

APPENDIX A

Alternative Option Package



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1. INTRODUCTION

The Dufferin Wind Power Project is currently being developed by Dufferin Wind Power Inc. (DWP). *Ontario Regulation 359/09* requires that renewable energy projects conduct a Natural Heritage Assessment (NHA), which includes a records review, site investigation, evaluation of significance and environmental impact study for natural heritage features that fall within the project location or the prescribed setback area (*REA Section 27*). An NHA package has been completed for the Dufferin Wind Power Project. There are currently two options to connect the project to the provincial grid. Both of these options have been addressed in the NHA package and have been included as part of the project location however only one option would be constructed.

As an appendix to the NHA package, this document addresses alternative options for construction within wetlands along Option 2 – a 230 kV power line as a result of pre-construction surveys. Within the 230 kV private easement study area, construction will occur outside of all identified wetland units; therefore, these alternative options apply to 16 unevaluated wetland units south of this area.



2. NATURAL FEATURES

The location of the Dufferin Wind Power Project has been subject to numerous field investigations and a thorough review of constraints to development was undertaken prior to delineating the project location. Based on the natural environment information collected, the project location was refined to avoid impacts to significant and/or sensitive natural heritage features, where possible. The layout of the wind project has been developed to minimize its footprint and prioritized the protection of natural features that provided habitat for sensitive species. The project has been developed to retain the significance of natural features identified and mitigates effects that will occur.

Through the NHA process, 16 unevaluated wetlands and their associated candidate significant wildlife habitats were identified along the proposed 230 kV Line as shown in **Table 1**. Pre-construction surveys will be conducted to determine the significance of these natural features. Survey methodology is discussed in **Section 3**.

Table 1: Unevaluated wetlands and associated Candidate Significant Wildlife Habitat Units

Unevaluated Wetland Unit	Candidate Significant Wildlife Habitat
47	<ul style="list-style-type: none"> • Section of Amphibian Breeding Habitat – ABH 30 • Section of Marsh Breeding Bird Habitat MBB 30
48	<ul style="list-style-type: none"> • Section of Amphibian Breeding Habitat – ABH 30 • Section of Marsh Breeding Bird Habitat MBB 30
51	<ul style="list-style-type: none"> • Section of Amphibian Breeding Habitat – ABH 31 • Section of Marsh Breeding Bird Habitat MBB 32 • Colonial Bird Nesting Habitat CNH 14
52	<ul style="list-style-type: none"> • Section of Marsh Breeding Bird Habitat MBB 32 • Colonial Bird Nesting Habitat CNH 13
53	<ul style="list-style-type: none"> • Section of Marsh Breeding Bird Habitat MBB 33
54	<ul style="list-style-type: none"> • Section of Marsh Breeding Bird Habitat MBB 33
56	<ul style="list-style-type: none"> • Section of Amphibian Breeding Habitat ABH 34 • Section of Marsh Breeding Bird Habitat MBB 36
57	<ul style="list-style-type: none"> • Section of Amphibian Breeding Habitat ABH 34 • Section of Marsh Breeding Bird Habitat MBB 36
58	<ul style="list-style-type: none"> • Section of Amphibian Breeding Habitat ABH 35 • Section of Marsh Breeding Bird Habitat MBB 37



59	<ul style="list-style-type: none">• Section of Amphibian Breeding Habitat ABH 35• Section of Marsh Breeding Bird Habitat MBB 37
60	<ul style="list-style-type: none">• Marsh Breeding Bird Habitat MBB 38
61	<ul style="list-style-type: none">• Amphibian Breeding Habitat 37• Marsh Breeding Bird Habitat MBB 39• Section of Colonial Bird Nesting Habitat CNH 15
71	<ul style="list-style-type: none">• Section of Amphibian Breeding Habitat ABH 42• Section of Marsh Breeding Bird Habitat MBB 42
72	<ul style="list-style-type: none">• Section of Amphibian Breeding Habitat ABH 42• Section of Marsh Breeding Bird Habitat MBB 42
81	<ul style="list-style-type: none">• Section of Amphibian Breeding Habitat ABH 48• Section of Marsh Breeding Bird Habitat MBB 49
82	<ul style="list-style-type: none">• Marsh Breeding Bird Habitat MBB 46

* Identification and mapping of these units can be found in the *Records Review Report* and *Site Investigation Report* as part of the NHA package.



3. PRE-CONSTRUCTION SURVEY METHODOLOGY

The following surveys will be conducted in Spring and Summer 2012 to determine the significance of unevaluated wetland communities and associated candidate significant wildlife habitat (**Table 1**) along the proposed 230 kV Line.

3.1 Wetlands

The Proponent will evaluate the unevaluated wetland units that are isolated and those in catchment areas of non-provincially significant and unevaluated wetland complexes along the 230 kV transmission line using OWES protocol. For unevaluated wetland units in non-provincially significant wetland complex catchment areas, the existing Wetland Evaluation will be re-scored to see if the combined potential scoring changes to the biological, social, hydrological or special features components elevate the wetland complex to provincially significant status. For isolated wetland units or wetlands units in unevaluated wetland complexes, we will complete a full OWES evaluation.

3.2 Amphibian Breeding Habitat

Significance of Amphibian Breeding Habitat currently treated as significant will be will be evaluated using the amphibian monitoring methods outlined in the Marsh Monitoring Program protocol (Bird Studies Canada 1994). Three different surveys will be conducted in April, May and June, 2012, with at least two weeks between each survey. Surveys will begin at least one half hour after sunset during evenings with a minimum night temperature of 5°C, 10°C and 17°C for each of the three respective surveys.

Each amphibian survey involves standing at a predetermined station for 3 minutes and listening for frog calls. The calling activity of individuals estimated to be within 100 metres of the observation point will be documented. All individuals beyond 100 metres will be recorded as outside of the count circle and calling activity not recorded. Calling activity will be ranked using one of the following three abundance code categories:

- Code 1: Calls not simultaneous, number of individuals can be accurately counted;
- Code 2: Some calls simultaneous, number of individuals can reliably be estimated;
- Code 3: Calls continuous and overlapping, number of individuals cannot be estimated.



In areas where appropriate habitat exist and is accessible, vernal pools will be examined for egg masses and amphibian larvae.

The outcome of these surveys will result in either identifying these Amphibian Breeding Habitats as significant or non-significant. Significance will be evaluated using the Ontario Ministry of Natural Resources Draft Schedule 6E (MNR 2012). Specifically, habitats that meet the following criteria will be considered significant: the presence of breeding population of one or more of the listed species (Eastern Newt, Blue-spotted Salamander, Spotted Salamander, Gray Treefrog, Spring Peeper, Western Chorus Frog, Wood Frog) with at least 20 individuals (adults, juveniles, eggs/larval masses).

3.3 Marsh Breeding Bird Habitat

Significance of Marsh Breeding Bird Habitat will be evaluated using data collected during breeding bird surveys along the railway corridor. These surveys will be completed using a birding scope which will allow for the entire habitat to be searched for marsh breeding birds.

Breeding bird surveys, will follow methods outlined in the Ontario Breeding Bird Atlas Guide for Participants (OBBA 2001), and will be conducted in late May, June and early July 2012. Generally surveys occur between dawn and 5 hours after sunrise. No surveys will be conducted during inclement weather (e.g., thick fog, wind speed > 3 of the Beaufort scale, storm events). An assessment of the habitats will be undertaken to determine the abundance and species richness of the marsh breeding bird community within or directly adjacent to the area. Efforts will be focused on identifying nests. Breeding behaviour generally includes, but is not limited to, males singing, nest building, egg incubation, territorial defence, carrying food and feeding their young. Surveys will be undertaken twice over the course of each breeding season (Visit 1 – late May to mid-June, Visit 2 – mid-June to early July) to ensure that both early and late breeders are detected.

Specifically, the breeding bird surveys will consist of ten minute point counts. Point counts are used to establish quantitative estimates of bird abundance in major habitat types of the study area. Breeding evidence for each bird species will be documented using Breeding Bird Atlas Evidence Codes. For all point count locations, a GPS coordinate in NAD 83 will be documented.

The outcome of these surveys will result in either identifying these Marsh Breeding Bird Habitats as significant or non-significant. Significance will be evaluated using the Ontario Ministry of Natural Resources Draft Schedule 6E (MNR 2012). Specifically, habitats that meet one or more of the following criterion will be considered significant: the presence of 5 or more nesting pairs of Sedge Wren or Marsh



Wren or one pair of Sandhill Cranes or breeding by any combination of five or more of the listed species (American Bittern, Virginia Rail, Sora, Common Moorhen, American Coot, Pied-billed Grebe, Marsh Wren, Sedge Wren, Common Loon, Sandhill Crane, Green Heron, and Trumpeter Swan); or if one or more Black Terns, Trumpeter Swan, Green Heron, or Yellow Rail are observed.

3.4 Colonial Bird Nesting Habitat

Significance of Colonial Bird Nesting Habitat (Hérons) will be evaluated using data collected during breeding bird surveys along the railway corridor. These surveys will be completed using a birding scope which will allow for the entire habitat to be searched for nests.

Breeding bird surveys, will follow methods outlined in the Ontario Breeding Bird Atlas Guide for Participants (OBBA 2001), and will be conducted in late May, June and early July 2012. Generally surveys occur between dawn and 5 hours after sunrise. No surveys will be conducted during inclement weather (e.g., thick fog, wind speed > 3 of the Beaufort scale, storm events). An assessment of the habitats will be undertaken to determine the abundance and species richness of the Colonial breeding bird community within or directly adjacent to the area. Efforts will be focused on identifying nests. Breeding behaviour generally includes, but is not limited to, males singing, nest building, egg incubation, territorial defence, carrying food and feeding their young. Surveys will be undertaken twice over the course of each breeding season (Visit 1 – late May to mid-June, Visit 2 – mid-June to early July) to ensure that both early and late breeders are detected.

Specifically, the breeding bird surveys will consist of ten minute point counts. Point counts are used to establish quantitative estimates of bird abundance in major habitat types of the study area. Breeding evidence for each bird species will be documented using Breeding Bird Atlas Evidence Codes. For all point count locations, a GPS coordinate in NAD 83 will be documented.

The outcome of these surveys will result in either identifying these Colonial Bird Nesting Habitats as significant or non-significant. Significance will be evaluated using the Ontario Ministry of Natural Resources Draft Schedule 6E (MNR 2012). Specifically, habitats that meet one or more of the following criterion will be considered significant: the presence of 5 or more active Great Blue Heron nests; if the edge of the colony and a minimum 300m area of habitat or extent of the Forest Ecosite containing a colony or any island <15.0 ha with a colony is found; or if an active heronry is found during site visits during the nesting season or by the presence of fresh guano, dead young, and/or eggshells.



4. ALTERNATIVE OPTION

As outlined in the NHA package, there are two options for the construction of the 230 kV power line along the proposed route

- i. Horizontal directional drilling (HDD)
- ii. Overhead Line

The first option will be implemented for Provincially Significant Wetlands (PSW) that have been identified by the Ministry of Natural Resources (MNR) and whose boundaries have been confirmed by field investigations. The second option will be implemented for Non-Provincially Significant Wetlands (Non-PSW) that have been identified by the MNR and whose boundaries have been confirmed by field investigations.

4.1 Current Approach

Within the NHA package, it is outlined that construction of project components will remain outside of all unevaluated wetlands along the 230 kV Line. As a result, all candidate significant wildlife habitats associated with these units have been generalized.

The following alternatives will apply to the 16 unevaluated wetlands after pre-construction evaluations and wildlife surveys have occurred. A flow chart outlining the following alternatives is shown in **Figure 1**.

4.2 Alternative 1

All 16 wetlands are evaluated to be provincially significant.

Construction activities must remain outside of all PSWs, therefore HDD must be used for the installation of the proposed 230 kV Line to avoid impacts to these areas. Only indirect impacts to the wetland have the potential to occur therefore all candidate wildlife habitat associated with these wetlands can be generalized. This action is consistent with the current approach outlined in the NHA package. Further mitigation details regarding indirect impacts can be found in the *Environmental Impact Study Report* within the NHA package.

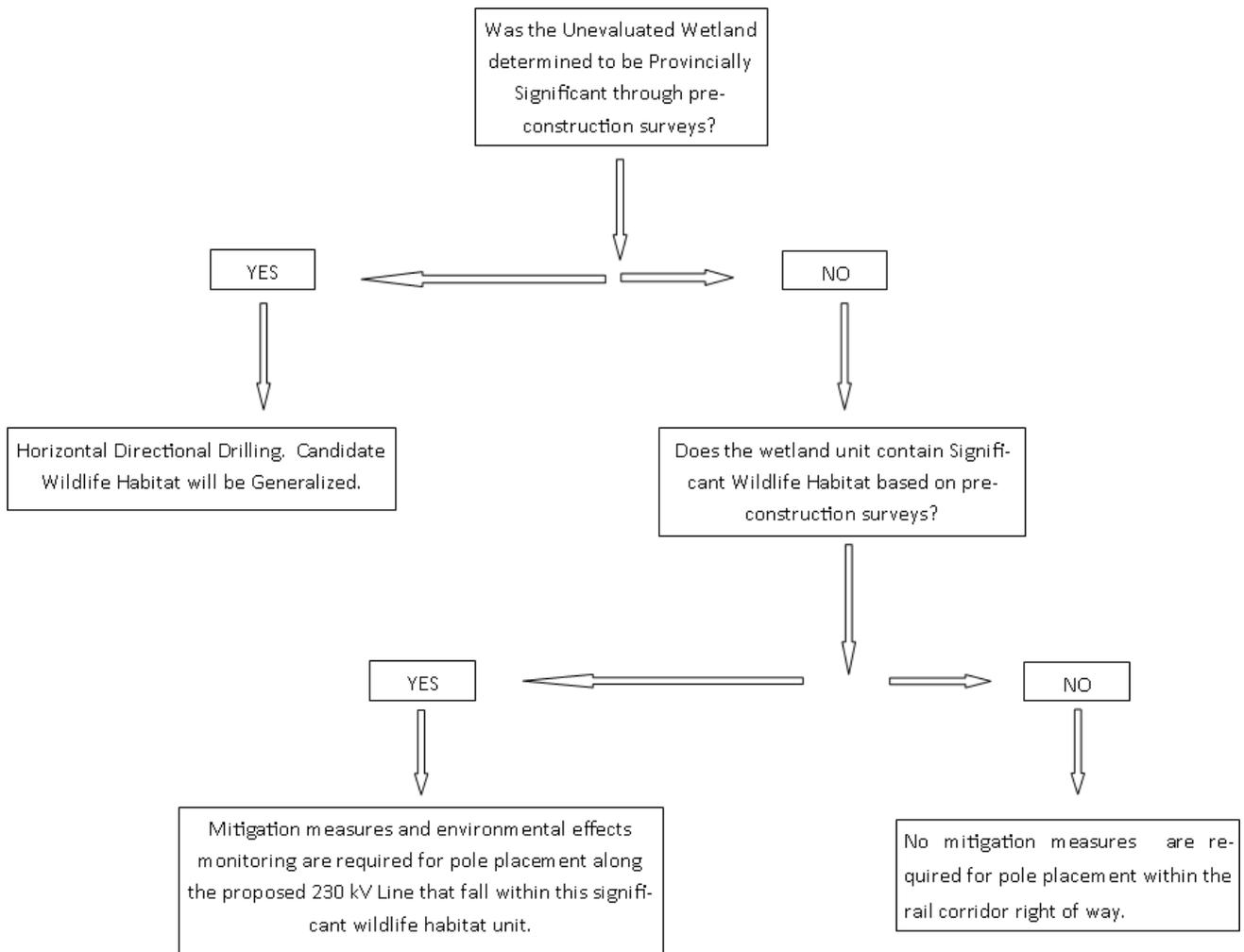


Figure 1: Flow chart of alternative options for the construction of the proposed 230 kV Line



4.3 Alternative 2

One or more of the 16 wetlands is evaluated to be non-provincially significant. Candidate wildlife habitats associated with the non-provincially significant units are not significant.

As outlined in **Section 3.2**, all wetlands evaluated to be PSWs will require HDD for the installation of the proposed 230 kV Line. For wetlands evaluated to be non-provincially significant, poles as part of an overhead line may be placed within the boundary of the wetland community. If candidate wildlife habitats within these non-PSW units are found to be non-significant through pre-construction surveys, then mitigation measures and an environmental effects monitoring plan are not required.

4.4 Alternative 3

One or more of the 16 wetlands is evaluated to be non-provincially significant. Candidate wildlife habitats associated with these non-provincially significant units are determined to be significant.

As outlined in Section 3.2 and 3.3, installation of the proposed 230 kV Line will be determined by wetland evaluations of 16 units currently classified as unevaluated. If candidate wildlife habitats associated with any wetlands evaluated to be non-provincially significant are determined to be significant then mitigation and an environmental effects monitoring plan are required to address direct impacts to these habitats. Three wildlife habitat types are located within these 16 unevaluated wetlands:

- Amphibian Breeding Habitat
- Marsh Breeding Bird Habitat
- Colonial Bird Nesting Habitat

A summary of the potential negative effects and mitigation measures for these significant wildlife habitats is outlined below in **Table 2**. A plan for environmental effects monitoring is outlined in **Table 3**.

Table 2: Summary of the Construction Plan and how it addresses Potential Positive/Negative Effects and Mitigation Measures for Significant Wildlife Habitats within Non-Provincially Significant Wetlands

Significant Natural Feature Potentially Affected by Activity	Project Phase & Activity within 120 m of Natural Feature	Distance to Nearest Project Component and Components within 120m	Potential Negative/Positive Effect(s)		Magnitude of Effect	Frequency of Effect	Duration of Effect	Mitigation Measures	Residual Effects
			Physical	Functional					
<p>Amphibian Breeding Habitat</p> <ul style="list-style-type: none"> • ABH 30, 31, 34, 35, 37, 42 and 48 <p>Marsh Breeding Bird Habitat</p> <ul style="list-style-type: none"> • MBB 30, 32, 33, 36, 37, 38, 39, 42, 46 and 49 <p>Colonial Bird Nesting Habitat</p> <ul style="list-style-type: none"> • CNH 13, 14 and 15 	<p>Construction – Overhead 230 kV Power Line</p>	<p>The 230 kV Overhead Power Line will be located 0 m (within) all habitat units that are associated with a Non-PSW</p>	<ul style="list-style-type: none"> • Removal of vegetation for placement of pole. • Disturbance of woodland edge by heavy equipment and machinery needed to install the line. • Limited potential for increased erosion and sedimentation to enter into adjacent wetlands 	<ul style="list-style-type: none"> • Localized temporary displacement of marsh birds, amphibians and colonial birds due to noise • Disturbance to amphibian breeding area, in addition to colonial and marsh bird species and nests 	<p>Installation of new poles with foundations at base.</p> <p>Effect will be minimized as the line will mainly be installed at the edge significant woodlands and along an open rail right-of-way</p>	<p>Once to facilitate construction of the 230 kV Power Line.</p>	<p>Temporary during construction</p>	<ul style="list-style-type: none"> • Re-vegetate disturbed area with fast growing wetland species • Develop and implement an erosion and sediment control (ESC) plan* (based on standard construction practices) which will include silt fencing around work area if within 30 m of a wetland, woodland or waterbody and minimize any stock piled or excavated materials in the project location to prevent runoff into adjacent areas and to protect surrounding areas prior to construction. Any stockpiled material will be stored more than 30 m away from a wetland, woodland or waterbody. • Erosion and sediment control structures should be monitored regularly to ensure that they are fully functional. Should erosion and sediment control measures not be functional, they should be immediately repaired • Construction area adjacent to sensitive natural features should be clearly delineated by sediment or erosion control fencing, or other similar boundary, to avoid impacting the adjacent feature(s) • Emergency spill kit will be kept on site in case of leaks from machinery. 	<p>No Residual Effect.</p>

Significant Natural Feature Potentially Affected by Activity	Project Phase & Activity within 120 m of Natural Feature	Distance to Nearest Project Component and Components within 120m	Potential Negative/Positive Effect(s)		Magnitude of Effect	Frequency of Effect	Duration of Effect	Mitigation Measures	Residual Effects
			Physical	Functional					
<p>Amphibian Breeding Habitat</p> <ul style="list-style-type: none"> • ABH 30, 31, 34, 35, 37, 42 and 48 <p>Marsh Breeding Bird Habitat</p> <ul style="list-style-type: none"> • MBB 30, 32, 33, 36, 37, 38, 39, 42, 46 and 49 <p>Colonial Bird Nesting Habitat</p> <p>CNH 13, 14 and 15</p>	Decommissioning – Removal of Overhead 230 kV Power Line	The 230 kV Overhead Power Line will be located 0 m (within) all habitat units that are associated with a Non-PSW	<ul style="list-style-type: none"> • Loss of riparian vegetation • Erosion and sedimentation resulting from bank disturbance, loss of root systems, rutting and compaction of stream substrates 	<ul style="list-style-type: none"> • Decrease in water quality • Localized temporary displacement of marsh birds, colonial birds and amphibians due to noise 	Detailed design has not been finalized but poles are planned to be spaced 200 – 300 m apart. Based on 69kV Line design, poles will be removed from a depth of 2.5 m.	Once during decommissioning.	Temporary during decommissioning	<ul style="list-style-type: none"> • Design construction approaches to be perpendicular to water bodies to minimize disturbance to riparian vegetation • Operate machinery on land and minimize disturbance to the banks of adjacent water bodies • Install effective sediment and erosion control measures to prevent entry of sediment into the water bodies. Avoid work during wet, rainy conditions. • Install silt fencing around work area if within 30 m of a wetland, woodland or waterbody and minimize any stock piled or excavated materials in the project location to prevent runoff into adjacent areas and to protect surrounding areas prior to decommissioning. Any stockpiled material will be stored more than 30 m away from a wetland, woodland or waterbody. • Emergency spill kit will be kept on site in case of leaks from machinery. • Stabilize waste materials removed from the work site to prevent them from entering water bodies • Vegetate any disturbed areas by planting native trees, shrubs, grasses and cover to prevent erosion 	No Residual Effect.

*All erosion and sediment control plans will be developed with the contractor and be based on Ontario Provincial Standard Specification 577 and the Greater Golden Horseshoe Area Conservation Authorities' Erosion and Sediment Control Guideline for Urban Construction (2006)

Table 3: Environmental Effects Monitoring Plan

Unique Feature ID	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Environmental Effects Monitoring Plan					Contingency Measure
				Methodology	Monitoring Locations	Frequency and Duration of Sample Collection	Technical and Statistical Value of Data	Reporting Requirements	
Amphibian Breeding Habitat ABH 30, 31, 34, 35, 37, 42 and 48	Loss of species diversity and abundance though habitat displacement or avoidance	Continued use of the habitat by the species (to be determined) that currently inhabit these features.	Line is to be constructed along abandoned rail line or road right of ways which will reduce the encroachment on Amphibian Breeding Habitat. Minimize erosion and sedimentation of adjacent lands. Monitor the effectiveness of the erosion and sedimentation control measures.	Apply same methodology followed during pre-construction monitoring for call count surveys and egg mass searches See Section 3.2 for detailed methods	Within the evaluated significant habitat features, post-construction monitoring locations will be the same as pre-construction monitoring locations.	Pre-construction Survey (baseline): 1. Spring 2012 1 year post-construction survey (for significant habitats along transmission line): Spring 2014	Determine if there is a loss of diversity and abundance of amphibians through displacement or avoidance effects caused by access roads sited adjacent to amphibian breeding habitats	Annual Reports submitted to MNR. Estimated Report Submission Dates: 1. Pre-construction survey to be submitted Fall 2012 2. Post-Construction survey to be submitted Fall 2014	Upon submission of annual post-construction monitoring reports to MNR it will be determined in consultation with MNR whether contingency measures are required and the contingency measures to be undertaken.
Marsh Breeding Bird Habitat MBB 30, 32, 33, 36, 37, 38, 39, 42, 46 and 49	Loss of species diversity and abundance though habitat displacement or avoidance	Continued use of the habitat by the species (to be determined) that currently inhabit these features.	Line is to be constructed along abandoned rail line or road right of ways which will reduce the encroachment on Marsh Breeding Bird Habitat.	Apply same methodology followed during pre-construction monitoring (Breeding bird survey focusing on Marsh species). See Section 3.3 for detailed methods	Within evaluated significant habitat features, post-construction monitoring locations will be the same as pre-construction monitoring locations.	Pre-construction Survey (baseline): 1. June 2012 1 year of post construction monitoring for significant MBBH along 230kv transmission corridor: June 2014	Determine if there is a loss of species abundance through a displacement or avoidance effect caused by transmission located in proximity to Marsh Bird Breeding Habitat.	Annual Reports submitted to MNR. Estimated Report Submission Dates: 1. Pre-construction survey to be submitted Fall 2012 2. Post-Construction survey to be submitted Fall 2014	Upon submission of annual post-construction monitoring reports to MNR it will be determined in consultation with MNR whether contingency measures are required and the contingency measures to be undertaken.
Colonial Bird	Loss of species	Continued use of the	Line is to be	Apply same	Within evaluated	Pre-construction	Determine if there is	Annual Reports	Upon submission of annual post-

Unique Feature ID	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Environmental Effects Monitoring Plan					Contingency Measure
				Methodology	Monitoring Locations	Frequency and Duration of Sample Collection	Technical and Statistical Value of Data	Reporting Requirements	
Nesting Habitat CNH 13, 14 and 15	diversity and abundance through habitat displacement or avoidance	habitat by the species (to be determined) that currently inhabit these features.	constructed along abandoned rail line which will reduce the encroachment on Colonial Nesting Bird Breeding habitat.	methodology followed during pre-construction monitoring (i.e., nest searches, species identification) See Section 3.4 for detailed methods	significant habitat features, post-construction monitoring locations will be the same as pre-construction monitoring locations.	Survey (baseline): June 2012 1 year of post-construction surveys for significant CNH along the 230KV transmission corridor: June 2014	a loss of species abundance through a displacement or avoidance effect caused by transmission located in proximity to Colonial Nesting Breeding bird Habitat.	submitted to MNR. Estimated Report Submission Dates: 1. Pre-construction survey to be submitted Fall 2012 2. Post-Construction survey to be submitted Fall 2014	construction monitoring reports to MNR it will be determined in consultation with MNR whether contingency measures are required and the contingency measures to be undertaken.



5. CONCLUSIONS

This alternative option package is to be read in conjunction with the Natural Heritage Assessment package completed for the Dufferin Wind Power Project. The alternatives described above relate to potential changes in construction within 16 unevaluated wetlands located along the proposed 230 kV Line as a result of pre-construction surveys. Candidate wildlife habitat within these unevaluated wetlands includes Amphibian Breeding Habitat, Marsh Breeding Bird Habitat and Colonial Bird Nesting Habitat units. The significance of these wildlife habitats in wetland units evaluated to be non-provincially significant will dictate mitigation measures and environmental effects monitoring required for potential negative effects as shown in **Table 2** and **Table 3**. All mapping and descriptions of these specific unevaluated wetland units and candidate significant wildlife habitat can be found within the NHA package.