Samsung Renewable Energy Inc. and

Pattern Energy

2 Construction Plan Report

For

South Kent Wind Project

HATCH™

Samsung Renewable Energy Inc. and
Pattern Energy

2 - Construction Plan Report

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South Kent Wind Project

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February 22, 2012

Report Revisions

Section	Report Date: July 19, 2011	Report Date: February 23, 2012 – Revised Content	Report Date: April 25, 2012 – Revised Content
1	Samsung Renewable Energy and Pattern Energy (hereinafter referred to as the "Proponent") are jointly proposing to develop the South Kent Wind Project, a 270 MW wind energy project (the "Project"), which will be located within the Municipality of Chatham-Kent in southwestern Ontario. The Project is located south of Highway 401 between the towns of Tilbury and Ridgetown to the west and east, respectively. The Project is proposed to be 270 MW in size, using Siemens wind turbine technology, supporting infrastructure, including: access roads, buried cables, overhead collector lines, a 230 kV transmission line and two (2) substations which are required to step-up the voltage from 34.5 kV to 230 kV to enable connection to the Chatham Switching Station (SS).	Samsung Renewable Energy and Pattern Energy (hereinafter referred to as the "Proponent") are jointly proposing to develop the South Kent Wind Project, a 270 MW wind energy project (the "Project"), consisting of approximately 127 operational wind turbines, as well as supporting infrastructure including access roads, construction and turnaround areas, and buried and/or overhead collection/ transmission lines. The collection/transmission line will include approximately 34 km of 239 kV transmission line and two (2) substations to enable step-up of the voltage from 34.5 kV to 230 kV to connect to the Chatham Switching Station (SS). The project area is located in the Municipality of Chatham-Kent in southwestern Ontario. The Project is located south of Highway 401 between the towns of Tilbury and Ridgetown to the west and east, respectively.	Samsung Renewable Energy and Pattern Energy (hereinafter referred to as the "Proponent") are jointly proposing to develop the South Kent Wind Project, a 270 MW wind energy project (the "Project"), consisting of approximately 124 operational wind turbines, as well as supporting infrastructure including access roads, construction and turnaround areas, and buried and/or overhead collection/ transmission lines. The collection/transmission line will include approximately 34 km of 239 kV transmission line and two (2) substations to enable step-up of the voltage from 34.5 kV to 230 kV to connect to the Chatham Switching Station (SS). The project area is located in the Municipality of Chatham-Kent in southwestern Ontario. The Project is located south of Highway 401 between the towns of Tilbury and Ridgetown to the west and east, respectively.
1	The construction period is estimated to be fifteen to eighteen months in duration, with Project commissioning anticipated in the first quarter of 2013.	The construction period is estimated to be fifteen to eighteen months in duration, with Project commissioning anticipated in the fourth quarter of 2013.	The construction period is estimated to be fifteen to eighteen months in duration, with Project commissioning anticipated in the first quarter of 2014.
Table 2.1		Project Timeline has been modified.	Project Timeline has been modified.

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2.2.6	In addition, 24-hr on-site security will be utilized once the turbines and cables are delivered. [if this is just during construction maybe the brief discussion is OK. We will have more security in stations after COD in the form of motion detectors that alert 24 hour control center.]	In addition, 24-hr on-site security will be utilized once the turbines and cables are delivered.	
2.2.11	The Contractor will provide a temporary water storage facility as well as water by truck to meet the water demand during construction. The water will be used throughout construction for activities such as dust control.	The Contractor may provide a temporary water storage facility as well as water by truck to meet the water demand during construction. The water will be used throughout construction for activities such as dust control. Water supply will be from a commercial water delivery contractor.	
2.3.1.4	Design of roads, culverts, swales, and ditches as necessary will be in accordance with OPSS regulations and local municipal engineering guidelines.	Design of roads, culverts, swales, and ditches as necessary will be in accordance with appropriate regulations and local municipal engineering guidelines.	
Figure 2.1		Figure number corrected	
Figure 2.2		Figure number corrected	
2.3.1.5	Figure 2.2 depicts the layout of the required areas. Dimensions for all three areas are found in Table 2.2.	Figure 2.2 depicts an example of the layout of the required areas. Dimensions for all three areas are found in Table 2.3.	
2.3.1.5	All three areas will be cleared and the topsoil stockpiled and seeded with quick sprouting grass, if necessary, to prevent wind erosion.	All laydown areas will be cleared and the topsoil stockpiled and seeded with quick sprouting grass, if necessary, to prevent wind erosion.	

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2.3.2.4	Wind turbine erection will occur when meteorological conditions allow for safe assembly (i.e., acceptable ranges of wind speed, rain, snow etc.).	Wind turbine erection will occur when meteorological conditions allow for safe assembly (i.e.,, acceptable ranges of wind speed, rain, snow, etc).	
2.3.2.5	Switchgear and protection and control equipment will be housed in a weatherproof "E-House" building, which is bolted to a concrete foundation.	Switchgear and protection and control equipment will be housed in a weatherproof control building, which is bolted to a concrete foundation.	
3	• Natural Heritage Records Review Report (NRSI, 2011a) • Natural Heritage Site Investigation Report (NRSI, 2011b) • Natural Heritage Environmental Impact Study (Hatch, 2011a) • Water Body Records Review Report (NRSI, 2011d) • Water Body Site Investigation Report (NRSI, 2011e).	• Natural Heritage Records Review Report (NRSI, 2012a) • Natural Heritage Site Investigation Report (NRSI, 2012b) • Natural Heritage Environmental Impact Study (Hatch, 2012a) • Water Body Records Review Report (NRSI, 2012d) • Water Body Site Investigation Report (NRSI, 2012e).	
3.5	Mitigation measures as provided in the Environmental Impact Study will result in only residual minor impacts (Hatch, 2010d).	Mitigation measures as provided in the Environmental Impact Study will result in only residual minor impacts (Hatch, 2012d).	
3.6	The potential loss of wildlife habitat in woodlands and hedgerows are also expected to be minor as disturbance of the woodlands will be minimized through measures discussed in	The potential loss of wildlife habitat in woodlands and hedgerows are also expected to be minor as disturbance of the woodlands will be minimized through measures discussed in	

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	Section 3.5, and rehabilitation of the disturbed areas will occur immediately following construction.	Section 4.6, and rehabilitation of the disturbed areas will occur immediately following construction.	
3.6.1	Several Species at Risk were identified as having potential habitat in the vicinity of the Project. Consultation with the Ministry of Natural Resources (MNR) is ongoing, as is required by the *Endangered Species Act, 2007,* in order to ensure that either: • there is no impact to these species, or • if an impact is determined to be likely to occur, compensation occurs such that an overall benefit to the species is achieved.	Several Species at Risk were identified as having potential habitat in the vicinity of the Project, with confirmed occurrences of Barn Swallow (*Hirundo rustica*), Bobolink (*Dolichonyx oryzivorus*), Eastern Fox Snake (*Pantherophis gloydi*, and Butternut (*Juglans cinerea)*. Consultation with the Ministry of Natural Resources (MNR) is ongoing, as is required by the *Endangered Species Act, 2007,* in order to ensure that there is no impact to these species or their habitat.	
Section 3.14 and 3.15 titles changed	**3.14 Built Heritage and Cultural Heritage Landscapes** Upon completion of the Ministry of Tourism and Culture (MTC) – *Check Sheet for Environmental Assessments: Screening for Impacts to Built Heritage and Cultural Heritage Landscapes,* it has been determined that no Heritage Impact Assessment for the Project would be required as no negative effect to built heritage and cultural heritage landscapes is anticipated. **3.15 Archaeological Resources**	**3.14 Archaeological and Cultural Heritage Resources** (Paragraph removed)	

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Previously Section 3.14, currently Section 3.15	A Stage 1 Archaeological Assessment has been completed and a confirmation letter received on 11 February 2011 from the Ministry of Tourism and Culture (MTC). A Stage 2 Archaeological assessments was conducted to determine if archaeological resources were present within the Project site.	A Stage 1 Archaeological Assessment has been completed and a confirmation letter received on February 11, 2011 from the Ministry of Tourism, Culture and Sport (MTCS). An initial Stage 2 Archaeological assessment was conducted to determine if archaeological resources were present within the Project site.	
Previously Section 3.14, currently Section 3.15	The findings of the Stage 2 Assessment identified a total of 85 archaeological sites (eight (8) Euro-Canadian/77 pre-contact Aboriginal site) with 43 (7 Euro-Canadian sites and 36 pre-contact Aboriginal sites) archaeological sites meeting the MTC's 2011 Standards and Guidelines, Section 2.2: Analysis - Determining the requirement for Stage 3 assessment, MTC's Standards and Guidelines for sites and therefore requiring further Stage 3 Site-specific assessment.	The findings of the Stage 2 Assessment identified a total of 85 archaeological sites (8 Euro-Canadian/77 pre-contact Aboriginal site) with 43 (7 Euro-Canadian sites and 36 pre-contact Aboriginal sites) archaeological sites meeting the MTCS's 2011 Standards and Guidelines, Section 2.2: Analysis - Determining the requirement for Stage 3 assessment, MTCS's Standards and Guidelines for sites and therefore requiring further Stage 3 Site-specific assessment. However, since that time, Pattern Energy actively revised the layout to exclude as many of the sites (or portions thereof) from the Project as possible. This work resulted in only 20 sites now meeting the criteria for further Stage 3 assessment.	

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Previously Section 3.14, currently Section 3.15	Stage 2 archaeological report was submitted and accepted by MTC on XX July 2011.	In addition, subsequent to the initial Stage 2 Archaeological Assessment, a Stage 2 Archaeological Assessment was also completed on lands added to the Project as a result of the change in layout. A total of 19 new archaeological sites (4 Euro-Canadian/15 pre-contact Aboriginal sites) were identified. Of these new archaeological sites, eight pre-contact Aboriginal sites were determined to be sufficiently assessed and documented at Stage 2, and the eleven remaining archaeological sites met the criteria for requiring a Stage 3 site specific assessment. This report has been completed and submitted to MTCS for review and confirmation.	
Previously Section 3.14, currently Section 3.15	In this instance, the MTC has specified mitigation that must be undertaken in the event of discovery of human remains or other archaeologically or culturally significant material. These mitigation measures are discussed in Section 4.13.	In this instance, the MTCS has specified mitigation that must be undertaken in the event of discovery of human remains or other archaeologically or culturally significant material. These mitigation measures are discussed in Section 4.12. The proposed Project is not located on a Protected Property as described in Column 1 of the Table to Section 19 of the REA Regulation. A Heritage Assessment has been conducted for the Project to determine built heritage resources and cultural landscape resources found	

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		within the study area and to evaluate the impact of the proposed Project as required within MTC's *Information Bulletin for Applicants Addressing the Cultural Components of Projects Subject to Ontario Regulation 359/09*. This report has been submitted to MTCS for confirmation.	
3.15: Spills		Section number has changed.	
4	An Environmental Effects Monitoring Plan summary table is also provided in Section 4.4 of the EIS (Hatch, 2010d) and may be used as additional reference to the mitigation measures proposed in this Section.	An Environmental Effects Monitoring Plan summary table is also provided in Section 4.4 of the EIS (Hatch, 2012d) and may be used as additional reference to the mitigation measures proposed in this Section.	
4.1 (1st Bullet Point)	All erosion and sediment control measures are to be installed and maintained in accordance with Ontario Provincial Standards Specification (OPSS) 577.	All erosion and sediment control measures are to be installed and maintained in accordance with appropriate standards and regulations.	
4.1 (7th Bullet Point)	• Erosion and sedimentation control measures (e.g. silt fence barriers, flow dissipaters, rock flow check dams etc) shall be installed and maintained as required, in accordance with OPSS 577.	• Erosion and sedimentation control measures (e.g., silt fence barriers, flow dissipaters, rock flow check dams etc) shall be installed and maintained as required, in accordance with appropriate standards.	
4.4	A number of access roads/cabling associated with these turbines, as identified in the EIS (Hatch, 2010d), will cross watercourses.	A number of access roads/cabling associated with these turbines, as identified in the EIS (Hatch, 2012d), will cross watercourses.	
4.4	Additional detail on the mitigation measures to prevent/minimize adverse effects on surface water	Additional detail on the mitigation measures to prevent/minimize adverse effects on surface water	

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	quality in the watercourses during construction is also identified in the Waterbodies Environmental Impact Study (NRSI, 2010e).	quality in the watercourses during construction is also identified in the Waterbodies Environmental Impact Study (NRSI, 2012e).	
4.6	An Environmental Effects Monitoring Plan to address effects on birds and bats and other wildlife will be implemented as identified in Section 4.5 of the EIS (Hatch 2010d).	An Environmental Effects Monitoring Plan to address effects on birds and bats and other wildlife will be implemented as identified in Section 4.5 of the EIS (Hatch 2012d).	
4.6.1		The following mitigation measures have been added: Mitigation measures in respect of the identified species at risk will include: • A 20 m buffer has been proposed from the Butternut tree in order to ensure that there is no impact on this species. • Further, timing restrictions, or set backs from identified habitats of avian and snake species at risk have been proposed to prevent impacts to those species or their habitat.	
4.12 (title change)	**Archaeological Resources**	**Archaeological and Cultural Heritage Resources**	
4.12	Consultation with the Ministry of Tourism and Culture is being conducted to determine that the Stage 2 Assessments have been completed and the reports accepted by MTC. Any additional requirements (Stage 3 and 4 Assessments) will be conducted in consultation with MTC.	Consultation with the Ministry of Tourism, Culture and Sport is being conducted to determine that the Stage 2 Assessments have been completed and the reports accepted by MTCS. Any additional requirements (Stage 3 and 4 Assessments) will be conducted in consultation with MTCS.	

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4.12	In this instance, the MTC has specified mitigation that must be undertaken in the event of discovery of human remains or other archaeologically or culturally significant material:	In this instance, the MTCS has specified mitigation that must be undertaken in the event of discovery of human remains or other archaeologically or culturally significant material:	
4.12		The following paragraph has been added: Mitigation measures with respect to specific heritage resources are documented within the Heritage Assessment. These include, among others, identifying preferred locations for pole and cabling placement, tree planting where required, and heritage recordings/documentation of significant features.	
5	The environmental effects monitoring during construction will be restricted to ensuring compliance with the mitigation measures identified herein and those summarized in Table 5.1 - Summary of Environmental Effects Monitoring Requirements with Respect to Significant Natural Feature in the Natural Heritage EIS (Hatch, 2010d).	The environmental effects monitoring during construction will be restricted to ensuring compliance with the mitigation measures identified herein and those summarized in Table 5.1 - Summary of Environmental Effects Monitoring Requirements with Respect to Significant Natural Feature in the Natural Heritage EIS (Hatch, 2012d).	
Table 5.1: Soils, Proposed Mitigation Measures	Erosion and sedimentation control measures will be maintained in accordance with OPSS 577.	Erosion and sedimentation control measures will be maintained in accordance with appropriate regulations.	
Appendix A		Appendix A has been replaced with updated Figures.	

Project Report

April 25, 2012

Samsung Renewable Energy Inc. and Pattern Energy
South Kent Wind Project

Construction Plan Report
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1. Introduction

1.1 Background

Samsung Renewable Energy and Pattern Energy (hereinafter referred to as the "Proponent") are jointly proposing to develop the South Kent Wind Project, a 270 MW wind energy project (the "Project"), consisting of approximately 124 operational wind turbines, as well as supporting infrastructure including access roads, construction and turnaround areas, and buried and/or overhead collection/transmission lines. The collection/transmission line will include approximately 34 km of 239 kV transmission line and two (2) substations to enable step-up of the voltage from 34.5 kV to 230 kV to connect to the Chatham Switching Station (SS). The project area is located in the Municipality of Chatham-Kent in southwestern Ontario. The Project is located south of Highway 401 between the towns of Tilbury and Ridgetown to the west and east, respectively.

Construction of the Project will commence after the Renewable Energy Approval ("REA") has been obtained. The construction period is estimated to be fifteen to eighteen months in duration, with Project commissioning anticipated in the first quarter of 2014. It is anticipated that the Project will be operational for at least a duration of 20 years after which it may be decommissioned if no arrangement for further use is determined.

1.2 Objective and Scope

The Construction Plan Report ("the Report") is required as a part of an application for all renewable energy projects that must submit in order to obtain a REA permit under Ontario Regulation (O. Reg.) 359/09– *Renewable Energy Approvals Under Part V.0.1 of the Act*. The Report serves several purposes as follows:

- details all anticipated activities during the Project construction phase so that all potential negative environmental effects may be identified
- describes the actions that are anticipated to be taken to mitigate the negative environmental effects of the construction and installation of the Project.

The Report also functions as a communication tool for public, agency, municipal and Aboriginal consultation to convey to these groups the construction activities. A draft of the Construction Plan Report must be made public 60 days prior to the final public consultation meeting in accordance with Section 16 of O. Reg. 359/09 and provided to the Aboriginal communities more than 60 days prior to the final public consultation meeting.

The Report is structured as follows:

- Section 2 describes the Project development, construction and installation activities
- Section 3 describes the potential environmental effects
- Section 4 describes proposed mitigation measures to prevent/minimize those effects
- Section 5 includes the environmental effects monitoring plan
- Section 6 provides the references.

2. Project Construction Plan

2.1 Construction Overview

The construction process of the Project consists of four phases:

- Phase 1 – Site Preparation
- Phase 2 – Construction and Installation of Plant
- Phase 3 – Testing and Commissioning
- Phase 4 – Site Restoration.

It is anticipated that the Proponent will hire a general contractor (the "Contractor") to perform the engineering, procurement and construction of the Project, and who will be required to comply with, and fulfill, all of the associated regulatory requirements. The site work is scheduled to start in 2012 (after the REA is obtained) and have an estimated fifteen to eighteen month construction period.

The timeline and duration of each of the main construction phases is provided in Table 2.1.

Table 2.1 Project Timeline

Activity	Duration (Days)	Start	Finish
REA Approval (Estimate)	0	**1-July-12**	**1-July-12**
WTG Procure, Fabricate & Delivery	330	1-Juyl-12	1-July-13
Mobilize	40	1-Sept-12	30-Sept-12
Installation of Site Access Components	150	14-Sept-12	26-Feb-13
Safety and Security	510	1-Sept-12	31-Mar-14
Temporary Facilities	420	1-Sept-12	1-Feb-14
Power and Communication	365	1-Sept-12	1–Aug-13
WTG Site Preparation	150	15-Sept-12	15-Jan-13
Foundations	200	4-Oct-12	28-May-13
Turbine Erection	180	15-Aug-13	15-Feb-14
Electrical Systems	180	17-Nov-12	7-June-13
Commissioning	185	1-Oct-13	31-Mar-14
Commercial Operation Date	0	**15 Mar-14**	**31 Mar-14**
Remediation and Demobilization	90	01-May-14	01-Aug-14

The approximate durations listed in the above table are inclusive of all seasons. Construction of some particular activities may be shut down due to seasonal and climatic influences. The final construction schedule will consider any local and environmental restrictions pertaining to construction activities such as "half load season" (March and April) to protect municipal roads from damage. Bird nesting season restrictions and warm water fish spawning restrictions on construction timing will be respected where applicable. Information on the construction and installation activities is provided in the following sections.

2.2 Construction Methodology

2.2.1 Safety Management

Public and worker safety is a primary concern of the Proponent, who has established a Project goal to develop and maintain a safe working environment that results in completion of the Project with zero fatalities, zero critical injuries and zero lost time injuries.

The Project will comply with all applicable Ontario Occupational Health and Safety Act requirements during the construction period and will be complemented and reinforced by the safety management program of the Contractor and Proponent's construction management organization. The Proponent will develop a site-specific health and safety plan that will be supplemented by the Contractor's comprehensive plan. The project proponent will assign a safety and compliance officer to the Project to implement and strictly enforce the plan.

The Contractor is required to provide construction method statements and related Job Safety Assessments (JSA), for review by the Proponent's Construction Manager, prior to commencement of work.

Methods of review and approval may include a permit system for high exposure operations such as electrical system energization.

2.2.2 Workforce

The Project will employ a construction workforce recruited from within the local area to the extent possible. The workforce will include: construction supervision, general and skilled labour, equipment operators, technicians for electrical systems and commissioning, plant installation and operation, security, and general maintenance. The construction workforce is estimated to be 100 workers on average during the construction period, with a peak of approximately 250 workers.

2.2.3 Hours of Work

Municipal of Chatham-Kent By-Law 41-2004 states that construction can occur Monday through Saturday from 7 a.m. to 11 p.m., however, construction hours will normally be from 7:00 a.m. to 7:00 p.m., Monday through Saturday, unless extended hours are required to ensure that safety[1] or other project-critical commitments are met. A variance to the by-law will be sought prior to the work being performed during extended hours.

2.2.4 Project Access

The Project is accessed via Highway 401 between Tilbury, Ontario and Ridgetown, Ontario from the west and east, respectively. A detailed transportation study will be conducted by the wind turbine vendor's logistics provides to define adequate local routes for transporting equipment to specific turbine locations. Temporary changes to local roads to facilitate transportation shall be described and permitted under the authority of the Road User Agreement to be reached with the Municipality of Chatham Kent.

2.2.5 Construction Equipment

Table 2.2 summarizes the construction equipment that is typically required for this type of site work.

[1] For example, waiting for winds to die down so that wind turbine erection takes place during the safest possible conditions.

Table 2.2 Construction Equipment

Equipment	Power & Weight	Usage	Quantity
Track-Type Tractor (D8)	179 kW 37.6 T	Land Clearing and Grubbing; Spreading granular material for access road	4-8
Wheel Tractor-Scraper (615C)	198 kW 25.6 T	Excavating and moving topsoil	4
Hydraulic Excavator (325B)	125 kW 25.9 T	Excavating topsoil and placing backfill	4-8
Backhoe Loader (446B)	82 kW 8.9 T	Excavating topsoil and placing backfill	4
Wheel Loader (966F)	164 kW	Moving soil and granular material	4
Dump Truck (D25D)	194 kW 19.5 T	Transport and placement of granular for access road.	8-16
Motor Grader (14H)	160 kW 18.8 T	Grading of access road during construction (as necessary)	4
Drum Vibratory Compactor (CS-563C)	108 kW 10.9 T	Granular compaction for access road	4-8
Crawler Crane (LS-118)	267 kW 48.9 T	Pile driving or assistance assembling turbine erection crane	4
Heavy Lift Cranes	CC2800 or equivalent	Erection of wind turbine components, erection of transmission structures	2
Large Lowbed Trucks	Specialized Turbine Transport Truck	Used to carry large wind turbine components including nacelles, blades and tower sections	5
Pile Driving Equipment (B-6505 HD)	300 kJ 19.5 T	Mounted on the crawler crane, used for driving piles	8
Rough Terrain Crane (RT500C)	90 kW 23.4 T	Unloading, moving material, equipment, and plant	4
Telescopic Handler (TH83)	81 kW 10.0 T	Unloading, moving material, equipment, and plant	4-8
Concrete Transit Mixers (6 m^3)	12.7 l 450 hp	Transportation and placement of concrete mix for foundations	1-4
Pick-up Trucks (F150 Super Crew)	V8 5.7l	General transportation of small equipment, materials, and personnel	20
Diesel Generators, Air Compressors	175 kW	Power supply for electrical equipment (hand tools, etc)	15+
Hand Tools - drills, wrenches, concrete vibrators, welding machines, saws, etc (as necessary)		General construction and assembly activities	15+
Track Mounted Augers	40 kW 10 T	Hole digging for collector poles	5
Line Tensioning (truck and trailer)	5 T	Associated with line work	7
Line Work Equipment Truck	V8 – 5.7 L	Similar to F150 super crew.	5

2.2.6 Security Gate, Fencing and Lighting

Fencing will be erected around the substation areas and the site will be under surveillance during working hours by the supervising construction staff. In addition, 24-hr on-site security will be utilized once the turbines and cables are delivered.

For security and maintenance purposes, task-specific lights will be installed as needed on the Project location during construction. Motion sensor security lighting may be installed in strategic areas that require additional security.

2.2.7 Fire Control Plan

The Project is very unlikely to be a source of fire, or a contributor to spreading an existing fire, exception being the substations where the mineral oil coolant for the main transformers is a flammable substance. The design of the plant includes in-ground oil containment as well as oil water separators for control of contaminates. However, there is some rare potential fire hazard due to electrical faults at the ancillary equipment. The Contractor will prepare a fire control plan for the construction activities. It is anticipated that this will include establishing procedures for specific types of likely fires, training staff accordingly, and keeping fire protection equipment on site.

2.2.8 Drainage

The Contractor will maintain existing drainage patterns and will restore and/or repair drainage tiles located within the individual land parcels if damage occurs during construction. Except for two crossings of the municipal open cut drainage system, there is no interface of the project with this wider ranging drainage system. In general, erosion and sedimentation control measures will be installed as necessary to minimize deleterious material from entering the drainage system. An effort will be made to use existing farming roads in order to minimize environmental impacts.

2.2.9 Landscaping and Vegetation

The Project does not propose any major alteration to the existing landscape for construction purposes. After installation of wind turbines and ancillary equipment, temporary access roads and facilities built for construction purposes will be cleared, tilled and levelled, unless the land owner requests that they remain for farming or other purposes. Final grading will be performed as necessary, and open ground and disturbed areas will be covered with a suitable, low maintenance grass cover.

2.2.10 Power and Communication

During construction and commissioning, electrical power will be provided by portable generators for small equipment and hand tools. The Proponent will obtain an electrical power supply feed and communication line from the local utilities for both temporary and permanent larger electrical needs.

2.2.11 Water Usage

The Contractor may provide a temporary water storage facility as well as water by truck to meet the water demand during construction. The water will be used throughout construction for activities such as dust control. Water supply will be from a commercial water delivery contractor.

2.2.12 Housekeeping

It is important to the Proponent to keep a tidy work site and to respect the Project's neighbours in this regard. The contract documents will specify that the Contractor must maintain proper housekeeping and keep the Project location orderly to prevent unnecessary safety and fire hazards.

Typical construction waste, such as cutoffs and wastage, electrical wires, wood, and miscellaneous packaging materials, will be managed in accordance with local, provincial, and federal regulations during construction. Contractor will transport recyclable waste to the closest recycling centre.

2.3 Construction Phases

2.3.1 Phase 1 - Site Preparation

Site preparation includes surveying/staking, site clearing and grubbing, construction of access roads, installation of security measures and fencing, and construction of staging areas, and any other necessary activities to prepare for the construction of foundations, substation, and installation and erection of the wind turbines.

2.3.1.1 Site Survey and Staking

A land surveyor will provide an appropriate site survey, and will stake the exact location of the Project perimeter for access road layout, overhead and underground collection system routes and all foundations and substations.

2.3.1.2 Geotechnical Investigations

Geotechnical studies will be conducted throughout the Project location to determine foundation design parameters. An understanding of the subsurface stratigraphy is required by the turbine manufacturer and engineers in order to design the appropriate shape, dimensions and composition for the foundation. Geotechnical studies involve borehole sampling, laboratory testing, geotechnical analysis and Multichannel Assessment of Service Waves (MASW) survey within the turbine foundation area and other areas of interest. Details of soil compaction, grain size, soil pH, resistivity and groundwater levels are gathered. One borehole per wind turbine foundation will be performed, with additional boreholes performed in the project switchyards and along the transmission line route as necessary to provide information for the design of foundations and ground resistivity.

2.3.1.3 Site Clearing and Grading

Site grading will occur for the construction of the access roads, temporary facilities, staging area, substations, foundations, and trenches for electrical cabling and instrumentation. Grading includes the excavation and on-site temporary stockpiling of topsoil at designated areas determined in consultation with the landowners and not within 30 m of a water body. Topsoil will remain on site and will be used for site restoration following completion of construction activities. During temporary stockpiling, topsoil will be protected to minimize soil erosion due to wind and rain. Erosion and sedimentation control measures will be installed as necessary to minimize erosion and sedimentation.

2.3.1.4 Access Roads

The construction of new access roads will be necessary to support construction activities and to provide access to the site during the operation phase of the Project. Design of roads, culverts, swales, and ditches as necessary will be in accordance with appropriate regulations and local

municipal engineering guidelines. Ditches and culverts will be constructed, as necessary, to maintain existing site drainage conditions.

The proposed 5 - 6 m wide access road will be constructed with suitable base material and a finished surface of granular 'A' material, sourced from a local aggregate quarry. The topsoil and subsoil will be removed as necessary prior to the preparation of the base. A suitable road base will consist of either a compacted granular base or a cement-stabilization of the subsoil, whereby the Portland cement is tilled into the subsoil and compacted, to achieve the required load bearing capacity. The use of granular 'A' gravel for the finished surface will maintain permeability to avoid impacts on storm water flow and will minimize dust generation to reduce water use for dust control during construction. Geo-grid and geotextile fabric will be used where necessary to stabilize areas of soft ground. The maximum thickness of the access road base and top course material will be 300 mm. The road will be constructed with ditches, swales and culverts, where necessary, for proper storm water run-off, site drainage and to minimize road and soil erosion. Depending on construction timing, soil stabilization materials may be used as a means of minimizing granular material use. Soil stabilization is the term for the road construction method where lean concrete is dug into the soil and then compacted, upon which a thin layer (approx 100 mm) of granular is overlain.

Truck turn around areas will be incorporated into the access road layout in the majority of the proposed turbine locations. Figure 2.1 shows the dimensions and layout of a typical turnaround. The materials of construction of these will be the same as the access roads.

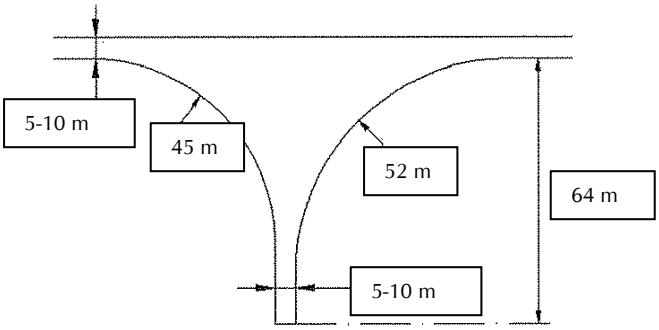


Figure 2.1 Truck Turn-Around Area Schematic

2.3.1.5 Crane Pads and Laydown Areas

The wind turbine manufacturer, Siemens, has specified a construction area, a laydown area and an assembly area required around each turbine location. These areas are necessary for equipment delivery, temporary storage and turbine assembly. Figure 2.2 depicts an example of the layout of the required areas. Dimensions for all three areas are found in Table 2.3.

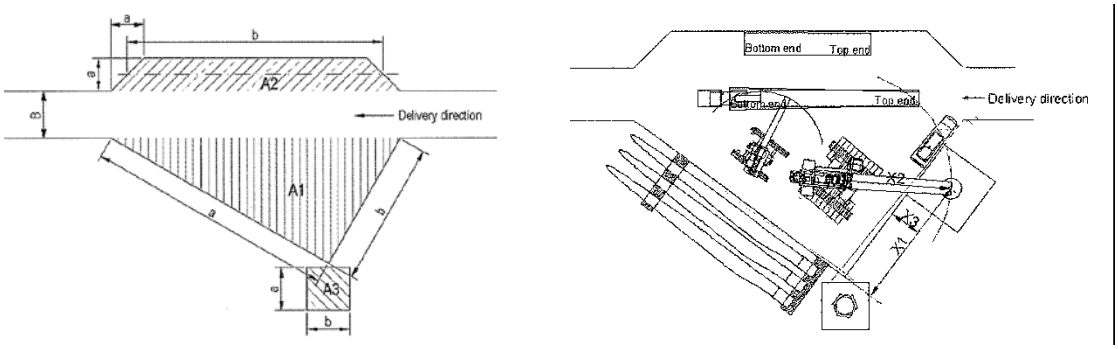


Figure 2.2 Turbine Installation Area Schematic (Left) and with Construction Equipment and Turbine Components (Right)

Table 2.3 Dimensions and Requirements for Crane Pad, Laydown and Assembly Areas

Area	Description	Area (m^2)	Dimension a x b (m)	Bearing Capacity (kN/m^2)	Maintenance
A1	Construction area	938	50 x 37.5	200	Permanent
A2	Lay down area	340	7 x 48.5	200	Temporary
A3	Assembly Area	81	9 x 9	100	Temporary

All laydown areas will be cleared and the topsoil stockpiled and seeded with quick sprouting grass, if necessary, to prevent wind erosion. The construction and lay down areas will then be covered with a layer of gravel. At the end of the construction period, the gravel will be removed and the topsoil will be restored for continued crop production. The compacted soil under the crane pad (approximately 40 m by 20 m in size) will remain in place for potential future turbine maintenance. The temporary laydown area does not require significant compaction as comparable bearing capacities are not required.

2.3.1.6 Temporary Facilities

Part of the work site will be used as a construction staging area, which may require clearing, grading, removal of topsoil, placement of granular material, compaction, and security fencing, prior to use. The staging area will include construction offices, washrooms, first aid station, parking, construction equipment, material and plant storage/laydown area, and an unloading/loading area. Modular trailers will be used for the construction offices, washrooms and first aid station. Washrooms (portable toilets) will be maintained daily during construction. Following Substantial Completion (Project in service), the temporary facilities will be removed from site, followed by removal of granular material, decompaction, topsoil backfill, and site revegetation.

2.3.2 Phase 2 - Construction and Installation of Plant

2.3.2.1 Foundations

Wind turbines will be securely mounted on either a spread footing or a driven pile foundation, depending on the soil conditions at the individual turbine locations. These underground support structures will be constructed at a design depth below the frost line, and designed to be capable of supporting the structure for the life of the project.

Upon completion of the excavation for the wind turbine foundation, a thin concrete slab (sometimes called mud slab) will be placed for a clean working surface. Wooden or reusable steel formwork and steel reinforcing bars (rebar) will be arranged according to the engineering designs and only if required, piles will be driven prior to placement of the rebar and fastened to the rebar according to the engineering design specifications.

Ready-mix concrete will be delivered by transit mixer truck from a local supplier. Foundations will require a minimum of 28 days to cure to allow for concrete to reach its specified compressive strength prior to full erection of the tower and wind turbine equipment installation.

Foundation construction for accessory infrastructure such as: electrical equipment, substation, and oil containment basins comprises of excavation and removal of in-situ material, placement of granular material, formwork, reinforcing steel, grounding, and placement of concrete.

2.3.2.2 Trenches for Cable and Instrumentation Control

Trenches will be excavated for underground electrical cabling. Trenches will have a sand base layer below and above the cabling, and will be backfilled with excavated, or suitable imported material in accordance with Ontario Electrical Safety Code guidelines. The layout of the trenches will be such that it will have minimum impact on the existing drainage. Trenches will typically be 1 m deep by 0.5 m wide and will be excavated by using a 'ditch-witch' plough, or similar equipment. Where necessary, high density polyethylene (HDPE) or PVC conduits of suitable diameter will be provided to cross roads. Directional drilling for steel conduit of suitable diameter will be provided to cross train tracks and underneath major existing drainage channels.

2.3.2.3 Transport of Equipment

The wind turbine and related hardware will be transported to the site via lowbed truck and trailer. Oversized trucks will be necessary to transport turbine components and some construction equipment.

There will be four tower sections, a hub assembly, three blades and a nacelle plus a container of miscellaneous tools & hardware transported to each turbine site. These pieces will be delivered separately and will be stored within the designated lay down area until assembly. There are approximately 15 deliveries per wind turbine.

The turbine manufacturer will oversee the logistics of transportation of major equipment to the site for construction. A detailed schedule to target "just in time delivery" for construction will be developed. This approach will avoid the construction of a major transfer yard or material storage facility. The carrier will arrange for police escorts in accordance with the moving permits required and issued by local authorities.

2.3.2.4 *Wind Turbine Installation*

Wind turbine towers, nacelles and blades will be assembled and erected at each site by qualified installers according to the turbine specifications. The detailed wind turbine specifications are provided in the "Turbine Specifications Report".

Wind turbine erection will be performed using a crawler crane or truck mounted crane conducted by engineered lifts, with each lift approved before it is carried out. A crane movement plan will be prepared by the Contractor with the objective of minimizing impacts of crane movements on local roads.

Wind turbine erection will occur when meteorological conditions allow for safe assembly (i.e. acceptable ranges of wind speed, rain, snow, etc). Wind speeds on-site will be measured constantly using a wind anemometer located on the top of the main crane.

2.3.2.5 *Substation*

The Project substations will be located as depicted in the Site Plans provided in Appendix A. Construction will include excavation of topsoil, installation of ground grid, foundation construction, installation of a grounding system, installation of electrical equipment and covering of the surface area with crushed stone. Switchgear and protection and control equipment will be housed in a weatherproof control building, which is bolted to a concrete foundation. Any outdoor electrical cabinets, such as the transformer control cabinet, will be weatherproof cabinets. The substation area will be fenced and appropriately signed for safety and security purposes.

2.3.2.6 *Electrical System*

A combination of underground and overhead 34.5 kV wires will make up the electrical collection system used to collect and deliver the power generated from the turbines to the Project substations, and subsequently the existing Hydro One transmission grid. Underground cables will be used from the wind turbine locations to existing roads where a combination of underground and overhead collectors will continue to the Sattern and Railbed substations. The collection system voltage between the wind turbines and the substations will be 34.5 kV. Each substation will include a main transformer to step up the voltage from 34.5 kV to 230 kV. A 230 kV transmission line will then be run overhead to the point of interconnection with the Hydro One transmission network at Chatham Switching Station.

The 34.5 kV collection system consists of three electrical phase cables, a neutral ground, and a fibre optic cable used for communication. The underground collection system cables connect to a transformer at the base of each wind turbine and interconnects with other turbines on the same circuit in a given collection system route. A Junction box will be used to join radial arms of the collection system.

The underground collection system will be installed via direct burial in all locations where topography and soil type permits. Direct burial is a simple method by which an excavator digs a trench below any tile drainage system and lays the cabling at a minimum depth below grade, as is required by the Ontario Electrical Safety Code. This depth, typically greater than 1 metre, avoids farming operations. The cables will be laid in a trench with a layer of sand above and below, and the trench will then be filled in with the original local material or imported. Flagging tape will be placed in the trench to provide warning and identify the depth of the buried cable.

Any damages to the tile drainage system will be repaired prior to the backfilling of the trench. After filling, the trenches will be graded to bring the land back to its original contours and the original topsoil will be regarded. This will restore the natural drainage prior to the Project development and will have minimum impact to the local flora and fauna.

Directional boring may be used where the collection system intersects existing infrastructure such as roads, pipelines, and natural features such as flood hazards and watercourses; directional boring will remove the need for surface excavation and potential disruption to these features.

Alternatively, where neither direct burial nor directional boring are logical options, overhead lines may be used to complete the collection system. This can only be determined after geotechnical sampling has been completed on site. Overhead lines will only be used within the individual land parcels where no underground option exists and the collector systems will follow the access roads wherever possible.

The Proponent will construct a 230 kV transmission line between the Project substations and the point of interconnection at the Chatham Switching Station. Hydro One Networks Inc. (HONI) and the Independent Electricity Systems Operator (IESO) have completed the SIA/CIA interconnection studies. System design on the HONI transmission system is underway.

All materials used will conform to Canadian Standards Association (CSA) standards and will comply with the Ontario Electrical Safety Code and will be inspected by the Electrical Safety Authority (ESA).

2.3.3 Phase 3 – Testing and Commissioning

Testing and commissioning will be performed on the installation prior to start up and connection to the Hydro One transmission systems. Wind turbines, collection systems, and substations will be checked for system continuity, reliability, and performance. Modifications will be made prior to start-up if problems or issues are identified.

2.3.4 Phase 4 – Site Restoration

Site restoration will be applicable for the entire Project location. The main objective will be to re-instate the area to the original pre-construction condition, such as the ecosystem, vegetation, and drainage. All construction material, equipment, temporary facilities, and waste will be removed from the site. Topsoil will be backfilled where required, including landscaping to achieve proper drainage. Re-vegetation will include planting of native plants and hydro-seeding where required.

3. Environmental Effects

This section describes the potential negative environmental effects that could occur during the construction and installation activities associated with the Project. All construction and installation activities are expected to occur at the Project location, however, potential environmental effects are considered within 300 m of the Project location. Information on the existing baseline conditions of the natural heritage and water body features can be found in the following documents:

- Natural Heritage Records Review Report (NRSI, 2012a)
- Natural Heritage Site Investigation Report (NRSI, 2012b)
- Natural Heritage Environmental Impact Study (Hatch, 2012a)
- Water Body Records Review Report (NRSI, 2012d)
- Water Body Site Investigation Report (NRSI, 2012e).

Potential environmental effects are addressed below.

3.1 Soils

A number of construction activities may potentially result in negative effects on soil quality and loss of soils due to erosion. These activities include: soil stripping, vegetation removal, site grading, addition of fill for temporary or permanent access roads, excavation/pile driving, compaction of soils in vehicle turnaround areas and crane pad areas, temporary stockpiling of materials, heavy equipment use and accidental spills.

Excavation/soil stripping and temporary stockpiling of excavated materials may result in the mixing of topsoils and subsoils, in addition to loss of soils due to erosion, which could negatively affect the soil's productivity once reapplied during revegetation of the Project. All stockpiles will be provided with a native vegetation cover if "seasonally feasible" or other measures, such as an erosion control blanket, will be provided until the stockpiles are respread.

The soil structure and/or texture of the soil, surface water infiltration, and vegetation growth may be affected by the mixing of the gravel or granular materials, used for the base of the access roads, with the underlying soils.

Excessive soil compaction may inhibit vegetation growth by impeding root penetration within the soil, reducing aeration, and altering moisture intake (i.e., decreased infiltration due to decreased pore space within the soil structure) (DeJong-Hughes et. al., 2001). An increase in surface runoff may also potentially occur as a result of a decrease in the infiltration rate of the soil.

There is potential disturbance of surficial soils during the construction of the wind turbines and other associated Project infrastructure (e.g., cabling ROW, access roads) due to topsoil and subsoil stripping, grading and use of heavy machinery. These activities have the potential to increase soil erosion due to the exposure of non-vegetated soil surfaces to the natural environment elements (e.g., rain, wind). Higher rates of surface runoff or more concentrated flow, resulting in the formation of gulls and rills, from Project infrastructure may also result in an increase in soil erosion both on and off-site.

Potential adverse effects on soils due to accidental spills are discussed in Section 3.16.

The effects on soil quality and soil loss due to the construction of the Project components are expected to be minor although small variances in impacts to the soils may exist from site to site as the soil composition changes from the eastern to western portion of the Project. This could potentially affect the quality of the remaining soil and in particular, its ability to support vegetation growth. Loss of soils due to erosion and sedimentation could also potentially affect other environmental components (e.g., surface water quality, aquatic habitat and biota). Mitigation measures to address these impacts are described in Section 4.1.

3.2 Groundwater

Excavations for turbine towers and foundations may potentially intersect with the groundwater table causing seepage of water into the excavations. If this occurs, pumping may be necessary to keep the area dry during the construction period. In areas where significant amounts of pumping are required, there is potential for localized lowering of the groundwater table. The lowering of the groundwater table may potentially affect any wells drawing from this water source. Significant impacts to the groundwater table are not anticipated due to the avoidance of areas of high groundwater tables and the depth of excavations for the foundations. It is not anticipated that pumping greater than 50,000 L/d will occur. If this level of infiltration into the excavation does occur, the site will be re-evaluated for use.

Groundwater quality could also be impaired as a result of contamination from accidental spills during construction (see Section 3.16).

3.3 Surface Water Quality

Surface water quality of the watercourses located on, and within 300 m of the Project location could potentially be impaired during construction by increased turbidity resulting from:

- erosion/sedimentation of excavated or exposed soils
- erosion caused by increased runoff from impervious or less pervious areas (e.g., concrete slabs, access roads); or
- deposition of fugitive dust.

These effects are temporary and will result in only short term minor impacts to the waterbodies in the vicinity of the Project location. Mitigation measures to address these impacts are described in Section 4.3.

Potential adverse effects to surface water quality as a result of accidental spills are discussed in Section 3.16.

3.4 Aquatic Habitat and Biota

There are a number of watercourses within the Project which will be crossed by access roads and cabling required by the Project. It is not anticipated that there will be any direct impacts to the watercourses from these crossing due to the implementation of the mitigation measures identified in Section 4.4.

Installation of turbine towers, substations, and the transmission line (service road) will not have any direct adverse effects on aquatic habitat and/or biota, as construction of these towers will not occur within 30 m of the average annual high water mark of any of the watercourses.

Additionally, indirect negative effects to aquatic habitat and/or biota may potentially occur as a result of changes in surface water quality (see Section 3.3) and/or sedimentation due to wind or water erosion of adjacent soils. These effects include, but are not limited to:

- an increase in the turbidity of the water which may negatively affect biota through the clogging of gills, alterations in behaviour, and smothering of incubating eggs, and
- an increase in sedimentation of the watercourse which may adversely affect aquatic habitat by infilling of interstitial spaces in areas with rocky substrates.

Mitigation measures to address these potential adverse effects are described in Section 4.4.

Aquatic biota could also be negatively affected by accidental spills during construction (see Section 3.16).

3.5 Vegetation

The removal of vegetation is expected to occur as a result of the construction of access roads and underground cabling through approximately two (2) woodlands although the overall effects on vegetation are expected to be minor. The removal of vegetation is expected to occur as a result of the construction of above ground cabling through approximately five (5) woodlands, although the overall effects on vegetation are expected to be minor as only select trees will be removed. Installation of an access road and underground cabling will also occur within open country breeding bird habitat, however the overall effects on the vegetation are expected to be minor. Loss of vegetation will also occur within various hedgerows. As the hedgerows are single rows of trees, impacts are expected to be minor. Mitigation measures as provided in the Environmental Impact Study will result in only residual minor impacts (Hatch, 2012d).

Vegetation communities in the vicinity of the Project location may also be indirectly affected by dust deposition on leaf surfaces, resulting in minor impairment of growth. These effects are temporary and will result in only short term minor impacts to vegetation communities adjacent to the Project location. Mitigation measures to address these impacts are described in Section 4.5.

Vegetation could also be damaged as a result of accidental spills, which are addressed in Section 3.16.

3.6 Wildlife

Impacts to wildlife could occur as a result of loss of habitat, disturbance from construction activities, or incidental mortality as a result of collision with construction vehicles.

The loss of wildlife habitat may potentially occur on agricultural lands, and within woodlands and hedgerows. The loss of habitat on agricultural lands is considered minimal as most turbine locations and associated infrastructure require only portions of an entire agricultural field and are generally located on lands under active agriculture which are not considered ideal wildlife habitat. The potential loss of wildlife habitat in woodlands and hedgerows are also expected to be minor as disturbance of the woodlands will be minimized through measures discussed in Section 4.6, and

rehabilitation of the disturbed areas will occur immediately following construction. The majority of the site will remain suitable for use by wildlife species that would have been present on the agricultural fields, and within the woodlands and hedgerows prior to construction.

The presence of the construction workforce and operation of construction machinery on-site may result in temporary avoidance of the Project location by wildlife not normally subjected to this type of disruption on a regular basis. It is expected, however that wildlife avoidance of the area will not be significant as a result of the existing disturbance from agricultural operations.

The movement of construction machinery throughout the Project has the potential to result in the incidental take (accidental mortality) of wildlife species as a result of collisions with moving vehicles. Machinery operating on site will be travelling at low speeds, and therefore the potential for incidental take is considered low, and likely restricted to species of small mammals and reptiles/amphibians that may be unable to rapidly move away from oncoming machinery.

These effects are temporary and will result in only short-term minor impacts to wildlife communities on, and in the vicinity, of the Project infrastructure. Mitigation measures to address these impacts are described in Section 4.6.

3.6.1 Species at Risk

Several Species at Risk were identified as having potential habitat in the vicinity of the Project, with confirmed occurrences of Barn Swallow (*Hirundo rustica*), Bobolink (*Dolichonyx oryzivorus*), Eastern Fox Snake (*Pantherophis gloydi*, and Butternut (*Juglans cinerea)*. Consultation with the Ministry of Natural Resources (MNR) is ongoing, as is required by the *Endangered Species Act, 2007,* in order to ensure that there is no impact to these species or their habitat.

Mitigation measures to address any impacts that may occur are discussed in Section 4.6.1.

3.7 Air Quality and Noise

Air quality in the Project may be affected by airborne dust particles caused by vehicular traffic, heavy machinery use, and soil moving activities. Airborne dust particles can have a range of effects including, but not limited to the following:

- impacts on human health as a result of irritation to lungs, eyes, etc, which could impact construction workers or nearby residents
- impacts on surface water quality and aquatic habitat if the dust is deposited into waterbodies; and
- impacts on vegetation as airborne dust builds-up on plant surfaces impairing the photosynthesis process potentially resulting in mortality of the plants.

Emissions (carbon monoxide, nitrogen oxides and sulphur oxides) from the exhausts of a variety of construction, material transport, and personnel vehicles, as well as portable generators to be used on-site during the construction period may also result in a minor decrease in the air quality in the Project. This effect, however, will be temporary and emissions are expected to dissipate following the shutdown of the equipment and the removal of the equipment from the affected area.

Construction and installation activities have the potential to result in increased noise levels on, and within, the vicinity of the Project components. Noise emanating from the conduct of the

construction activities within and around the various turbine and associated infrastructure locations could disturb both the local sensitive receptors in the vicinity of the Project location (e.g., nearby residences) and local wildlife populations.

Both of these effects are temporary and will result in only short term minor impacts on local air quality and noise levels. Mitigation measures to address these impacts are described in Section 4.7.

3.8 Traffic

Increased traffic volumes and equipment delivery to the turbine locations (and associated infrastructure) and temporary disruption along routes utilized by construction vehicles may result in occasional delays to local community traffic flow during the construction period. Mitigation measures to address these impacts are described in Section 4.8.

3.9 Municipal Roadways

The use of municipal roadways by construction vehicle traffic may result in some minor damage to roadways during construction. Construction vehicles (e.g., cranes), and material transportation vehicles (turbine towers and blades) may potentially cause the most damage, especially during spring load restrictions and also as a result of vehicle weight. Mitigation measures to address these impacts are described in Section 4.9.

3.10 Public Safety

Potential risks to public safety during the Construction Phase of the Project exist due to the interaction of the general public with construction activities. Such interactions are attributed to joint-use of municipal roads and construction activities occurring in public right of ways. Impacts include injury from construction equipment or activities. Mitigation measures to address these impacts are described in Section 4.10.

3.11 Waste Management

Construction activities will likely result in the generation of recyclable material, construction and sanitary waste. Generation of such material will occur at and within each of the Project component locations with wastes and recyclables transported to the nearest approved facility for disposal or recycling. Mitigation measures to address these impacts are described in Section 4.11.

3.12 Land Use

Lands within the Project location will be removed from agricultural production upon Project construction. However, the agricultural land used may be restored following Project decommissioning. This potential negative effect is therefore considered to be negligible given its reversibility.

3.13 Protected Properties

No protected properties, as defined in Section 19(1) of O. Reg. 359/09, exist in the vicinity of the Project location. Therefore, no adverse effects on protected properties will occur.

3.14 Archaeological and Cultural Heritage Resources

A Stage 1 Archaeological Assessment has been completed and a confirmation letter received on February 11, 2011 from the Ministry of Tourism, Culture and Sport (MTCS). An initial Stage 2 Archaeological assessment was conducted to determine if archaeological resources were present within the Project site. The MTC has reviewed the Archaeological Assessment Report in accordance

with Part VI of the *Ontario Heritage Act*, R.S.O 1990, c 0.18, and accepted its findings. The findings of the Stage 2 Assessment identified a total of 85 archaeological sites (8 Euro-Canadian/77 pre-contact Aboriginal site) with 43 (7 Euro-Canadian sites and 36 pre-contact Aboriginal sites) archaeological sites meeting the MTCS's 2011 Standards and Guidelines, Section 2.2: Analysis - Determining the requirement for Stage 3 assessment, MTCS's Standards and Guidelines for sites and therefore requiring further Stage 3 Site-specific assessment. However, since that time, Pattern Energy actively revised the layout to exclude as many of the sites (or portions thereof) from the Project as possible. This work resulted in only 20 sites now meeting the criteria for further Stage 3 assessment.

In addition, subsequent to the initial Stage 2 Archaeological Assessment, a Stage 2 Archaeological Assessment was also completed on lands added to the Project as a result of the change in layout. A total of 19 new archaeological sites (4 Euro-Canadian/15 pre-contact Aboriginal sites) were identified. Of these new archaeological sites, eight pre-contact Aboriginal sites were determined to be sufficiently assessed and documented at Stage 2, and the eleven remaining archaeological sites met the criteria for requiring a Stage 3 site specific assessment. This report has been completed and submitted to MTCS for review and confirmation.

Following a standard archaeological assessment there remains a potential to uncover deeply buried heritage or archaeological resources (including human burial sites) which would not have previously been identified. In this instance, the MTCS has specified mitigation that must be undertaken in the event of discovery of human remains or other archaeologically or culturally significant material. These mitigation measures are discussed in Section 4.12.

The proposed Project is not located on a Protected Property as described in Column 1 of the Table to Section 19 of the REA Regulation. A Heritage Assessment has been conducted for the Project to determine built heritage resources and cultural landscape resources found within the study area and to evaluate the impact of the proposed Project as required within MTC's *Information Bulletin for Applicants Addressing the Cultural Components of Projects Subject to Ontario Regulation 359/09*. This report has been submitted to MTCS for confirmation.

3.15 Spills

Potential negative effects due to spills of hydrocarbons from vehicles or equipment operating on-site, or spills of concrete materials from concrete trucks, sewage from portable toilets and silt from earth moving operations may occur during construction of the Project. Spills may occur as a result of mechanical malfunctions from vehicles or equipment, releases from storage areas as a result of failure in the storage equipment, improper handling techniques, and improper refuelling techniques. Spills of these materials may result in the following negative effects:

- contamination of soils, surface water, and groundwater with materials inhospitable to the promotion of biological life, and
- uptake/ingestion by, or coating of, vegetation species or terrestrial and aquatic biota resulting in senescence or individual mortality.

The extent of these effects is highly dependent on the magnitude and location of the spills (i.e., larger spills or those in proximity to sensitive areas are anticipated to potentially have greater effects). The effectiveness of the spill response has a strong bearing on the scale of potential impact. Spill response measures are discussed in Section 4.13.

4. Proposed Mitigation Measures

The following sections detail the proposed mitigation measures to prevent or minimize the potential negative environmental effects, discussed in Section 3, resulting from the construction of the wind turbines and the associated Project infrastructure. An Environmental Effects Monitoring Plan summary table is also provided in Section 4.4 of the EIS (Hatch, 2012d) and may be used as additional reference to the mitigation measures proposed in this Section.

Three (3) types of mitigation measures are documented, where applicable, in this section and include:

- modifying the types of construction activities
- installing treatment technologies (e.g. erosion and sedimentation control measures), and
- changing the Project construction schedule to prevent adverse effects during sensitive time periods.

4.1 Soils

As identified in Section 3.1, soils on and in the vicinity of the Project may be negatively affected as a result of construction and installation activities. Negative effects were documented with respect to soil displacement, soil quality and sedimentation/erosion processes. Mitigation measures to address these negative effects are identified on a Project wide basis.

Soil compaction of the disturbed areas around the specific Project components will be assessed upon completion of construction activities. Disturbed areas will be visually monitored for evidence of rutted or flattened areas beneath stockpiles in order to assess if excessive soil compaction has occurred. Rehabilitation efforts to loosen the soil by discing or scarifying the soil by other methods will be undertaken, as required.

Where excavation is required, all topsoil and subsoil materials will be stored separately and at a distance of no less than 5 m apart, to prevent the mixing of the soils. The topsoil stockpiles should be restricted to depths less than 1 m, as temporary stockpiling to depths greater than 1 m may result in adverse effects on the health of the soils at the base of the stockpile by promoting the generation of anaerobic conditions (Harris and Birch, 1989; cited in Strohmayer, 1999).

A layer of geotextile fabric will be placed over the entire area, following the stripping of the topsoil and prior to the deposition of the gravel base along access road areas, to prevent mixing of gravel with the underlying native soils.

The primary goal of the erosion and sedimentation control plan, to be developed by the Contractor, is to prevent erosion from occurring. The primary mitigation measures that will form the basis for the sediment and erosion control plan will include, but not be limited to the following:

- Erosion and sediment control measures (i.e., erection of silt fence, straw bales, riprap, rock check dams) shall be placed throughout the Project location, as required, to minimize the potential for erosion and sedimentation. This will include, at minimum, silt fencing installed around the Project work areas where there is potential for off-site sediment transport, and in the vicinity of drainage features on and adjacent to the Project location. All erosion and sediment control

measures are to be installed and maintained in accordance with appropriate standards and regulations.

- All necessary erosion and sediment control measures shall be in place prior to the commencement of construction activities, and are to remain in place until areas disturbed during construction have been suitably stabilized.
- An adequate supply of erosion control devices (e.g., geotextiles, revegetation materials) and sedimentation control devices (e.g., silt fences) shall be maintained on-site to be able to address erosion and sedimentation and respond to unexpected events in a timely manner.
- The size of the disturbed areas in the area of each of the Project components shall be minimized. The extent of the work area is to be demarcated on the site to ensure that the Contractor does not work beyond these bounds.
- Construction shall be phased to minimize the time that soils are exposed.
- Re-vegetate/stabilize slopes as soon as possible after exposure.
- Erosion and sedimentation control measures (e.g., silt fence barriers, flow dissipaters, rock flow check dams etc) shall be installed and maintained as required, in accordance with appropriate standards.
- Sediment control measures shall be used during any dewatering activities, should they be required.
- Stockpiles shall be provided with appropriate barrier/covers to prevent wind and water erosion from occurring.

With the implementation of the proposed mitigation measures as outlined above, it is anticipated that soil erosion on the construction sites will be minor, temporary and localized.

4.2 Groundwater

The pumping of groundwater from open excavations to construct the foundations of the wind turbines could potentially result in the lowering of the local groundwater table. All dewatering activities shall be pumped out of the excavated area, filtered to meet MOE water quality discharge criteria for turbidity, and discharged/dispersed toward the vegetated 30 m buffer area surrounding the watercourses or towards a drainage feature nearest to the area of work. The duration of groundwater pumping will be limited to the extent possible to avoid significant changes in the groundwater table. This pumping may cause short-term localized lowering of the groundwater table, although significant changes in the groundwater level are not anticipated to occur.

Rehabilitation of significant areas of soil compaction following construction (as discussed in Section 4.1) will ensure that soil compaction around the site is limited with no significant adverse effects on water infiltration, and hence groundwater recharge, anticipated to occur.

Section 4.13 details the mitigation to prevent or minimize the potential adverse effects of accidental spills during construction.

4.3 Surface Water Quality

Mitigation measures identified for other resources discussed in this section may also be used to prevent impacts to surface water quality. These measures include:

- mitigation for contamination from accidental spills (see Section 4.13)
- mitigation for erosion/sedimentation addressed in Soils (see Section 4.1), and
- mitigation for fugitive dust deposition addressed in Air Quality (see Section 4.7).

It is anticipated that there will be no resulting adverse effect on surface water quality as a result of the use of effective mitigation measures and adherence to the 30 m construction buffer zone from the watercourses.

4.4 Aquatic Habitat/Biota

Aquatic biota (e.g., fish and benthic invertebrates) and their habitat in the watercourses located within or adjacent to Project components will not be directly affected by the installation of the wind turbines or foundations, and substations/transmission lines as these Project components will not occur within 30 m of the average annual high water mark of the watercourse. A number of access roads/cabling associated with these turbines, as identified in the EIS (Hatch, 2012d), will cross watercourses. The crossing of these watercourses identified as containing aquatic habitat or biota will be crossed at right angles and using a bailey bridge to avoid affecting the watercourse bed or banks.

Indirect effects on aquatic biota and habitat may be potentially affected if changes in surface water runoff, surface water quality, and groundwater quality and quantity for each of the Project components were to occur as a result of the conduct of construction activities. Mitigation measures to prevent/minimize adverse effects are discussed above. The mitigation proposed previously is anticipated to be effective in preventing/minimizing negative effects associated with these other biophysical components of the environment, such that there are no adverse effects on aquatic biota and habitat within the tributary on and adjacent to the site. Construction within identified turtle over-wintering habitat will occur outside of the winter months in order to not impact hibernating turtles. Additional detail on the mitigation measures to prevent/minimize adverse effects on surface water quality in the watercourses during construction is also identified in the Waterbodies Environmental Impact Study (NRSI, 2012e).

4.5 Vegetation

Impacts to vegetation communities identified in Section 3.5 may include: clearing portions of woodlands and/or hedgerows, accidental spills or settling of dust generated during construction in areas adjacent to the construction site/project location. It is not possible to mitigate the impacts of clearing from the woodland. The woodlands directly adjacent to the above ground cabling will be avoided, where possible, by relocating the Project component outside of the woodland, and thereby avoiding any clearing required for these woodlands. The impacts to the one (5) woodland that will require clearing will be minimized by crossing the woodlands at right angles and placing Project components within the edge of the woodlands. Removal of hedgerow vegetation will be minimized by crossing at right angles and limiting disturbance to the area required for construction. Rehabilitation of disturbed areas not used for permanent infrastructure will be revegetated using native seed mixes.

In order to minimize potential losses from surrounding vegetation communities, areas where clearing is required will be well marked, and workers will be instructed not to enter areas of natural vegetation. In addition, cleared and grubbed materials will be piled away from the surrounding woodlands, and trees will be felled into cleared areas.

Mitigation measures with respect to potential impacts of accidental spills on vegetation communities are addressed in Section 4.13. In addition, mitigation measures with respect to dust accumulation are described in Section 4.7. As a result of the effective use of the mitigation measures identified in these sections, potential impacts to vegetation communities from these impacts are expected to be minor, and resulting effects will be minimized to the extent possible. Full rehabilitation of the sites will not occur until the decommissioning phase.

4.6 Wildlife

As described in Section 3.6, wildlife populations could be impacted by loss of habitat, disturbance due to construction activities, and incidental take. An Environmental Effects Monitoring Plan to address effects on birds and bats and other wildlife will be implemented as identified in Section 4.5 of the EIS (Hatch 2012d).

In order to minimize the potential for habitat loss, work areas will be demarcated in order to ensure that the Contractor does not work beyond those bounds. Vegetative ground cover to be used for revegetation of the disturbed areas at the Project locations will be selected in consideration of promotion of wildlife features.

In order to minimize potential for disturbance or incidental take of wildlife, construction activities will be timed outside of the breeding bird period (generally May through July), wherever possible. If this is not possible, a trained avian biologist will inspect the proposed work area, plus an additional 100 m around the area, for nesting birds prior to any work being done to delineate workable areas (i.e., avoiding nests or other sensitive breeding habitat until area is abandoned for wildlife breeding). If an active nest of a species covered under the federal *Migratory Birds Convention Act* (MBCA) or the provincial F*ish and Wildlife Conservation Act* (FWCA) is located within a proposed work area, a mitigation plan (which may include the establishment of buffers around the active nests) will be developed to prevent impacts on birds or their active nests, and submitted to Environment Canada (EC) (for MBCA species) or Ontario Ministry of Natural Resources (MNR) (for FWCA species) for review prior to implementation.

It is anticipated that there will be some disturbance of wildlife populations on and in the vicinity of the Project location during construction even with implementation of the above mentioned mitigation measures, however these effects are minor, temporary, and reversible. It is possible that there may be an incidental take of a wildlife species during construction; however, this may be avoided or minimized through enforcement of speed limits on all roads travelled by Project vehicles. The construction workforce will also be educated on the potential for wildlife occurring on the Project location, and the characteristics and behaviour of species of conservation concern will be identified to the workforce to make them aware of their potential presence. The construction workforce will be advised that measures should be taken to avoid wildlife wherever possible.

4.6.1 Species at Risk and Species of Conservation Concern

Mitigation measures in respect of the identified species at risk will include:

- A 20 m buffer has been proposed from the Butternut tree in order to ensure that there is no impact on this species.
- Further, timing restrictions, or set backs from identified habitats of avian and snake species at risk have been proposed to prevent impacts to those species or their habitat.

A contingency plan will also be developed prior to construction in order to identify procedures to be followed if a provincial or federal SAR is identified on any of the Project during construction. The contingency plan will generally consist of:

- ceasing all construction activities in the affected area
- contacting the Contractor's environmental representative to (i) confirm the presence of the SAR, (ii) identify the nature of its presence on the Project location (i.e., breeding, stop-over on migration, incidental occurrence), and (iii) determine if critical habitat for the species is present; and
- the environmental representative will then contact MNR (for species listed on the Ontario Endangered Species Act) or EC (for species listed on the federal Species at Risk Act) to identify whether a mitigation plan is required, and to develop such a plan, if needed.

4.7 Air Quality and Noise

The use of standard construction best management practices and mitigation measures, such as those identified in "Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities" (Cheminfo Services Inc., 2005), will be used. These mitigation measures are to include, as required:

- the use of dust suppression (i.e., water) on exposed areas including access roads, stockpiles and work/laydown areas, as necessary
- provision of hard surfacing (addition of coarse rock) of access roads or other high-traffic work areas
- phased construction, where possible, to limit the amount of time soils are exposed
- avoidance of earth-moving works during excessively strong winds. Stockpiles are to be worked (e.g., loaded/unloaded) from the downwind side to minimize wind erosion.
- stockpiles and other disturbed areas to be stabilized as necessary (i.e., taped, mulched, graded, revegetated or watered) to create a hard surface crust) to reduce/prevent erosion and escape of fugitive dust
- dust curtain(s) to be used on loaded dump trucks delivering materials from off-site
- workers to utilize appropriate personal protective equipment (e.g., masks, safety goggles) as necessary.

The use of these mitigation measures is expected to minimize effects of dust on local air quality, with any impacts expected to be temporary in nature.

Construction and installation activities that produce a large amount of noise will be limited to daylight hours. Vehicles will also be regularly checked for properly working mufflers or other noise reducing equipment, and all construction equipment will meet MOE emission standards (NPC 115). In spite of the mitigation measures identified above, it is anticipated that noise from the Project will have some effect on local wildlife populations (addressed in Section 4.6, above) and nearby sensitive receptors. In order to minimize impacts on sensitive receptors, receptors will be made aware of a contact person for complaints relating to noise during the Project construction. As construction is anticipated to last for approximately 12 months, the resulting effect on nearby receptors is expected to minor, temporary and reversible.

4.8 Traffic

Potential negative effects as a result of increased traffic volumes and equipment delivery to the Project location as well as temporary disruption along routes used by construction vehicles can be minimized with the implementation of the following proposed mitigation measures:

- only designated transportation routes will be used
- a police or security escort will guide or accompany major equipment deliveries to the Project location, if necessary
- flagmen will facilitate traffic flow and control, if necessary
- construction vehicles will be driven in accordance with all traffic laws
- detour signage will be prominently displayed
- tracks created by vehicles or erosion gullies will be repaired or re-graded as necessary.

As a result of the above mitigation measures, impacts to traffic will be minor, temporary and reversible following Project construction.

4.9 Municipal Roadways

Construction vehicle traffic may cause damage to municipal roadways during the construction of the Project. The following mitigation measures are proposed to minimize this potential negative effect:

- only designated transportation routes will be used
- construction vehicles will be driven in accordance with all traffic laws
- roadways will be photographed and video surveyed prior to construction and damage to municipal roadways, above and beyond normal wear and tear, will be repaired as necessary.

Following the use of these mitigation measures, there will be no residual effect to municipal roadways.

4.10 Public Safety

Implementation of the following mitigation measures will serve to minimize potential risk to the public within the Project location:

- public access to the construction area will be restricted through the use of fences, gates, and security procedures

- signage will be posted to notify the public of construction in the area
- proper procedures for construction traffic will be developed, where required.

The implementation of these mitigation measures is anticipated to effectively minimize the risk to public safety.

4.11 Waste Management

Solid wastes generated during construction will include construction waste such as material packaging and scrap material as well as domestic waste such as food and sanitary waste. Sanitary facilities on-site will include portable self-contained toilets and washroom facilities. The following mitigation measures will serve to minimize any potential negative effects as a result of the generation of waste and recyclables:

- construction waste will be properly stored on-site prior to disposal off-site at local registered disposal facilities
- all food wastes will be maintained separately from construction wastes and stored in a wildlife proof container on-site until it can be taken off-site
- all sanitary waste is to be contained and hauled off-site by a designated hauler throughout the construction period
- hazardous wastes will be properly stored in secure containers inside secondary containment areas until disposal off-site at a registered facility
- reuse and recycling of all wastes will be practiced wherever possible.

The use of these mitigation measures will minimize any environmental effects resulting from the generation of waste.

4.12 Archaeological and Cultural Heritage Resources

Consultation with the Ministry of Tourism, Culture and Sport is being conducted to determine that the Stage 2 Assessments have been completed and the reports accepted by MTCS. Any additional requirements (Stage 3 and 4 Assessments) will be conducted in consultation with MTCS. However, there remains a potential to uncover deeply buried archaeological resources (including human burial sites) during construction of the Project, which would not have previously been identified. In this instance, the MTCS has specified mitigation that must be undertaken in the event of discovery of human remains or other archaeologically or culturally significant material:

- Should human remains or artifacts be identified during construction, all work in the vicinity of the discovery is to be halted immediately, as required under the Ontario Heritage Act. Work will resume once the site has been investigated and cleared by a licensed archaeologist.
- If human remains are found, notification is to be made to the Ontario Provincial Police (OPP), or local police who will conduct a site investigation and contact the district coroner.
- Notification is to be made to the Development Plans Review Office of the Ontario Ministry of Tourism and Culture, Heritage Libraries Branch, Heritage Operations Unit, 400 University Ave, 4th Floor, Toronto, ON, M7A 2R9, and Registrar of Cemeteries, Ontario Ministry of Consumer and Commercial Relations.

The mitigation measures identified above will effectively minimize impacts on archaeological resources of the study area.

Mitigation measures with respect to specific heritage resources are documented within the Heritage Assessment. These include, among others, identifying preferred locations for pole and cabling placement, tree planting where required, and heritage recordings/documentation of significant features.

4.13 Spills

Accidental spills have the potential to occur during construction and, as such, appropriate safeguards will be put in place to prevent contamination of the terrestrial or aquatic environments. Contaminants that will be used during construction and have the potential to be spilled consist of hydrocarbons (from fuel storage and transport, vehicle maintenance and in transformers), concrete materials (from concrete trucks), sewage (from portable toilets), and silt (from clearing and earth-moving operations).

To mitigate the potential for spills during construction, the site engineer and environmental inspector will be responsible for ensuring that the Project is constructed using environmental best management practices. The following measures will be implemented:

- A designated Site Environmental Inspector will be appointed by the Contractor. This person will be responsible for ensuring that the contractor(s) have prepared a spill clean-up procedure/emergency response plan and appropriate equipment, with all staff trained in proper implementation in the event of a spill.
- Emergency contacts will be posted, including Site Project Manager, Site Health and Safety Manager, Site Environmental Inspector, 911, Police, Fire Department, MOE Spills Action Centre, and contacted as required.
- All potentially hazardous materials, fuels and lubricants must be stored in the laydown area, in a impervious/protected/bermed area (110% of storage capacity) and at least 30 m from any watercourses.
- All refuelling and equipment maintenance activities will be conducted at specified locations.
- Equipment is to be monitored to ensure it is well maintained and free of leaks.
- Spill containment and clean-up supplies are to be maintained on-site at all times.
- Any spill will be cleaned-up immediately and reported accordingly.
- In the event of a reportable spill, the MOE Spills Action Centre is to be contacted immediately, as required by provincial regulations.
- Portable toilets will be located no closer than 50 m from a watercourse/drain and will be pumped by an MOE approved hauler to an approved facility.
- A sediment and erosion control plan will be developed and implemented.
- A system to control erosion and sedimentation must be installed in any location where erosion or sediment from stored soil/rock piles, access roads, clearings activities, etc, could discharge

directly into a watercourse surface. An adequate supply of erosion and sediment control devices (e.g., silt fences) will be maintained on-site at all times during construction.

- The size of cleared and disturbed areas are to be minimized where possible.
- All excavated and/or erodible material is to be placed in suitable designated areas away from watercourses and stabilized with erosion protection.

As a result, the effective use of mitigation measures will prevent impacts on soils, groundwater, surface water, vegetation and terrestrial or aquatic biota.

4.13.1 Spills of Concrete

Concrete will be used to construct the foundations for wind turbines, substation components, and buildings. Concrete will be brought on site by a ready-mix concrete supplier in concrete trucks and poured directly into the form for each foundation. No cement is anticipated to be stored or mixed on site.

Concrete, grout and associated materials (e.g., cement, mortars) typically have high pH values (i.e., highly basic or alkaline), which, if they enter a watercourse, could create adverse surface water quality conditions that are toxic to aquatic biota (Province of British Columbia, 2007).

Although the use of concrete during Project construction will not occur within 30 m of any water body, mitigation measures are proposed to prevent negative effects. Therefore, in order to mitigate potential adverse effects due to concrete and cement use, the following mitigation measures are to be implemented:

- No alkaline cement products will be deposited directly or indirectly into or adjacent to any watercourse.
- Concrete truck rinsing will occur at a designated area at least 120 m from any waterbodies or drainage routes in a manner to contain the rinse water and concrete residue to prevent off site transport. However, if all wastewater arising from truck rinsing will be contained and treated to meet pH requirements before discharge, then the truck rinsing may occur within the laydown area, however, this should be avoided if possible.

Given this mitigation, no negative effects on surface water quality due to use of concrete during construction is anticipated to occur.

5. Environmental Effects Monitoring Plan

The use of mitigation measures identified in Section 4 will either avoid, minimize, or mitigate the potential effects of the Project on the natural environment to ensure the protection of the environment to the extent possible. Table 5.1 provides a summary of the potential negative environmental effects on environmental components on or within 300 m of the project location and the mitigation measures to be used.

The environmental effects monitoring during construction will be restricted to ensuring compliance with the mitigation measures identified herein and those summarized in Table 5.1 - Summary of Environmental Effects Monitoring Requirements with Respect to Significant Natural Feature in the Natural Heritage EIS (Hatch, 2012d). Monitoring will consist of weekly inspections of the Project location site by a designated environmental inspector. The inspector will ensure that all mitigation measures described herein are in place and functioning according to design specifications. If required, remedial actions will be recommended and work ceased in the area of interest until the remedial actions are undertaken.

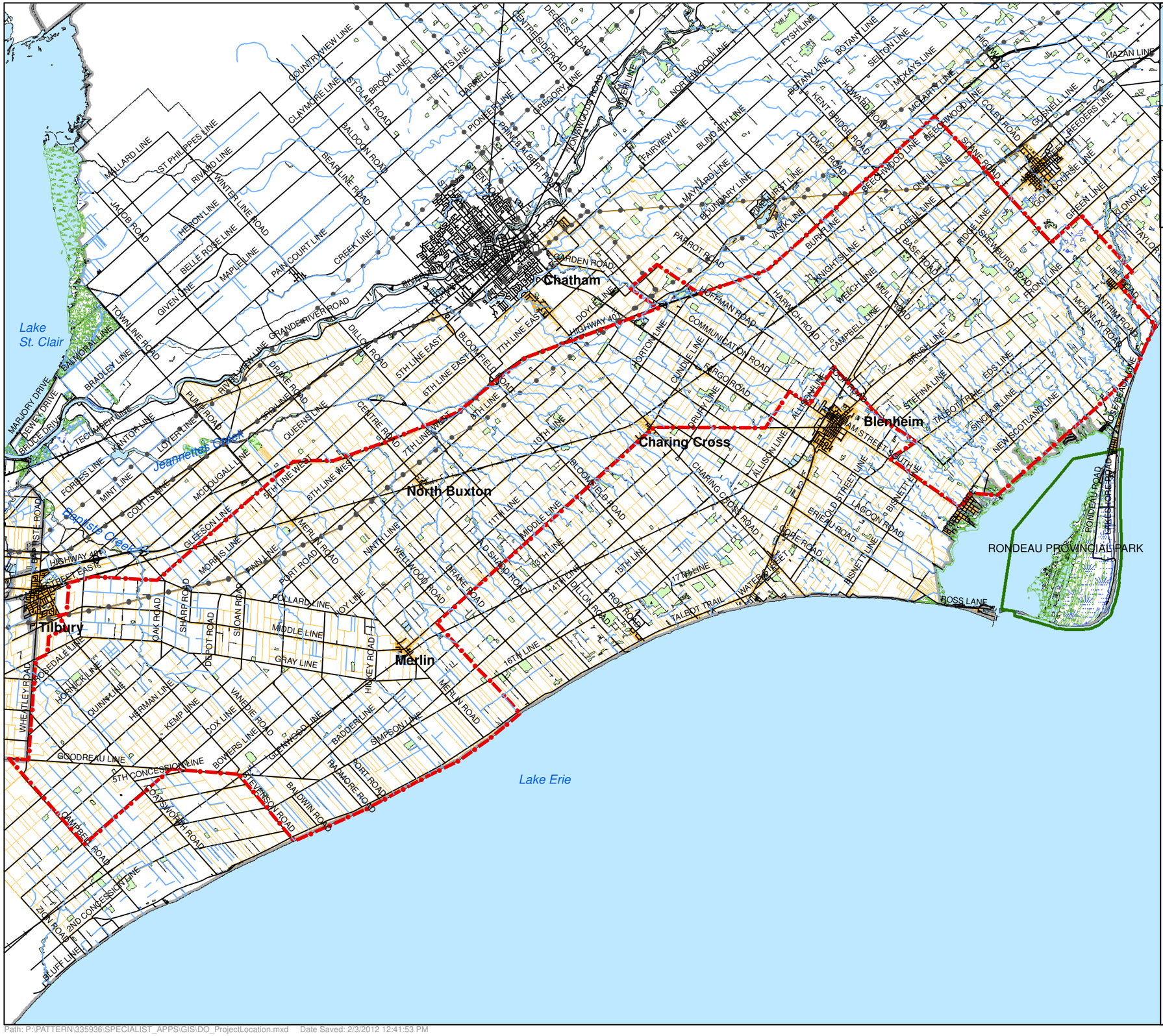
Table 5.1 Summary Negative Environmental Effects on Environmental Components on and within 300 m of the Project Location

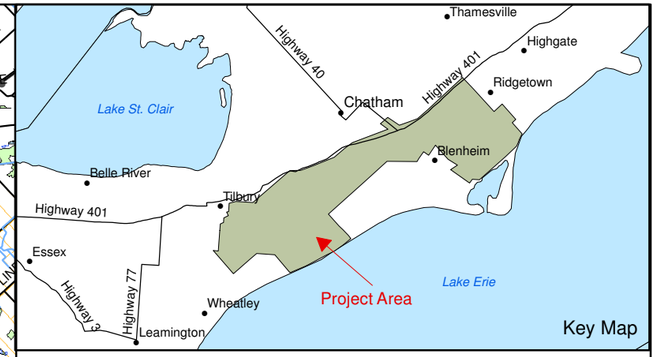
Environmental Component	Construction Activity and Associated Potential Environmental Effect(s)	Proposed Mitigation Measure(s)
Soils	Soil stripping, excavations and pile driving may cause mixing of topsoils and subsoils. Increased erosion and loss of soils may occur as a result of erosion from exposed soils. Site grading may cause mixing of topsoils and subsoils. Altering rates of surface water may create gulls and rills. Soil structure/texture of soil may be altered. Altering surface water infiltration may occur as a result of fill for temporary or permanent access roads. Soil compaction may inhibit vegetation growth, reduce aeration, altering moisture intake, and increase surface water runoff.	Topsoil and subsoil materials will be stored separately. Topsoil stockpiles to be restricted to depths of less than 1 m. Layer of geotextile fabric to be placed over area following stripping. Disturbed areas to be visually monitored for evidence of rutted or flattened areas beneath stockpiles. Soils will be loosened by discing or scarifying the soil. Erosion and Sediment Control (ESC) plan to be developed by construction contractor. Plan will include erosion and sediment control measures that will be in place, as required, prior to the start of construction activities. An adequate supply of erosion and sedimentation control devices will be maintained on site at all times. Minimize size of disturbed areas and areas outside of this will be demarcated to ensure work does not occur outside of the appropriate bounds. Construction will be phased. Re-vegetate/stabilize slopes as soon as possible. Erosion and sedimentation control measures will be maintained in accordance with appropriate regulations. Sedimentation control measure will be used during any dewatering activities. Stockpiles will be provided with appropriate barriers/covers to prevent erosion.
Groundwater	Excavations could potentially intersect with groundwater table and cause seepage of groundwater into excavations. Any required pumping could lower groundwater table and impact nearby wells.	Groundwater will be pumped out and filtered to meet MOE water quality discharge criteria for turbidity, and discharged towards a vegetated 30 m buffer area surrounding the watercourses or into a pond with an installed sediment trap prior to discharge into a ditch. Duration of pumping will be limited where possible. No groundwater will be used during construction.
Surface Water Quality	Excavations could increase turbidity due to excavated or exposed soils. Increase in turbidity due to erosion from increased runoff from impervious/less pervious areas. Increase in turbidity due to construction activities producing fugitive dust.	ESC plan to be created and implemented to prevent and mitigate turbidity (see Soils). Contamination features to be in place should a spill occur (see Spills). Mitigation for fugitive dust generation to prevent and mitigate turbidity (see Air Quality and Noise)
Aquatic Biota and Habitat	Installation of cabling and water crossings may cause indirect impacts to the environment due to increased turbidity (see Surface Water Quality). Installation may also indirectly impact biota by the clogging of gills and smothering of incubating eggs by sedimentation, and alteration of behaviour. This sedimentation may also lead to infilling of spaces in areas with rock substrate thereby removing potential spawning habitat.	No instream work is anticipated as all water crossings will occur at right angles and employ bailey bridges. Mitigation measures for surface water (see Surface Water Quality), fugitive dust generation (see Air Quality and Noise) and groundwater (see Groundwater) will be sufficient to prevent and mitigate any indirect impacts.
Vegetation	Removal of vegetation may impact woodlands and hedgerows by loss of vegetation and loss of habitat for wildlife. Fugitive dust generation may indirectly impact on plant growth by covering leaves and limiting sunlight and water intake.	Clearing within woodlands will not remove forest interior habitat and only occur within edge habitat of the woodlands. The woodlands will be crossed at right angles or at the narrowest point of the woodland or hedgerow. Areas to be cleared will be well marked and workers instructed not to enter/clear other areas. Cleared and grubbed material to be piles away from woodlands and hedgerows and trees felled into cleared areas. Areas will be revegetated with native plant species.
Wildlife	Disturbances from construction activities may temporarily cause avoidance of wildlife from the Project location. Minor loss of habitat within agricultural lands from placement of Project components and clearing within woodlands and hedgerows will occur. Incidental take may occur as a result with collisions with equipment and construction vehicles; this will likely be restricted to small mammals and reptiles/amphibians that may be unable to rapidly move away from moving machinery. Several Species at Risk were identified on and within 300 m of the Project components and may be impacted by construction activities.	Work areas will be demarcated in order to ensure work does not occur beyond the appropriate bounds. Vegetation and groundcover for revegetation will be selected to promote the wildlife features. Construction activities will be timed outside of the breeding bird period were possible. When not possible, a survey will be conducted by a trained avian. A specific mitigation plan will be created in order to establish buffers and mitigation measures should any nests be found. Enforcement of speed limits on all roads travelled by Project vehicles. All hedgerows to be crossed will be inspected by a trained biologist for species at risk. Contingency plan to be developed prior to star of construction for species at risk found on the Project location. Contingency plan will include ceasing all activities in the affected areas, confirming species, identify the nature of its presence, determining if critical habitat is present and contacting relevant agencies to report the finding.
Air Quality and Noise	Airborne dust particles caused by vehicular traffic, heavy machinery use, and soil moving activities could potentially impact human health resulting in irritation to lungs, eyes, etc, and may also impact local wildlife. Dust particles may impact surface water quality (see Surface Water Quality) and vegetation (see Vegetation). Increase in noise levels may disturb local receptors and wildlife within the vicinity if the Project location.	Use of dust suppressant on exposed areas will be used as necessary. Provision of hard surfacing of access roads or other high-traffic work areas. Phased construction to limit time of soils exposed. Avoiding earth-moving works during periods of high winds. Temporary stockpiling and other disturbed areas to be stabilized. Dust curtains on loaded dump trucks. Proper personal protective equipment for all workers. Vehicles will be checked for working mufflers and other noise reducing equipment. All construction equipment will meet MOE emission standards. A contact person will be made available for complaints relating to noise should any noise impact the sensitive receptors. All construction activities adhere to the noise by-law of Chatham-Kent Municipality.

Environmental Component	Construction Activity and Associated Potential Environmental Effect(s)	Proposed Mitigation Measure(s)
Traffic	Increased traffic volumes may result in occasional delays to the local community	Designated transport routes will be used. Police or security escort will guide major equipment if necessary. Flagmen will control traffic if necessary. Construction vehicles will be driven in accordance to all traffic laws. Detour signage will be displayed. Tracks or erosion gullies created by vehicles will be repaired or re-graded.
Municipal Roadways	Construction vehicle traffic may result in minor damage to roadways.	Designated transport routes will be used. Construction vehicles will be driven in accordance to all traffic laws. Roadways will be photographed and video surveyed prior to construction to assess their condition. Any damage above normal wear and tear will be repaired as necessary.
Public Safety	Possible injury from construction equipment and activities.	Public access to the construction area will be restricted through fences, gates and security procedures. Signage will be posted to notify the public of construction in the area and its hazards. Proper procedures for construction traffic will be developed where required.
Waste Management	Construction activities will generate recyclable materials, construction and sanitary waste.	Construction waste will be properly stored on-site prior to disposal. Disposal will occur at local registered facilities. Food wastes will be maintained separately from construction wastes and stored in wildlife proof containers. All sanitary waste will be contained and haled off-site by a designated hauler. Hazardous materials will be properly and securely stored in appropriate containers with a secondary containment area. Reuse and recycling will occur wherever possible.
Archaeological Resources	Construction activities have the potential to find archaeological resources, including human remains, during construction activities.	Should human remains or artifacts be found, all work in the vicinity of the discovery will be halted. Notification will be sent to the OPP or local police and the district coroner should it human remains be found. Notification will be made to the Ministry of Tourism and Culture on all discoveries.
Spills	Spills as a result of mechanical malfunctions, releases from storage areas, failure in the storage equipment, improper handling techniques, and improper fuelling techniques may cause contamination of soils, surface water, and groundwater. Spills may also cause illness or mortality via uptake/ingestion by, or coating of, vegetation species or terrestrial and aquatic biota.	Spill clean-up procedure/emergency response plan to be created. Appropriate equipment (spill containment and clean-up supplies) and trained staff will be on site. Emergency contacts will be posted. Hazardous materials, fuels and lubricants will be stored in an impervious, protected lay down area which has 110% storage capacity for spills. Storage areas will be located 30 m away from any watercourse. Refuelling and equipment maintenance will occur at specific locations away from waterbodies. Equipment to be monitored for leaks. Spill will be cleaned up immediately and reported to the appropriate agencies. Portable toilets will be located at least 50 m from any watercourse and will be pumped by an approved hauler for disposal. ESC plan will be implemented (see Soils).

Appendix A

Site Plans





Legend

- Road
- Rail
- Trail
- Hydro Line
- Intermittent Watercourse
- Watercourse
- Project Area

(Project Area indicated shows perimeter only and not the specific lands planned to be used for the project)

- Parcel
- Waterbody
- Unevaluated Wetland
- Significant Wetland
- Wooded Area
- Regulated Provincial Park

Notes:
1. Base and environmental data downloaded from LIO with permission.
2. Spatial referencing UTM NAD83.
3. Parcel data obtained from Teranet.

0 1.25 2.5 5 Km

NORTH

1:175,000

Pattern Wind Energy Development Inc.

South Kent Wind Project

Project Location

HATCH™

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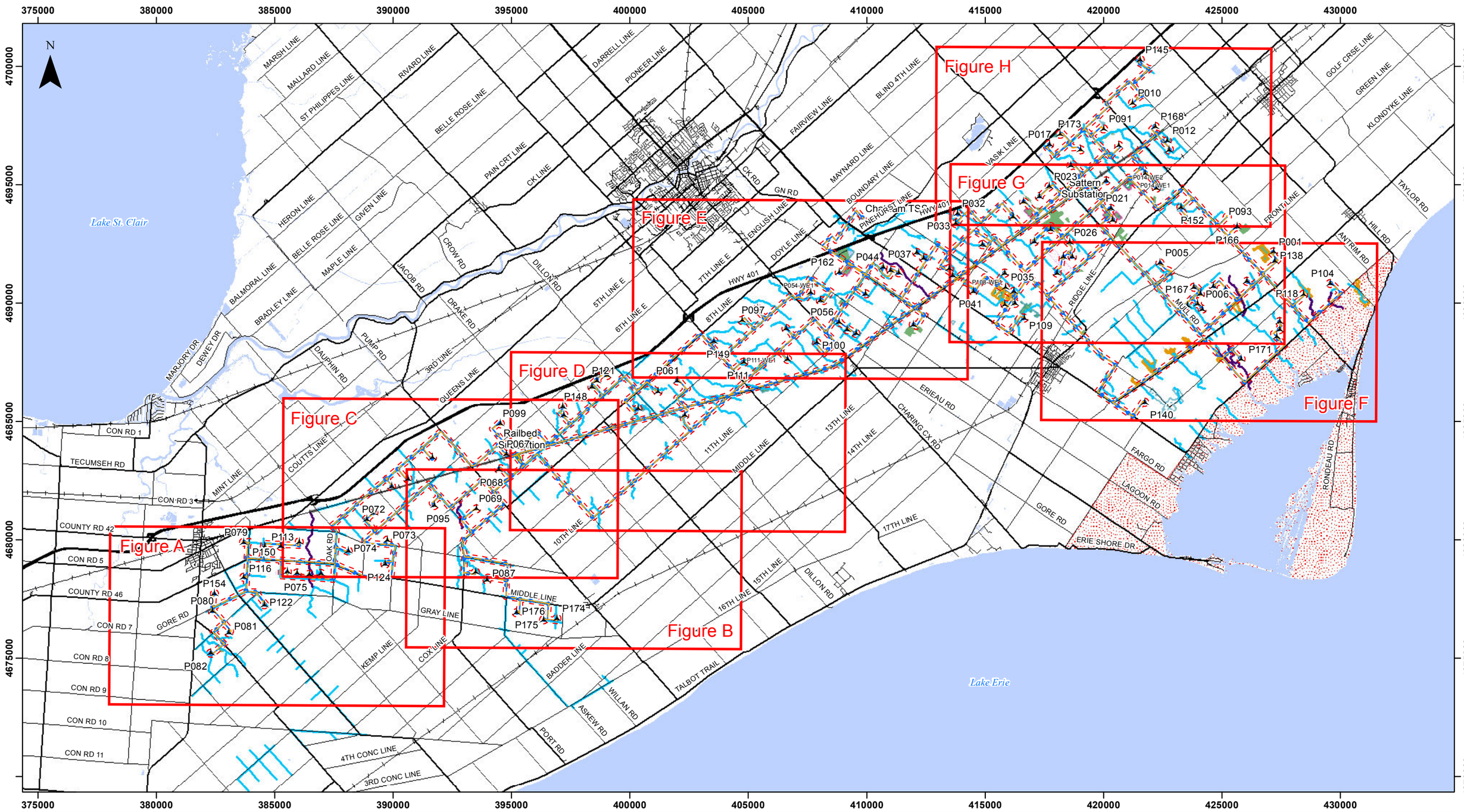

Figure A-H

South Kent Wind Project

Key Map

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 1 2 4 km

April 23, 2012
Project No: NRSI-1184
UTM Zone 17, NAD 83
Scale: 1:150,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Railway
- Highway
- Primary Road
- Secondary Road
- Watercourse (NRSI)
- Waterbody
- Wetland Area (NRSI)
- Woodland (NRSI)
- Important Bird Area

Seasonal Concentration Areas
- Bat Maternity Roost

Habitat of Species of Conservation Concern
- Open Country Bird Breeding Habitat
- Habitat for Species Ranked S1-S3
- Area Sensitive Bird Breeding Habitat

Animal Movement Corridor
- Vegetated Drain Corridor
- Railbed Corridor

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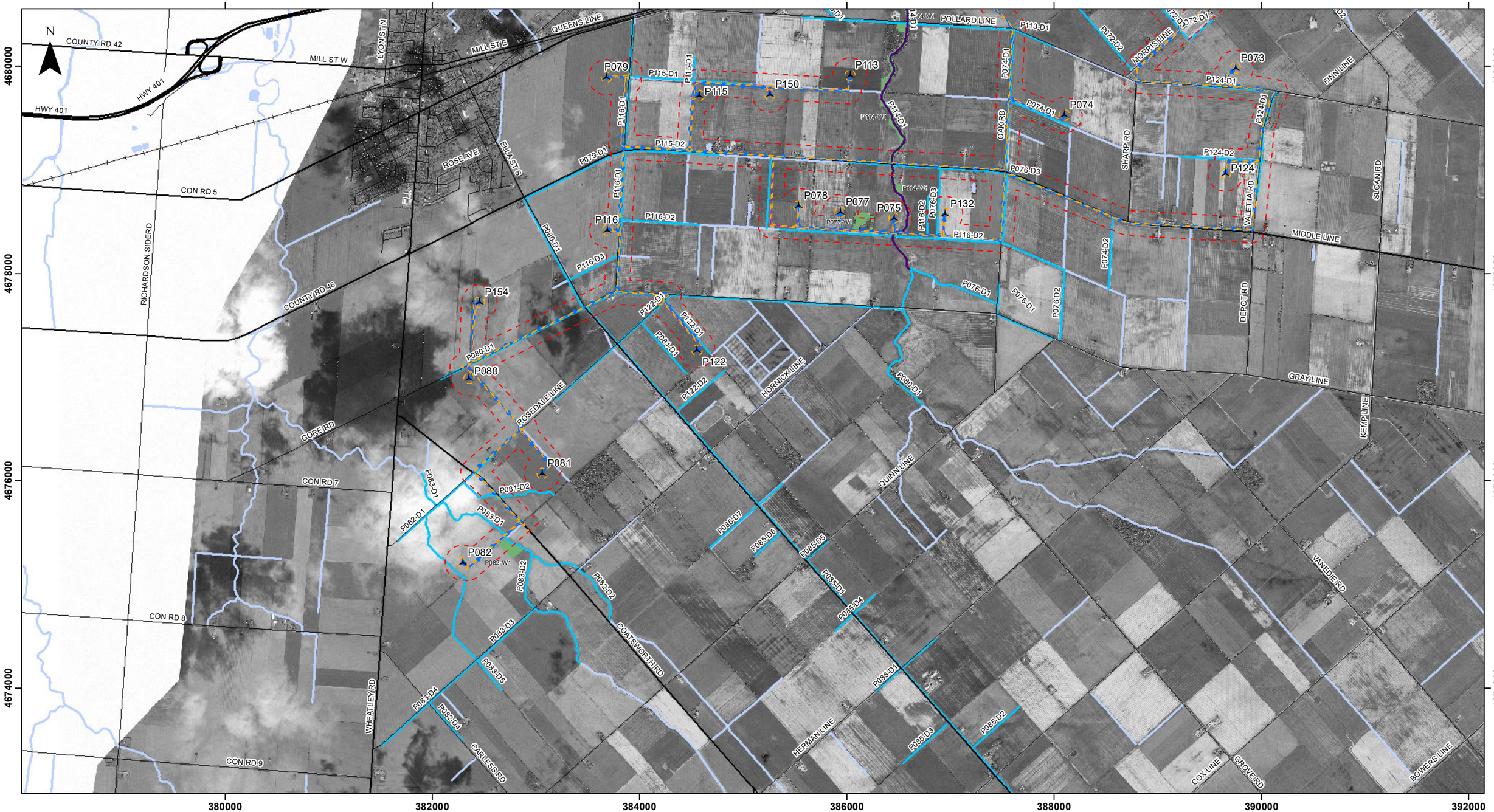

Figure A

South Kent Wind Project

Site Plan A

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 0.225 0.45 0.9 km

April 23, 2012
Project No: NRSI-1184
UTM Zone 17, NAD 83
Scale: 1:35,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Railway
- Highway
- Primary Road
- Secondary Road
- Watercourse (Permanent)
- Watercourse (NRSI)
- Waterbody
- Wetland Area (NRSI)
- Woodland (NRSI)
- Important Bird Area

Seasonal Concentration Areas
- Bat Maternity Roost

Habitat of Species of Conservation Concern
- Open Country Bird Breeding Habitat
- Habitat for Species Ranked S1-S3
- Area Sensitive Bird Breeding Habitat

Animal Movement Corridor
- Vegetated Drain Corridor
- Railbed Corridor

Path: X:\1184_ChathamKentWF\NRSI_1184_FigA-H_SigFeatureSitePlan_35k_2012_04_23_SWM.mxd

Figure B

South Kent Wind Project

Site Plan B

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 0.225 0.45 0.9 km

April 23, 2012
Project No: NRSI-1184
UTM Zone 17, NAD 83
Scale: 1:35,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Railway
- Highway
- Primary Road
- Secondary Road
- Watercourse (Permanent)
- Watercourse (NRSI)
- Waterbody
- Wetland Area (NRSI)
- Woodland (NRSI)
- Important Bird Area

Seasonal Concentration Areas
- Bat Maternity Roost

Habitat of Species of Conservation Concern
- Open Country Bird Breeding Habitat
- Habitat for Species Ranked S1-S3
- Area Sensitive Bird Breeding Habitat

Animal Movement Corridor
- Vegetated Drain Corridor
- Railbed Corridor

Path: X:\1184_ChathamKentWF\NRSI_1184_FigA-H_SigFeatureSitePlan_35k_2012_04_23_SWM.mxd

386000 388000 390000 392000 394000 396000 398000

4684000 4682000 4680000

N

MINT LINE
BAERT RD
MCDOUGALL LINE
5TH LINE W
HWY 401
DRAKE RD
A.D. SHADD RD
COUTTS LINE
SINCLAIR RD
GLEESON LINE
HWY 401
JEANNETTES CK RD
QUEENS LINE
MCKINLAY RD
POLLARD LINE
MORRIS LINE
SLOAN RD
FINN LINE
PORT RD
GIRARD LINE
COOPER RD
SWANTON LINE
10TH LINE
OAK RD
SHARP RD
MIDDLE LINE
VALETTA RD
HOY LINE
4TH LINE
MERLIN RD
7TH LINE W
5TH LINE
NINTH LINE
WELLWOOD RD
IRWIN RD

P148 P064 P099 P066 Railbed Substation P067 P068 P161 P126 P125 P095 P069 P071 P072 P073 P074 P124 P113 P078 P077 P075 P132 P070

RB-A6 RB-F3 RB-D1

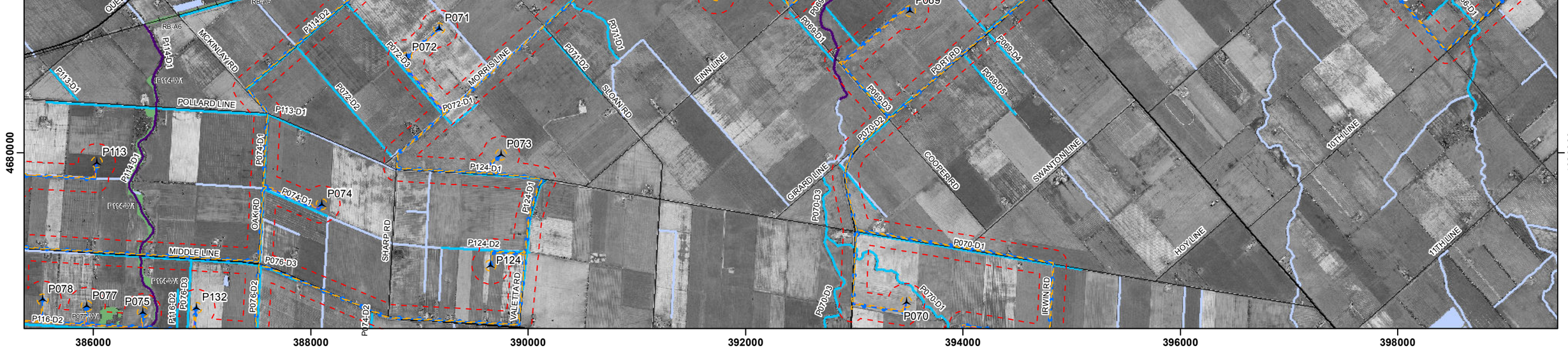

Figure C

South Kent Wind Project

Site Plan C

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 0.225 0.45 0.9 km

April 23, 2012
Project No: NRSI-1184
UTM Zone 17, NAD 83
Scale: 1:35,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Railway
- Highway
- Primary Road
- Secondary Road
- Watercourse (Permanent)
- Watercourse (NRSI)
- Waterbody
- Wetland Area (NRSI)
- Woodland (NRSI)
- Important Bird Area

Seasonal Concentration Areas
- Bat Maternity Roost

Habitat of Species of Conservation Concern
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- Area Sensitive Bird Breeding Habitat

Animal Movement Corridor
- Vegetated Drain Corridor
- Railbed Corridor

Path: X:\1184_ChathamKentWF\NRSI_1184_FigA-H_SigFeatureSitePlan_35k_2012_04_23_SWM.mxd

396000 398000 400000 402000 404000 406000 408000

4686000 4684000 4682000

N

5TH LINE E, CTY RD, 6TH LINE E, HWY 401, P062, P121, P063, P129-D2, P129-D1, P062-D1, P063-D1, P063-D2, 7TH LINE W, P099-D1, DILLON RD, P065-D1, P098, P061, P061-D3, P061-D2, P061-D1, P094-D5, P094-D2, P065-D2, P065-D3, P094-D3, P065, P065-V2, P094, RB-F2, P094-D6, P094-D1, P065-V1, RB-A5, P148, P064-D3, P064, P064-D2, P064-D1, P064-D1/P064-D2, RB-F3, P066, Railbed Substation, 6TH LINE W, DRAKE RD, AD SHADD RD, P111-D1, P111-V2, P111-D2, P111-V1, P060, P060-D1, P100-D1, RB-B4, P100-D2, RB-A3, BLOOMFIELD RD, P111-D6, P111-D7, P117-D2, P117-V1, RB-A4, RB-F1, P100-D1/P100-D2, 11TH LINE, MIDDLE LINE, 10TH LINE, P094-D9, P065-D3, 8TH LINE, P068-D4, P068-D3, P068-D2, P066-D2, WELLWOOD RD, P066-D1, NINTH LINE, MERLIN RD, DRAKE RD, AD SHADD RD, 4 ROD RD, 13TH LINE, 14TH LINE, 15TH LINE

396000 398000 400000 402000 404000 406000 408000

Figure D

South Kent Wind Project

Site Plan D

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 0.225 0.45 0.9 km

April 23, 2012
Project No: NRSI-1184
UTM Zone 17, NAD 83
Scale: 1:35,000 (at 11x17")

Legend

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- Bat Maternity Roost

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Animal Movement Corridor
- Vegetated Drain Corridor
- Railbed Corridor

Path: X:\1184_ChathamKentWF\NRSI_1184_FigA-H_SigFeatureSitePlan_35k_2012_04_23_SWM.mxd

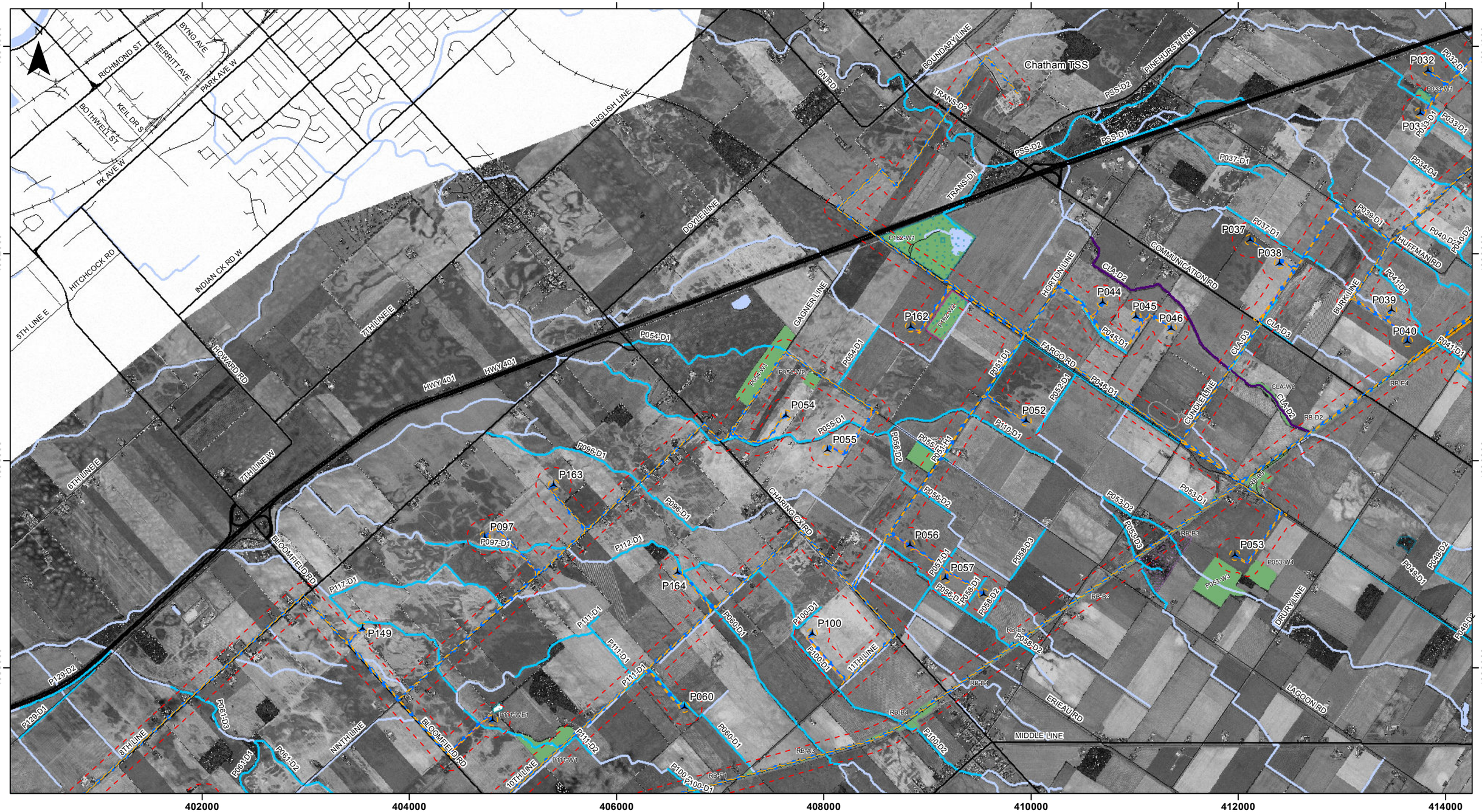

Figure E

South Kent Wind Project

Site Plan E

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 0.225 0.45 0.9 km

April 23, 2012
Project No: NRSI-1184
UTM Zone 17, NAD 83
Scale: 1:35,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
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- Secondary Road
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- Waterbody
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- Woodland (NRSI)
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- Bat Maternity Roost

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- Habitat for Species Ranked S1-S3
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Animal Movement Corridor
- Vegetated Drain Corridor
- Railbed Corridor

Path: X:\1184_ChathamKentWF\NRSI_1184_FigA-H_SigFeatureSitePlan_35k_2012_04_23_SWM.mxd

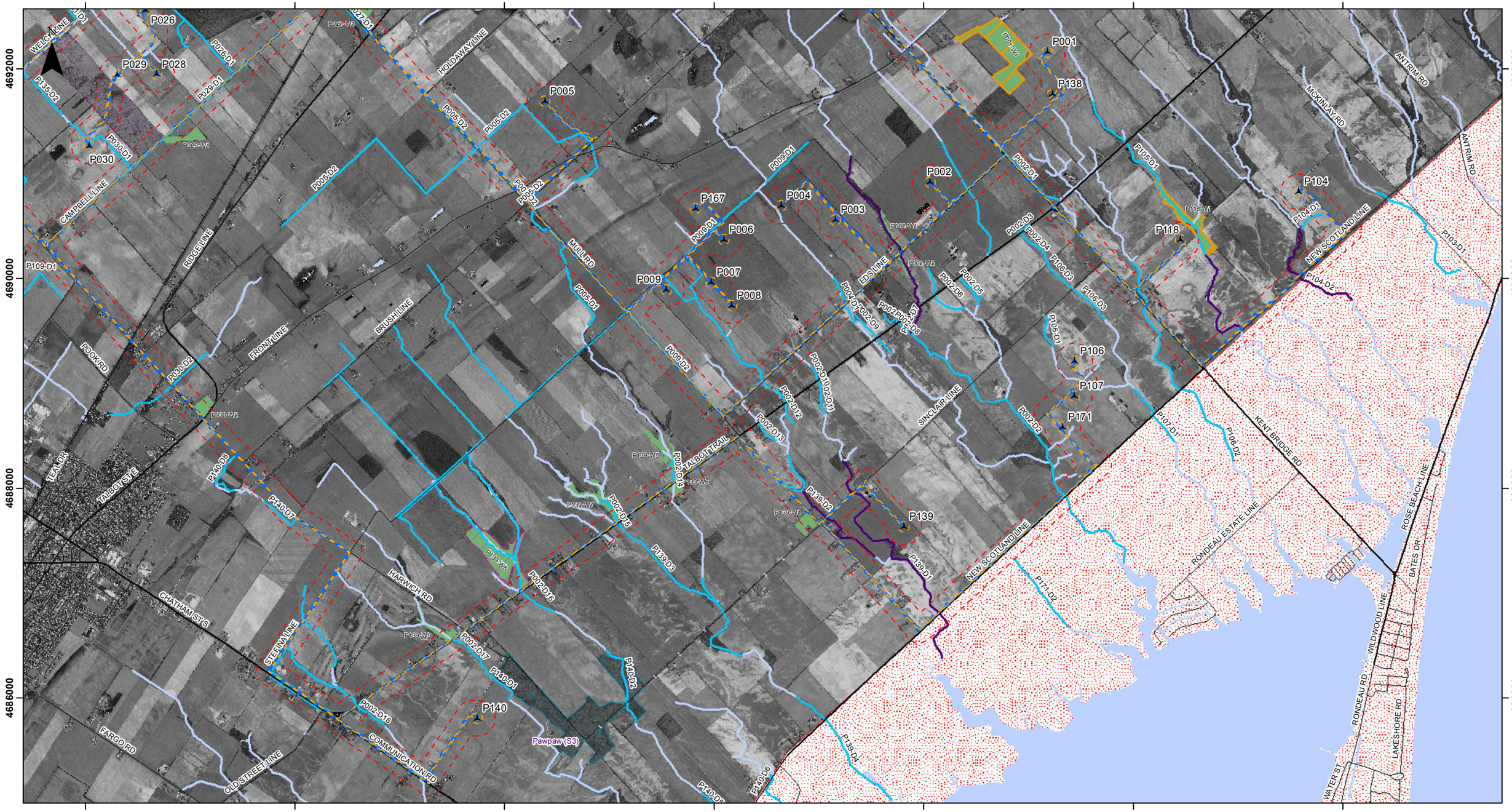

Figure F

South Kent Wind Project

Site Plan F

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 0.225 0.45 0.9 km

April 23, 2012
Project No: NRSI-1184
UTM Zone 17, NAD 83
Scale: 1:35,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
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- Highway
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- Bat Maternity Roost

Habitat of Species of Conservation Concern
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Animal Movement Corridor
- Vegetated Drain Corridor
- Railbed Corridor

Path: X:\1184_ChathamKentWF\NRSI_1184_FigA-H_SigFeatureSitePlan_35k_2012_04_23_SWM.mxd

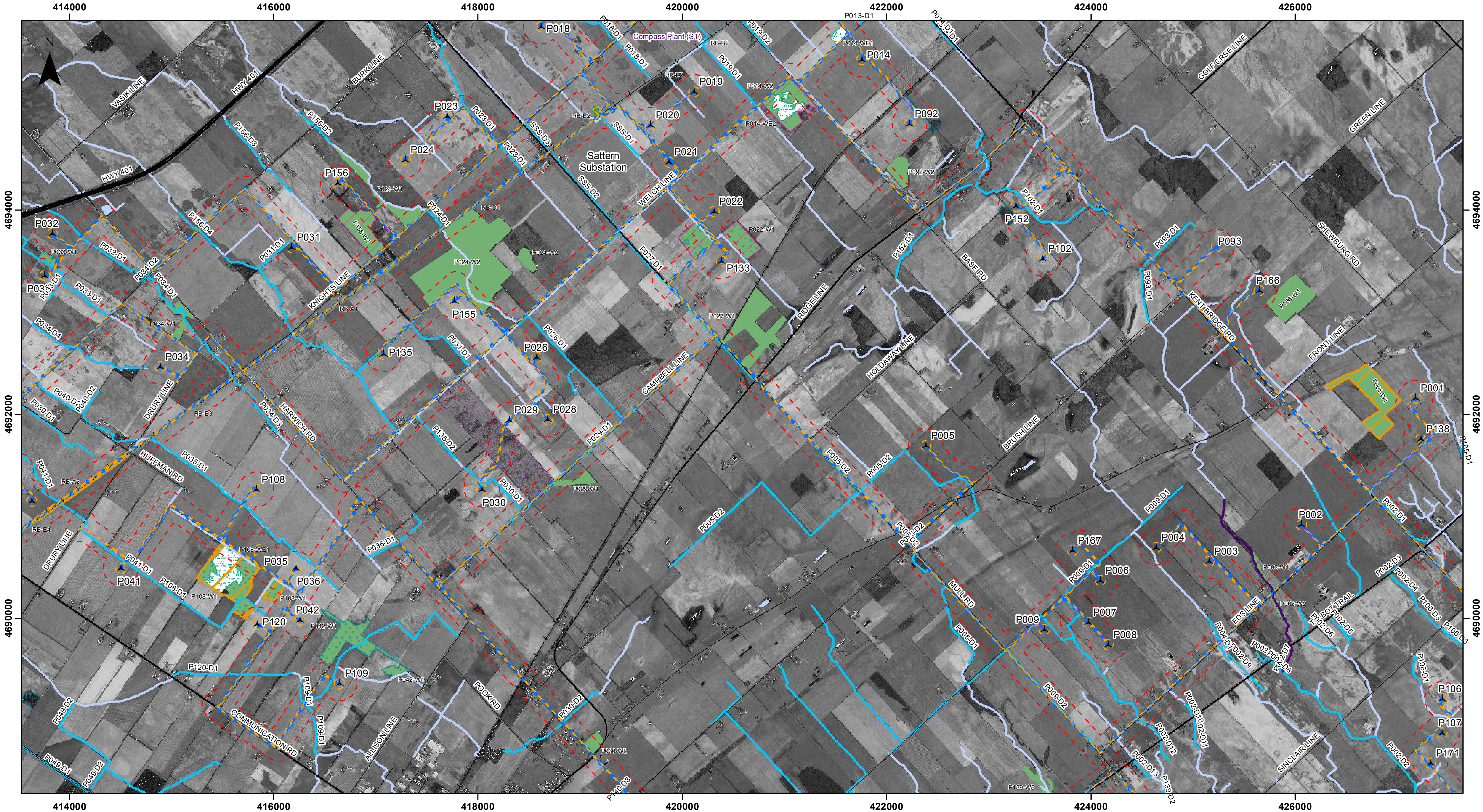

Figure G

South Kent Wind Project

Site Plan G

Natural Resource Solutions Inc.
Aquatic, Terrestrial and Wetland Biologists

0 0.225 0.45 0.9 km

April 23, 2012
Project No: NRSI-1184
UTM Zone 17, NAD 83
Scale: 1:35,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
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- Substation
- Cabling
- Access Road
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- Highway
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- Watercourse (NRSI)
- Waterbody
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Seasonal Concentration Areas

- Bat Maternity Roost

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- Open Country Bird Breeding Habitat
- Habitat for Species Ranked S1-S3
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Animal Movement Corridor

- Vegetated Drain Corridor
- Railbed Corridor

Path: X:\1184_ChathamKentWF\NRSI_1184_FigA-H_SigFeatureSitePlan_35k_2012_04_23_SWM.mxd

414000 416000 418000 420000 422000 424000 426000

4700000 4698000 4696000 4694000

N

MAYNARD LINE
BOUNDARY LINE
MCKAYS LINE
MCLARTY LINE
HOWARD RD
BEECHWOOD LINE
COLBY RD
GOSNELL LINE
VICTORIA AVE
SCANE RD
ONEILL LINE
W ST
MAIN ST W
TOMEKRD
KENTBRIDGE RD
MITTON LINE
MULL RD
LAKEVIEW DR
PINEHURST LINE
SHEWBURG RD
RIDGE LINE
VASIK LINE
HWY 401
BURK LINE
KNIGHTS LINE
HARWICH RD
GOLF CRSE LINE
GREEN LINE
WELCH LINE
BASE RD
Sattern Substation
Compass Plant (S1)

P145 P145-D1
P010 P010-D1
P168 P168-W1 P168-D2
P091 P091-W2 P013-D2
P173 P173-W1 P016-D2
P017 P018-D1
P016 P016-D1
P013 P013-D1 P013-D3 P013-D2
P012 P101-D1
P101
P011-D1
P018 P018-D1
P014 P014-W1 P014-W2 P014-WE1 P014-WE2 P019-D1
P019
P020
P023 P023-D1
P024 P024-W1 P024-W2 P024-D1
P156 P156-D1 P156-D2 P156-D3 P156-D4
P021
P022 P022-W1
P027-D1 P027-W1
P133
P092 P092-W1 P092-W2
P152 P152-D1 P102-D1
P102
P093 P093-D1
P165-W1
P032 P032-D1 P032-W1
P033 P033-D1
P034-D1 P034-D2
P031 P031-D1
P156-W1
RB-A1 RB-B1 RB-B2 RB-C1 RB-D1 RB-E1 RB-E2
SSS-D1 SSS-D2 SSS-D3

0 0.225 0.45 0.9 km

April 23, 2012
Project No: NRSI-1184
UTM Zone 17, NAD 83
Scale: 1:35,000 (at 11x17")

Figure H

South Kent Wind Project

Site Plan H

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Legend

- Project Area (April, 2012)
- Constructible Area
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- Substation
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Path: X:\1184_ChathamKentWF\NRSI_1184_FigA-H_SigFeatureSitePlan_35k_2012_04_23_SWM.mxd

Appendix B

Transport of Equipment and Materials

Transport of Equipment and Materials

Task	Description	Number of Loads
Mobilization and Offices	Office and Storage Set up.	50
Large Equipment Deliveries	Excavators	60
	Loaders	60
	Graders	30
	80 Ton Cranes	60
	300 Ton Cranes	180
	1600 Ton cranes	1500
Access Road Materials	Granular A &B	1400
Crane Pad and Erection Area	Excavation	200
	Backfill	430
Foundation	Engineering Fill	550
	Mud Slab	550
	Concrete footing	3000
	Concrete Pumps	50
	Formwork	50
	Steel Reinforcement 2 loads per footing	252
	Anchor bolts and adaptor	120
Wind Turbines	16 truck loads for each tower	2000
Cable and Trenching	Cable reel delivery	200
	Trenching equipment transport	10
	Directional drilling equipment transport	10
Electrical Misc	Major Equipment Deliveries	20
	HONI line work deliveries	32
General Delivery Not Elsewhere Listed	Assume 2 delivery per week for the construction duration	144

Note: It is intended to minimize the movement of excavated soils. The general philosophy is to spread excavated soils around the turbine base area after construction.

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