad (Plate 13). Some modern cultural materials, such as rope believed to be associated with modern logging and construction activities, were noted during the reconnaissance. Disturbed soil at the edges of the built portions of the road and the edges of the pad surface were examined, with no archaeological material noted.

4.0 RESOURCE INVENTORY

During the field reconnaissance, no areas of heightened archaeological potential were noted and no cultural features, aside from modern logging and construction materials, were noted.

5.0 RESOURCE EVALUATION

The brook is narrow and fairly shallow, rendering it not navigable. No areas suitable for First Nations habitation were noted based on the proximity to navigable water and other resources and terrain. No evidence of historic habitation was observed.

6.0 RESULTS AND DISCUSSION

The results of the field reconnaissance indicate that the proposed impact area has had little habitation by European or First Nations people. This is supported by the lack of navigable watercourses and the wetness of the northern part of the study area, as well as the background research which identified activity in the general area, but none which had been specifically documented in the study area. However, a high level of ground disturbance and impact had already occurred prior to the reconnaissance. This severely limited the ability of the reconnaissance crew to identify archaeological features or areas of potential.

7.0 RECOMMENDATIONS AND CONCLUSIONS

Research and field reconnaissance in the study area has revealed the presence of no areas of elevated archaeological potential or archaeological features. There is no evidence that archaeological resources were disturbed during previous construction activities, however the gravelly fill added to the road, and the extensive grubbing around the turbine pad obscure the soil and native topography beneath them. Therefore it cannot be stated with complete confidence that archaeological resources were not present prior to ground disturbance.

In the event that any archaeological material is encountered during further ground disturbance activities, all activity should cease and the Coordinator of Special Places (902-424-6475) should be contacted immediately to determine a suitable method of mitigation

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PLATES

Plate 1: Looking northwest along proposed access road over the harvested Black Spruce swamp to the staging area near the Main-A-Dieu Road.

Plate 2: Looking southeast over the proposed access road and the harvested Black Spruce swamp. The brook is located just behind the black culvert in the background.

Plate 3: The brook that will be diverted by the culvert, looking west.

Plate 4: The beginning of the newly built access road looking southeast. Note the grey gravel fill on top of the native orange/brown soil.

Plate 5: Looking southeast over a built section of the new access road. The new meteorological tower can be noted in the distance.

Plate 6: Close up of disturbed soil beside a section of the built access road (grey fill) demonstrating the level of impact. Looking southwest.

Plate 7: Looking east past the edge of the meteorological tower's pad and over harvested forest where it appears the road will connect to the pad.

Plate 8: The meteorological tower pad that had been constructed at the turbine site, looking southeast.

Plate 9: The meteorological tower and pad, looking northeast.

Plate 10: Close up of bedrock protruding from meteorological tower pad, looking east.

Plate 11: Looking east past the edge of the meteorological tower pad to the logging equipment and activity.

Plate 12: Looking northeast over the meteorological tower pad. Note the high level of ground disturbance in the tower pad and surrounding area.

Plate 13: Looking north-northwest to the edge of the tower pad. Note the old hardwood tree in the background and the exposed bedrock in the foreground.

APPENDIX A: HERITAGE RESEARCH PERMIT

NOVA SCOTIA

Heritage Research Permit (Archaeology)

Special Places Protection Act 1989

(Original becomes Permit when approved by Communities, Culture and Heritage)

Office Use Only
Permit Number:
A2013NS016

Greyed out fields will be made publically available. Please choose your project name accordingly

Surname Davis | First Name Stephen

Project Name Bateston Wind Project

Name of Organization Davis MacIntyre & Associates Limited

Representing (if applicable)

Permit Start Date 17 April 2013 | Permit End Date 31 July 2013

General Location: Bateston, Cape Breton County

Specific Location: *(cite Borden numbers and UTM designations where appropriate and as described separately in accordance with the attached Project Description. Please refer to the appropriate Archaeological Heritage Research Permit Guidelines for the appropriate Project Description format)*

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Permit Category:
Please choose one

☐ Category A – Archaeological Reconnaissance

☐ Category B – Archaeological Research

☑ Category C – Archaeological Resource Impact Assessment

☑ I certify that I am familiar with the provisions of the *Special Places Protection Act* of Nova Scotia and that I have read, understand and will abide by the terms and conditions listed in the Heritage Research Permit Guidelines for the above noted category.

Signature of applicant Stephen Davis | Date 02 April 2013

Approved by Executive Director | Date Apr 8/13