ONTARIO ENERGY BOARD

IN THE MATTER OF the *Ontario Energy Board Act, 1998*, S.O. 1998, c. 15 (Sched. B);

AND IN THE MATTER OF an application by Suncor Energy Products Inc. for an Order or Orders pursuant to Section 92 of the *Ontario Energy Board Act, 1998* (as amended) granting leave to construct transmission facilities in the Municipality of Lambton Shores, Lambton County, Ontario.

APPLICATION FOR LEAVE TO CONSTRUCT

SUNCOR ENERGY PRODUCTS INC.

January 21, 2014

EXHIBIT LIST

Exhibit A

EXHIBIT LIST

Exh.	Tab	Sch.	Title
A - INDEX			
A	1	1	Exhibit List
B - APPLICATION			
B	1	1	Application
		2	Procedural Orders, Correspondence and Notices
	2	1	Summary of the Application
		2	Description of the Applicant
		3	Project Location
		4	Maps
		5	Drawings and Illustrations
	3	1	Need for the Project
	4	1	Transmission Alternatives Considered
C- PROJECT PLANNING			
C	1	1	Construction and In-Service Schedule
D - PROJECT DETAILS			
D	1	1	Physical Design Features
E - DESIGN SPECIFICATIONS AND OPERATIONAL DATA			
E	1	1	Operational Details

	2	1	Codes, Standards and Other Regulatory Approvals
F - LAND MATTERS			
F	1	1	Land Matters
	2	1	Forms of Land Agreements
G - COMMUNITY AND STAKEHOLDER CONSULTATION			
G	1	1	Community and Stakeholder Consultation
H - IMPACT ASSESSMENTS			
H	1	1	Overview of Impact Assessments
	2	1	System Impact Assessment
	3	1	Customer Impact Assessment

EXHIBIT B - APPLICATION

ONTARIO ENERGY BOARD

IN THE MATTER OF the *Ontario Energy Board Act, 1998*, S.O. 1998, c. 15 (Sched. B);

AND IN THE MATTER OF an application by Suncor Energy Products Inc. for an Order or Orders pursuant to Section 92 of the *Ontario Energy Board Act, 1998* (as amended) (the "**Act**") granting leave to construct transmission facilities in the Municipality of Lambton Shores, Lambton County, Ontario.

APPLICATION

1. Suncor Energy Products Inc., a company incorporated under the laws of Ontario ("**Suncor**" or the "**Applicant**") is applying for leave to construct Transmission Facilities that will enable Suncor to convey electricity to the Independent Electricity System Operator ("**IESO**") controlled grid from its proposed Cedar Point II Wind Energy Project ("**Cedar Point Project**").

2. Suncor is a wholly-owned subsidiary of Suncor Energy Inc., which is a leading Canadian energy company.

3. Suncor is a leading renewable energy developer in Canada. It owns and operates six wind generation facilities in Ontario, Alberta and Saskatchewan, with total capacity of 255 MW. Two of these facilities are in Ontario, the Kent Wind Power Project and the Ripley Wind Power Project. Suncor is also developing several other wind energy generation facilities in Ontario, two of which, Cedar Point and the Adelaide Wind Power Project, have received FIT contracts.

4. Suncor is developing the 100 MW Cedar Point Project, pursuant to a FIT contract issued in July 2011 (FIT Contract F-002175-WIN-130-601). The wind turbines and the related transmission facilities are located in the Town of Plympton-Wyoming, Warwick Township, and Municipality of Lambton Shores, all in Lambton County.

5. Suncor hereby applies to the Ontario Energy Board (the "**Board**") pursuant to Section 92 of the *Ontario Energy Board Act, 1998* (the "**Act**") for an order or orders granting leave to construct the following transmission and interconnection facilities:

(a) a collector/transformer station located on Parcel PIN 430310087, Partial Lot 8 Concession 16 Township of Bosanquet, in the Municipality of Lambton Shores, at which power from the 34.5 kV collection system, which gathers the electricity from Cedar Point wind turbines will be stepped up from 34.5 kV to 115 kV for the power transfer to the transmission line (the "**Transformer Station**");

(b) an approximately 15 km single circuit 115 kV transmission line (the "**Transmission Line**"), connecting the Transformer Station with a station to be built as part of NextEra's Jericho Wind Energy Centre (the "**Jericho Substation**" or "**Substation**"), the subject of an application before the Board (EB-2013-0361). The Transmission Line will connect to the high voltage side of the Substation through a 115 kV circuit breaker and related equipment, located within the Substation.

6. The Suncor facilities described in paragraph 6 are collectively referred to in this Application as the "**Proposed Transmission Facilities**".

7. Suncor further requests the approval of the Board pursuant to Section 97 of the Act for the forms of land agreements included in Exhibit F, Tab 2, Schedule 1.

8. Suncor also requests the approval of the Board pursuant to Section 101 of the Act or pursuant to the Board's powers under Section 92 of the Act for authority to construct portions of the Proposed Transmission Facilities upon, under or over a highway, utility line or ditch.

9. Suncor requires the Proposed Transmission Facilities to connect the Cedar Point Project to the IESO-controlled grid. The Proposed Transmission Facilities, together with Suncor's contractual arrangements with NextEra and its affiliates described below, will enable Suncor to supply renewable energy to the IESO-controlled grid, consistent with its obligations under the FIT contract, the objectives of the FIT Program and the renewable energy policies of the Province of Ontario.

10. Suncor will connect the Cedar Point Project to the IESO-controlled grid via the Substation. The electricity produced from the Cedar Point Project will be conveyed to the IESO-controlled grid through the Jericho Substation. The Substation, together with the Jericho Shared Transmission Facilities (the "**Jericho Facilities**"), are the subject of a section 92 application by NextEra Energy Canada, through its wholly-owned subsidiary, Jericho Wind Inc., now before the Board (the "**Jericho Application**"); EB-2013-0361. From the Jericho Substation, the electricity will be conveyed via the Jericho Facilities to the NextEra-owned Bornish TS Switching Station and then through the Shared Transmission Facilities to the Hydro One grid. The Shared Transmission Facilities are described in the Bornish Wind L.P. Kenwood Wind Inc., and Jericho Wind Inc. (all NextEra subsidiaries) Application for Leave to Construct Transmission Facilities (EB-2013-0040), which was approved by the Board on November 12 (the "**Bornish Application**"). A schematic diagram of the pathway from the Cedar Point Collection

Station to the Hydro One grid can be found at Exhibit B, Tab 2, Schedule 5 of the Application. The point of interconnection between the Cedar Point Transmission Line and the Jericho Substation is also shown and noted in the single line diagram in the Jericho Application at Exhibit B, Tab 2, Schedule 5, and discussed at Exhibit D, Tab 1, Schedule 1, page 4 of that Application. The possibility of Suncor utilizing the Shared Transmission Facilities is noted in the Bornish Application (EB-2013-0040), and the impacts of its doing so were considered and approved in the Addendum to the Customer Impact Assessment and the System Impact Assessment, included in that Application.

11. In order to secure this pathway to the Hydro One grid, Suncor has obtained an option from NextEra to interconnect with, and to utilize as licensee, the Jericho Substation, Jericho Shared Transmission Line, and the Shared Transmission Facilities. These arrangements will provide Suncor with capacity on those facilities sufficient to convey the electricity from the Cedar Point Project to the IESO-controlled grid for the term of the FIT Contract. Suncor plans to exercise that option once it has received the required approvals for its project.

12. As noted in the Bornish Application (EB-2013-0040), to accommodate the connection of the Shared Transmission Facilities to the IESO-controlled grid, Hydro One Networks Inc. ("**Hydro One**") will construct, own and operate a 500 kV switching station located on Part Lot 18, Concession 17 in the Municipality of North Middlesex (the "**Evergreen Switching Station**" or "**Evergreen SS**"), through which power from the Shared Transmission Facilities will be conveyed to Hydro One's existing 500 kV circuit B562L at a point that is adjacent to the Evergreen SS and approximately 36.5 km from Longwood TS.

13. Suncor proposes to locate the Transformer Station on privately owned lands. To this end, Suncor has secured the necessary private land rights for the proposed station.

14. Suncor will locate the entire Transmission Line on privately owned lands. Suncor has signed options to lease the required land from each landowner from whom it requires such rights.

15. Suncor received a final System Impact Assessment ("**SIA**") Report from the IESO in the form of an SIA Addendum Report on December 12, 2012 for the Cedar Point Project. The SIA Report was issued an addendum to the SIA issued for the Shared Transmission Facilities in the Bornish Application. The addendum report concludes that the proposed inclusion of the Cedar Point project in the "cluster" of generation projects is expected to have no material adverse impacts on the reliability of the integrated power system. The IESO therefore recommended that a Notification of Conditional Approval for Connection be issued. The Notification was issued to Suncor concurrently with SIA Addendum Report.

16. Suncor received a final Customer Impact Assessment ("**CIA**") Report "Addendum, Wind Energy Power Project, Adelaide/Bornish/Jericho Wind Energy Centres" on June 8, 2012

from Hydro One in respect of the Proposed Transmission Facilities. This report concludes that electricity from the Cedar Point generation facilities can be conveyed to the IESO-controlled grid through the proposed Transmission Facilities and the Shared Transmission Facilities without adverse impacts on area customers. The CIA Report was issued in the form of an Addendum to the previously issued (in the Bornish Application) Customer Impact Assessment for the Shared Transmission Facilities.

17. The Cedar Point Project is subject to the requirements of the Renewable Energy Approval ("**REA**") process set out in Ontario Regulation 359/09 to the *Environmental Protection Act*. The final REA package was submitted by Suncor to the Ministry of the Environment on April 16, 2013. The application was deemed complete on December 5, 2013. Based on the Ministry's six-month service guarantee, Suncor anticipates that the REA will be issued in the second quarter of 2014.

18. Suncor has carried out a comprehensive stakeholder consultation program as part of the REA process. Throughout these consultations, Suncor has provided notices and information to potentially interested stakeholders, including the public, affected landowners, municipalities, and aboriginal communities, and held public meetings at which Suncor received feedback and information from stakeholders. Suncor has taken this input into consideration in planning and designing the Proposed Transmission Facilities.

19. Subject to receipt of the REA approval, as well as other necessary permits and approvals, Suncor plans to commence construction of the Proposed Transmission Facilities in September 2014. Construction is expected to take approximately seven months to complete. The Proposed Transmission Facilities would then be commissioned and be placed in service in May 2015.

20. Since the cost of the Proposed Transmission Facilities will be borne by Suncor, the Proposed Transmission Facilities will not affect electricity transmission rates in Ontario.

21. The evidence in support of this Application has been prepared in accordance with the requirements set out in Chapter 4 of the Board's *Minimum Filing Requirements for Transmission and Distribution Rate Applications and Leave to Construct Projects*, as amended May 17, 2012.

22. Suncor requests that copies of all documents filed with or issued by the Board in connection with this Application be served on Suncor and Suncor's counsel as follows:

(a) Suncor:
Suncor Energy Products Inc.
P.O. Box 38
112-4th Avenue S.W.
Calgary, Alberta
T2P 2V5

Attention: Mr. Chris Brett
Tel: (403) 296-7125
Fax: (403) 724-3626
Email: chbrett@suncor.com

(b) Suncor's Counsel:
Fogler, Rubinoff LLP
P.O. Box 95
3000-77 King Street West
Toronto, Ontario
M5K 1G8
Attention: Mr. Tom Brett
Tel: (416) 941-8861
Fax: (416) 941-8852
Email: tbrett@foglers.com

23. Additional written evidence, as required, may be filed in support of this Application, which may be amended from time to time prior to the Board's final decision.

24. Suncor requests that the Board proceed by way of written hearing, pursuant to Section 34.01 of the Board's *Rules of Practice and Procedure*.

Dated at Toronto, Ontario, this 21st day of January, 2014.

SUNCOR ENERGY PRODUCTS INC.
By their counsel, Fogler, Rubinoff LLP

Tom Brett

Exhibit B, Tab 1, Schedule 2
Procedural Orders, Correspondence, and Notices

PROCEDURAL ORDERS, CORRESPONDENCE & NOTICES

This tab is provided as a placeholder for any Procedural Orders, correspondence and notices that may be filed in connection with the Application

Exhibit B, Tab 2, Schedule 1
Summary of the Application

SUMMARY OF THE APPLICATION

1. The Applicant

Suncor Energy Products Inc. ("**Suncor**") is the owner of the project. Suncor is applying for leave to construct the Proposed Transmission Facilities that will enable Suncor to convey electricity from its proposed Cedar Point Project to the Independent Electricity System Operator ("**IESO**") controlled grid. It will do this by conveying the electricity to the Jericho Substation, from which it will be conveyed through the Jericho Shared Transmission Line and NextEra's Shared Transmission Facilities to the IESO-controlled grid. NextEra's Bornish Application, which described the Shared Transmission Facilities, was recently approved by the Board (EB-2013-0040). NextEra's Jericho Wind, Inc.'s Application (EB-2013-0361), which seeks approval for, inter alia, the Jericho Substation and the Jericho Shared Transmission Facilities, which will connect the Jericho generation facilities to NextEra's Shared Transmission Facilities is currently before the Board. A line diagram, showing the locations of the Cedar Point Project, the Jericho Project, and the facilities that are the subject of the Bornish Application, can be found at Attachment 1.

2. Approvals Sought

In the Application, Suncor is applying to the Ontario Energy Board (the "**Board**") pursuant to Section 92 of the *Ontario Energy Board Act, 1998* (the "**Act**") for an order or orders granting leave to construct the following transmission and interconnection facilities:

(a) a Transformer Station, located on Parcel PIN 430310087 Partial Lot 8 Concession 16 Township of Bosanquet, in the Municipality of Lambton Shores, Lambton County, at which power from the 34.5 kV collection system, which gathers the electricity from Cedar Point Project will be stepped up from 34.5 kV to 115 kV for the power transfer to the Transmission Line;

(b) approximately 15 km single circuit 115 kV Transmission Line, connecting the Transformer Station to the high voltage side of the Jericho Station;

(c) approval of the Board pursuant to Section 97 of the Act for the forms of land agreements included in Exhibit F, Tab 2, Schedule 1;

(d) approval of the Board either pursuant to Section 101 of the Act or pursuant to the Board's powers under Section 92 of the Act for authority to construct portions of the Proposed Transmission Facilities upon, under or over a highway, utility line or ditch, as further described in Exhibit F, Tab 1, Schedule 1.

3. Suncor is an indirect subsidiary of Suncor Energy Inc., a leading Canadian energy company.

Suncor is developing the Cedar Point Project, located approximately 20 miles northeast of Sarnia. Suncor has been developing this project since 2006. The project will consist of up to 46 wind turbines, with up to 100 MW capacity, electrical collection stations, meteorological towers, access roads, temporary construction facilities, the Transformer Station, and the Transmission Line.

The Transformer Station and the Transmission Line are the subject of this application. These facilities are collectively referred to as the Proposed Transmission Facilities.

4. Need for the Project

In July 2011, the OPA awarded Suncor a contract under the FIT Program in respect of the Cedar Point Project for 100 MW of electricity (FIT Contract F-002175-WIN-130-601). The Proposed Transmission Facilities are needed to enable electricity to be conveyed from the Cedar Point Project to the IESO-controlled grid. The electricity will be conveyed to the Jericho Station, through the Jericho Shared Transmission Line and the Shared Transmission Facilities to the IESO Grid, as described above. Suncor has options to licence capacity on each of the Jericho Shared Transmission Facilities and the Shared Transmission Facilities for the term of the FIT Agreement. As the development of the projects promotes the use of renewable energy sources in a manner consistent with the policies of the Government of Ontario, Suncor's Proposed Transmission Facilities are in the public interest pursuant to paragraph 96(2)2 of the Act.

5. Description of the Project

The Cedar Point Project will consist of up to 46 Siemens SWT 2.3-113 MW wind turbine generators, for a total installed capacity of up to 100 MW, on privately-owned agricultural lots in the Town of Plympton-Wyoming, the Municipality of Lambton Shores and Warwick Township, all within Lambton County, Ontario.

Suncor has options to lease the properties on which it proposes to locate the Transmission Line. The Transmission line starts at Suncor Cedar Point Substation and runs north for approximately 425m. The line then travels East approximately 950m to Fuller road where it travels 200m North and then turns East, crosses Fuller Road and travels to the back lot line (approximately 1000m). The Transmission line then turns North and travels north along the back of several parcels (sometimes referred to herein as "**private lands**") for approximately 1000m, crossing Proof Line at approximately 1000m. After crossing Proofline the Line then turns East and travels along the edge of parcels for approximately 1000m to Rawlings Road where it turns North and travels along Rawlings Road for approximately 800m. The line turns East, crosses Rawlings Road and then continues East for approximately1400m. The Line turns North and crosses two parcels until Thompson Line where it turns East. The Transmission Line then travels east, on lots adjacent to and parallel to Thompson Line for approximately 2600m. At Army Camp Road the Transmission Line turns North along and travels parallel to Army Camp Road for 420m at which point it turns East and crosses Army Camp Road and continues along private lot boundaries for 2600m,

crossing Jericho Road at approximately 2000m. The Line then turns South for approximately 425m to Thompson Line where it turns East and travels parallel to Thompson Line on private land for approximately 375m where it turns South and crosses Thompson Line onto the parcel where the Jericho Substation is located. A map of the route is provided at Exhibit B, Tab 2, Schedule 4.

6. Community and Stakeholder Consultations

Suncor has carried out a thorough stakeholder consultation, primarily as part of the REA process. Suncor has consulted with the public, affected municipalities, potentially affected Aboriginal communities and relevant provincial and federal regulatory authorities. Suncor has provided notices and information to potentially interested stakeholders and held a number of public meetings at which Suncor received feedback and information from stakeholders. Suncor has taken this input into consideration in planning and designing the Proposed Transmission Facilities.

7. Construction and In-Service Schedule

Subject to receipt of the REA, as well as other necessary permits and approvals, the Applicants plan to commence construction of the Proposed Transmission Facilities in September 2014. Construction is expected to take approximately seven months to complete. The Proposed Transmission Facilities would be placed in-service in June 2015.

8. Impact Assessments

Suncor received a final System Impact Assessment ("**SIA**") Report, as an SIA Addendum Report on December 12, 2012 for the Cedar Point Project. This report concluded that the proposed connection of the Cedar Point Project to the shared transmission facilities, approved by the IESO in a SIA dated June 4, 2012, is expected to have no material adverse impacts on the reliability of the integrated power system. The IESO therefore recommended that a Notification of Conditional Approval for Connection be issued. The Notification was issued to Suncor concurrently with SIA Addendum Report. These reports are found at Exhibit H, Tab 2, Schedule 2.

Suncor received a final Customer Impact Assessment ("**CIA**") Report on June 8, 2012 from Hydro One in respect of the Proposed Transmission Facilities. This report concludes that electricity from the Cedar Point generation facilities can be conveyed to the IESO-controlled grid through the proposed Transmission Facilities and the Shared Transmission Facilities without adverse impacts on area customers. The CIA Report was issued in the form of an Addendum to the previously issued Customer Impact Assessment for the Shared Transmission Facilities. These reports are found at Exhibit H, Tab 3, Schedule 1.

8. Other Approvals

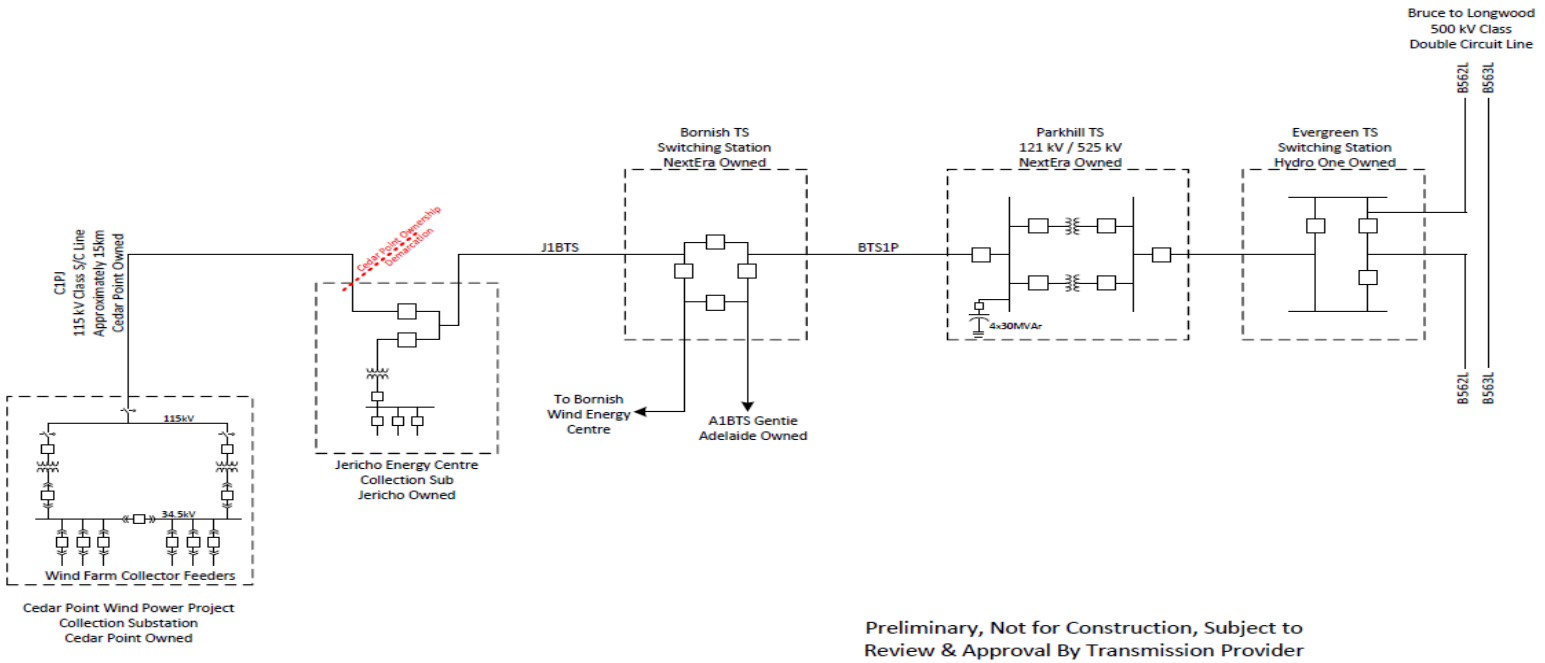
A list of all approvals required or potentially required for the Proposed Transmission Facilities is provided in Exhibit E, Tab 2, Schedule 1. Of particular note, Suncor filed its Renewable Energy Approval application with the Ministry of the Environment on April 16, 2013. The application was deemed complete on December 5, 2013. Based on the Ministry's six-month service guarantee, Suncor anticipates that the REA will be issued in the second quarter of 2014. The Renewable Energy Approval will include the Proposed Transmission Facilities.

9. Project Costs

The costs of the Proposed Transmission Facilities will be borne by Suncor and, as such, the Proposed Transmission Facilities will not affect electricity transmission rates in Ontario.

ATTACHMENT 1
Line Diagram

Cedar Point Wind Power Project (100MW)
Conceptual One Line Diagram



Preliminary, Not for Construction, Subject to
Review & Approval By Transmission Provider

Last Updated: 2013-12-19

Exhibit B, Tab 2, Schedule 2
Description of the Applicant

DESCRIPTION OF THE APPLICANT

Suncor Energy Products Inc. ("**Suncor**") is a corporation incorporated under the laws of Ontario and is a wholly-owned subsidiary of Suncor Energy Inc., a Canadian corporation.

Suncor develops, owns and operates renewable generation projects in Canada.

Exhibit B, Tab 2, Schedule 3
Project Location

PROJECT LOCATION

The Proposed Transmission Facilities are being developed to enable electricity from the Cedar Point Wind Project to be transmitted to the IESO-controlled grid. The discussion below is focused on the location of the Proposed Transmission Facilities. We also describe, for clarity, the locations of proposed facilities that will be located between the Cedar Point Project and the IESO-controlled grid, the Jericho Substation, the Jericho Shared Transmission Line, and the Shared Transmission Facilities. These facilities will be owned, constructed and operated by NextEra through its subsidiaries and related entities.

1. The Generation Projects

The Cedar Point Project is located in southwestern Ontario, approximately 20 miles northeast of Sarnia. The general location of the Proposed Transmission Facilities is presented in Figure 1 of Exhibit B, Tab 2, Schedule 4.

2. The Proposed Transmission Facilities

As noted above, the main components of the Proposed Transmission Facilities are the Transformer Station, and the Transmission Line.

(a) The Transformer Station

The Transformer Station will be located at Parcel PIN 430310087, Partial Lot 8 Concession 16 Township of Bosanquet in the Municipality of Lambton Shores, as shown in Figure 1 of Exhibit B, Tab 2, Schedule 4. The purpose of the Transformer Station is to collect the electricity from the wind turbines, and step-up the voltage of the 34.5 kV collector system to the 115 kV Transmission Line voltage. The Transformer Station will contain two transformers, each will have a nominal voltage rating of 115 kV/34.5 kV. Other standard ancillary equipment, including circuit breakers, buswork, outdoor switches, surge protectors, instrument transformers, protection and control equipment, and telecommunication equipment will also be installed at the site. The station will have an area of approximately 23,600 square meters.

(b) The Transmission Line

An approximately 15 km single circuit 115 kV transmission line (the "**Transmission Line**") will run from the Transformer Station to the Jericho Substation. The Transmission Line will connect to the high voltage side of that Substation.

As noted above, in addition to flowing through the Proposed Transmission Facilities for which Suncor is seeking approval in this Application, the electricity from the Cedar Point Project will flow through the Jericho Substation and the Jericho Shared Transmission Line, which will be owned by Jericho Wind Inc., a subsidiary of NextEra, for which a section 92 application was recently filed with the Board (EB-2013-0361). It will then flow through the Shared Transmission Facilities, jointly owned by three NextEra subsidiaries, and a step up transformer jointly owned by the same three entities (EB-2013-0040), to enter the Hydro One grid at the Evergreen Switching Station. NextEra's Shared Transmission Facilities application (the "Bornish Application") was recently approved by the Board (EB-2013-0040).

For convenience, Suncor has included in Attachment 1, two paragraphs from the Bornish Application (EB-2013-0040; Ex B, Tab 2, Sch 3, pp3-4), which describes the interconnection between the Shared Transmission Facilities and the Hydro One Transmission Line.

ATTACHMENT 1

Parkhill Customer Transformer Station

The Joint Transmission Facilities will connect to a 500 kV transformer station that will be located on Part Lot 18, Concession 17 in the Municipality of North Middlesex (the "**Parkhill Customer Transformer Station**" or "**Parkhill CTS**"), as shown in Figures 1 and 2(j) of Exhibit B, Tab 2, Schedule 4. Parkhill CTS will have an area of approximately 13 acres. At the Parkhill CTS, electricity transmitted from the Bornish CSS along the Transmission Line will be transformed from 115 kV to 500 kV by means of two 500/115 kV 135/180/225 MVA transformers. The Parkhill CTS will be jointly owned by the Co-owners (all subsidiaries of NextEra) as tenants in common. (our addition)

Hydro One Transmission Facilities

NextEra's Parkhill Customer Transformer Station will be connected to a new 500 kV switching station that will be constructed, owned and operated by Hydro One on Part Lot 18, Concession 17 in the Municipality of North Middlesex (the "**Evergreen Switching Station**" or "**Evergreen SS**"), as shown in Figures 1 and 2 (j) of Exhibit B, Tab 2, Schedule 4. The Evergreen SS will include a 500 kV 3-breaker ring bus that will split Hydro One's existing 500 12 kV circuit B562L from Bruce A TS to Longwood TS into two sections: Bruce A TS x Evergreen 13 SS and Evergreen SS x Longwood TS. This sectionalizing will occur approximately 36.5 km from Longwood TS, near tower #563 on Hydro One's existing circuit B562L. Evergreen SS will be located adjacent to the proposed Parkhill CTS and to Hydro One's existing transmission ROW for circuit B562L. The Evergreen Switching Station is ancillary to and does not form part of NextEra's Proposed Transmission Facilities.

Exhibit B, Tab 2, Schedule 4
Maps

MAPS

(1) General Project Location Maps.

(2) Proposed Transmission Facilities.

(3) Transmission Plan and Profile.

Cedar Point Interconnection Route

Legend

- Existing HONI Transmission Lines
- Suncor Transmission Lines
- NetEra Transmission Lines

SUNCOR ENERGY

N
W E
S

0 1 2 4
Kilometers

Date created: 1/9/2014
Scale: 1:60,000
Notes: Route information provided as general routing for informational purposeses only. Not exact and subject to change.

Path: R:\Ontario\ESTES\Cedar Point\Mapping\Arc\Map\140742CP_140707_InterconnectionRoute.mxd

Coordinate: NAD 1983 UTM Zone 17N
Projection: Transverse Mercator
Datum: North American 1983

Cedar Point Substation (Suncor Owned)

Jericho Substation (NextEra Owned)

Bornish Substation (NextEra Owned)

Park Hill Substation (NextEra Owned)

Evergreen Station (HONI Owned)

Adelaide Substation (NextEra Owned)

C1PJ

J1BTS

B1S1P

A1BTS

Cedar Point Interconnection Route

Route Tile 1

Legend

- Map Tiles
- Suncor Transmission Lines
- NetEra Transmission Lines
- Jericho Substation Area
- Cedar Point Substation

Suncor Turbine Locations

- Suncor Turbine Locations
- Suncor Project Lands
- Parcel Information
- Pin Fabric

SUNCOR ENERGY

N
W E
S

0 0.15 0.3 0.6

Kilometers

Date created: 1/9/2014
Scale: 1:8,000
Notes: Route information provided as general routing for informational purposeses only. Not exact and subject to change.

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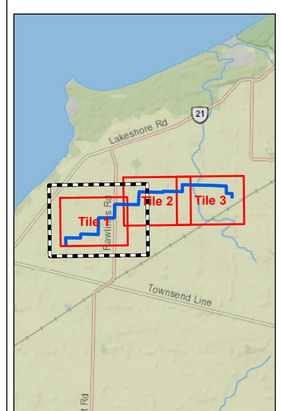
Projection: Transverse Mercator
Datum: North American 1983



WEST OF LAKE ROAD LOT 69
WEST OF LAKE ROAD LOT 70
WEST OF LAKE ROAD LOT 71
WEST OF LAKE ROAD LOT 72
EAST OF LAKE ROAD LOT 67
EAST OF LAKE ROAD LOT 68
EAST OF LAKE ROAD LOT 69
EAST OF LAKE ROAD LOT 70
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EAST OF LAKE ROAD LOT 72
EAST OF LAKE ROAD LOT 73
EAST OF LAKE ROAD LOT 74
EAST OF LAKE ROAD LOT 75
EAST OF LAKE ROAD LOT 76
EAST OF LAKE ROAD LOT 77
Lakeshore Rd
Thomson Line
Fuller Rd
Proof Line
Cedar Point Line
Rawlings Rd
21
CON 15 LOT 17
CON 14 LOT 17
CON 13 LOT 17
CON 13 LOT 18
CON 12 LOT 18
CON 12 LOT 17
CON 15 LOT 16
CON 14 LOT 16
CON 13 LOT 16
CON 12 LOT 16
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430320063
430320064
430320067
430320073
430320074
CP 7
CP 82
CP 10
CP 13
CP 14
CP 17
CP 19
CP 21
CP 22
CP 23
CP 24
CP 25
CP 15
Tile 1
Tile 2

Cedar Point Interconnection Route

Route Tile 2

Legend

- Map Tiles
- Suncor Transmission Lines
- NetEra Transmission Lines
- Jericho Substation Area
- Cedar Point Substation

Suncor Turbine Locations

- Suncor Turbine Locations
- Suncor Project Lands
- Parcel Information
- Pin Fabric

SUNCOR ENERGY

N W E S

0 0.15 0.3 0.6

Kilometers

Date created: 1/9/2014

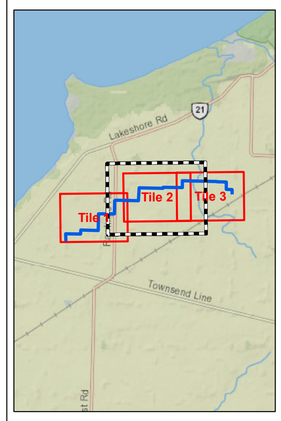
Scale: 1:8,000

Notes:

Route information provided as general routing for informational purposeses only.
Not exact and subject to change.

Path: R:\Ontario\GTES\Cedar Point\Mapping\Arcmap1401\CP_141107_interconnectionRoute_Tile2.mxd

Coordinate: NAD 1983 UTM Zone 17N
Projection: Transverse Mercator
Datum: North American 1983



EAST OF LAKE ROAD LOT 60
CON 13 LOT 20
CON 12 LOT 20
CON 11 LOT 20 430340095
CON 10 LOT 20 430340085
CON 9 LOT 20
CON 8 LOT 20
CON 14 LOT 19
CON 13 LOT 19
CON 12 LOT 19
CON 11 LOT 19 430340093
CON 10 LOT 19 430340086
CON 9 LOT 19
CON 8 LOT 19
CP 2
CON 14 LOT 18
CON 13 LOT 18
CON 12 LOT 18
CON 11 LOT 18 430340091
CON 10 LOT 18 430340087
CON 9 LOT 18
CON 8 LOT 18
CP 4
430350065
CON 14 LOT 17
CON 13 LOT 17
CON 12 LOT 17
CON 11 LOT 17 430340089
CON 10 LOT 17 430340088
CON 9 LOT 17
CON 8 LOT 17
CP 5
CON 14 LOT 16
CON 13 LOT 16
CON 12 LOT 16 430330086
CON 11 LOT 16 430420053
CON 10 LOT 16
CON 9 LOT 16
CON 8 LOT 16
CP 7
CP 6
CON 14 LOT 15 430330064
CON 13 LOT 15 430330077
CON 12 LOT 15 430330087
CON 11 LOT 15 430420055
CON 10 LOT 15
CON 9 LOT 15
CON 8 LOT 15
CP 82
Tile 2
Tile 3
CON 14 LOT 14 430330065
CON 13 LOT 14
CON 12 LOT 14
CON 11 LOT 14 430420056
CON 10 LOT 14
CON 9 LOT 14
CON 8 LOT 14
CP 8
430330066
CON 14 LOT 13
CON 13 LOT 13
CON 12 LOT 13
CON 11 LOT 13
CON 10 LOT 13
CON 9 LOT 13
CON 8 LOT 13
Tile 1
CON 14 LOT 12
CON 13 LOT 12
CON 12 LOT 12
CON 11 LOT 12
CON 10 LOT 12
CON 9 LOT 12
CON 8 LOT 12
430330070
CON 14 LOT 11
CON 13 LOT 11
CON 12 LOT 11
CON 11 LOT 11
CON 10 LOT 11
CON 9 LOT 11
CON 8 LOT 11
CON 14 LOT 10
CON 13 LOT 10
CON 12 LOT 10
CON 11 LOT 10 430420066
CON 10 LOT 10
CON 9 LOT 10
CON 8 LOT 10
CP 9
430330071
430330072
CON 13 LOT 9
Thomson Line
Proof Line
Ridge Rd
Army Camp Rd
Kinnaird Rd
Rawlings Rd
Shashawandan Creek
Kinnaird
21
31

Cedar Point Interconnection Route

Route Tile 3

Legend

- Map Tiles
- Suncor Transmission Lines
- NetEra Transmission Lines
- Jericho Substation Area
- Cedar Point Substation

Suncor Turbine Locations

- Suncor Turbine Locations
- Suncor Project Lands
- Parcel Information
- Pin Fabric

SUNCOR ENERGY

N
W E
S

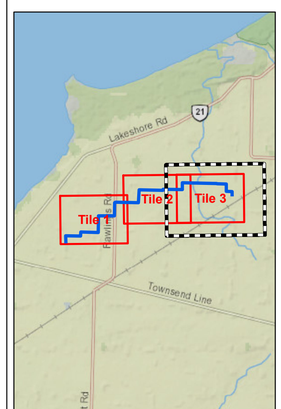
0 0.15 0.3 0.6

Kilometers

Date created: 1/9/2014
Scale: 1:8,000
Notes: Route information provided as general routing for informational purposeses only. Not exact and subject to change.

Path: R:\Ontario\SITES\Cedar Point\Mapping\ArcMap\140107CP_140107_InterconnectionRoute_Tile3.mxd

Coordinate: NAD 1983 UTM Zone 17N
Projection: Transverse Mercator
Datum: North American 1983



TENTHS 0 INCHES 1 2 3 4 5 6 7 8 9 10 EIGHTHS

0 MM 10 20 30 40 50 60 70 80 90 100

SEE DWG# 1325-P001-S01

SEE DWG# 1325-P001-S02

SEE DWG# 1325-P001-S03

SEE DWG# 1325-P001-S04

SEE DWG# 1325-P001-S05

SEE DWG# 1325-P001-S06

SEE DWG# 1325-P001-S07

CEDAR POINT SUBSTATION

JERICHO COLLECTION SUBSTATION

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	RY	EK				

ISS	D/M/Y	ISSUED FOR
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO. | ACTIVITY NO. | SCALE: NTS | PACKAGE CODE

	BY	D/M/Y
DSN	EK	14/01/14
DRN	RY	14/01/14
CHK	KW	
APP		

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE OVERALL SITE PLAN DRAWINGS KEY PLAN

amec

Chimax Inc.
Engineering Company
3950 Fourteenth Ave. East, Suite 506
Markham, On., L3R 0A9
Email: chimax@chimax.ca

CLIENT DWG. NO.

DRAWING NO. 1325-P001-S00

REV. A

CAD FILE: 1325-P001-A

9 8 7 6 5 4 3 2 1

A B C D E F

PIN 43031-0082

PIN 43033-0059

SCP-014 SCP-015 SCP-016 SCP-017 SCP-018 SCP-019 SCP-020 SCP-021

PIN 43033-0060

SCP-013

SCP-005 SCP-006 SCP-007 SCP-008 SCP-009 SCP-010 SCP-011 SCP-012

FULLER ROAD

PIN 43031-0083

SCP-004

PIN 43033-0061

SCP-003

SCP-002

SCP-001

CEDAR POINT LINE

PIN

CEDAR POINT SUBSTATION

PIN 43031-0087

PIN 43032-0053

LEGEND:

- LEGAL LIMIT OF ROAD ALLOWANCE
- PROPOSED TRANSMISSION STRUCTURE
- PROPOSED 115kV CLASS TRANSMISSION CONDUCTOR
- PROPOSED OPGW / SHEILDWIRE

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	RY	EK				

ISS	D/M/Y	ISSUED FOR	APP
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	

REF	NUMBER	REFERENCES
		TITLE

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO. | ACTIVITY NO. | SCALE: NTS | PACKAGE CODE

	BY	D/M/Y
DSN	EK	14/01/14
DRN	RY	14/01/14
CHK	KW	
APP		

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE OVERALL SITE PLAN DRAWINGS SHEET 1

amec

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CLIENT DWG. NO.

DRAWING NO. 1325-P001-S01

REV. A

CAD FILE: 1325-P001-S1

PIN 43033-0056

PIN 43033-0067

PIN 43033-0066

PIN 43033-0097

PROOF LINE

SCP-030 SCP-031 SCP-032 SCP-033 SCP-034 SCP-035 SCP-036 SCP-037

PIN 43033-0070

PIN 43033-0081

RAWLINGS ROAD

SCP-029

SCP-028

SCP-027

PIN 43033-0058

SCP-026

PIN 43033-0080

SCP-025

SCP-024

PIN 43033-0059

SCP-018 SCP-019 SCP-020 SCP-021 SCP-022 SCP-023

PIN 43033-0060

PIN 43033-0071

PIN 43033-0082

LEGEND:

- LEGAL LIMIT OF ROAD ALLOWANCE
- PROPOSED TRANSMISSION STRUCTURE
- PROPOSED 115kV CLASS TRANSMISSION CONDUCTOR
- PROPOSED OPGW / SHEILDWIRE

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	RY	EK				

ISS	D/M/Y	ISSUED FOR	APP
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	

REF	NUMBER	TITLE

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO. | ACTIVITY NO. | SCALE: NTS | PACKAGE CODE

	BY	D/M/Y
DSN	EK	14/01/14
DRN	RY	14/01/14
CHK	KW	
APP		

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE OVERALL SITE PLAN DRAWINGS SHEET 2

amec

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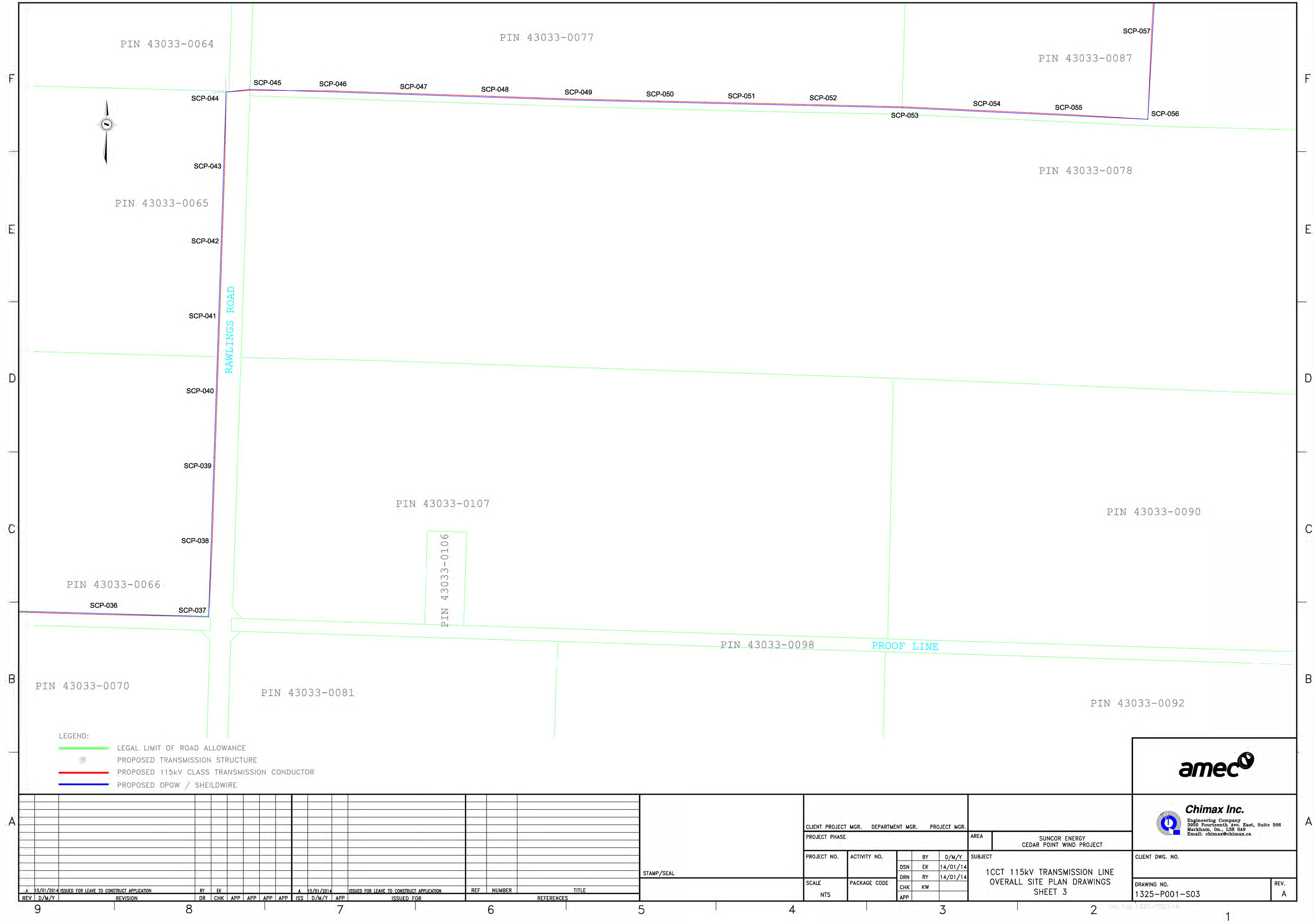
CLIENT DWG. NO.

DRAWING NO. 1325-P001-S02

REV. A

CAD FILE: 1325-P001-A



REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	RY	EK				

ISS	D/M/Y	ISSUED FOR	APP
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	

REF	NUMBER	REFERENCES	TITLE

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO. | ACTIVITY NO.

SCALE: NTS | PACKAGE CODE

	BY	D/M/Y
DSN	EK	14/01/14
DRN	RY	14/01/14
CHK	KW	
APP		

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE OVERALL SITE PLAN DRAWINGS SHEET 3

amec

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CLIENT DWG. NO.

DRAWING NO. 1325-P001-S03 | REV. A

CAD FILE: 1325-P001-S

9 8 7 6 5 4 3 2 1

A B C D E F

PIN 43034-0103

PIN 43034-0089

PIN

THOMSON ROAD

SCP-062

SCP-063

PIN 43034-0107

SCP-064

SCP-065

SCP-066

SCP-067

SCP-068

PIN

SCP-069

SCP-070

SCP-071

SCP-072

SCP-073

SCP-074

SCP-075

SCP-061

PIN 43033-0086

KINNAIRD ROAD

PIN 43042-0054

SCP-060

PIN 43042-0053

SCP-059

SCP-058

SCP-057

PIN 43033-0087

PIN 43042-0055

-054

SCP-055

SCP-056

PIN 43033-0078

LEGEND:

- LEGAL LIMIT OF ROAD ALLOWANCE
- PROPOSED TRANSMISSION STRUCTURE
- PROPOSED 115kV CLASS TRANSMISSION CONDUCTOR
- PROPOSED OPGW / SHEILDWIRE

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	RY	EK				

ISS	D/M/Y	ISSUED FOR
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION

REF	NUMBER	REFERENCES

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO. | ACTIVITY NO.

SCALE: NTS | PACKAGE CODE

	BY	D/M/Y
DSN	EK	14/01/14
DRN	RY	14/01/14
CHK	KW	
APP		

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE OVERALL SITE PLAN DRAWINGS SHEET 4

amec

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CLIENT DWG. NO.

DRAWING NO.: 1325-P001-S04

REV.: A

CAD FILE: 1325-P001-A

PIN 43034-0091

PIN 43034-0087

PIN 43035-0065

PIN 43034-0088

PIN 43035-0066

PIN 43034-0089

PIN 43042-0053

PIN 43042-0079

PIN 43042-0081

PIN 43042-0082

SCP-072 SCP-073 SCP-074 SCP-075 SCP-076 SCP-077 SCP-078 SCP-079 SCP-080 SCP-081 SCP-082 SCP-083 SCP-084 SCP-085 SCP-086 SCP-087 SCP-088 SCP-089 SCP-090

THOMSON ROAD

ARMY CAMP ROAD

LEGEND:

- LEGAL LIMIT OF ROAD ALLOWANCE
- PROPOSED TRANSMISSION STRUCTURE
- PROPOSED 115kV CLASS TRANSMISSION CONDUCTOR
- PROPOSED OPGW / SHEILDWIRE

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	RY	EK				

ISS	D/M/Y	ISSUED FOR	APP
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	

REF	NUMBER	REFERENCES
		TITLE

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO. | ACTIVITY NO. | PACKAGE CODE

SCALE: NTS

	BY	D/M/Y
DSN	EK	14/01/14
DRN	RY	14/01/14
CHK	KW	
APP		

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE OVERALL SITE PLAN DRAWINGS SHEET 5

amec

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Engineering Company
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CLIENT DWG. NO.

DRAWING NO. 1325-P001-S05

REV. A

CAD FILE: 1325-P001-S

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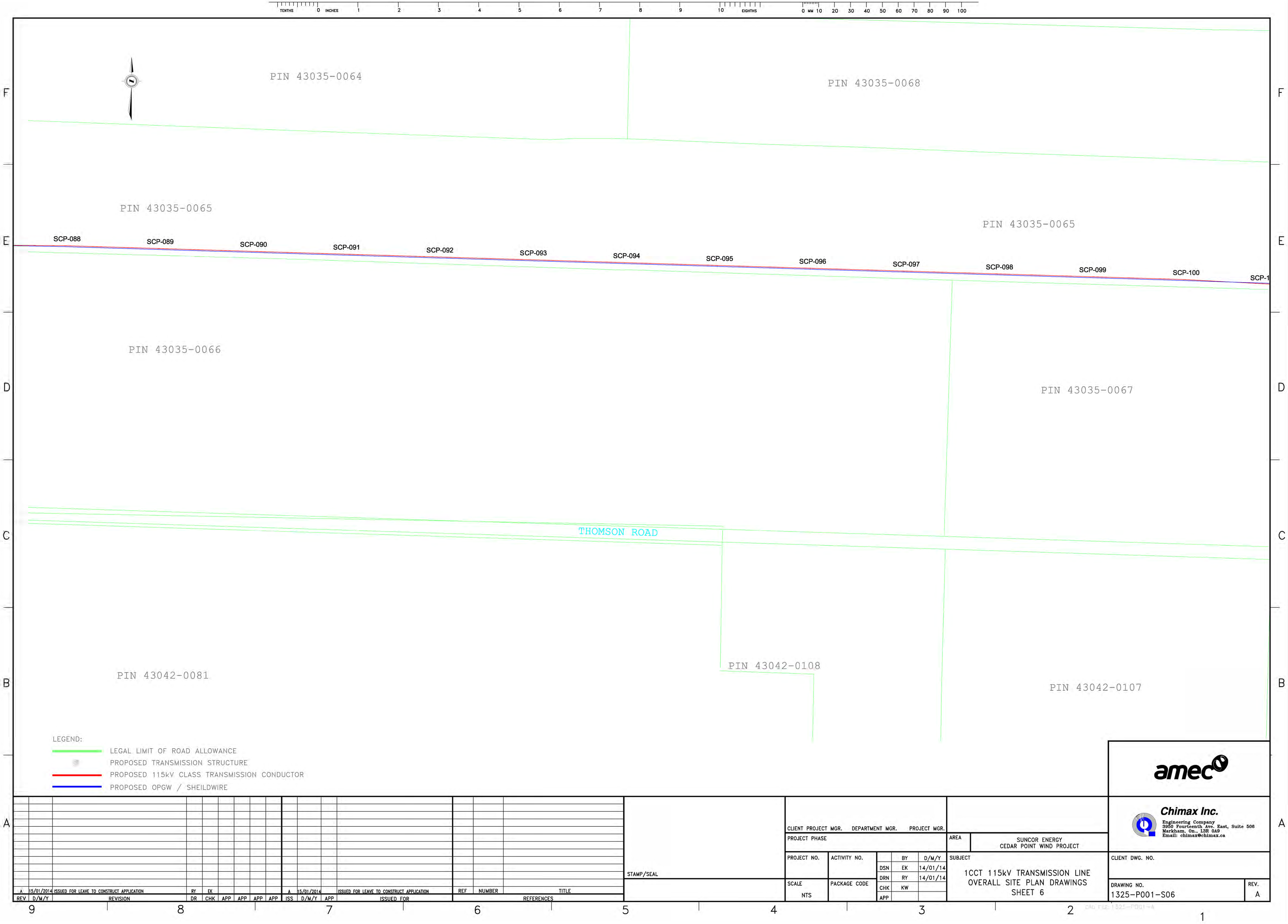
A B C D E F



REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	RY	EK				

ISS	D/M/Y	ISSUED FOR	APP
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	

REF	NUMBER	REFERENCES TITLE

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO. | ACTIVITY NO.

SCALE: NTS | PACKAGE CODE

	BY	D/M/Y
DSN	EK	14/01/14
DRN	RY	14/01/14
CHK	KW	
APP		

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE OVERALL SITE PLAN DRAWINGS SHEET 6

amec

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CLIENT DWG. NO.

DRAWING NO. 1325-P001-S06

REV. A

CAD FILE: 1325-P001-S6

PIN 43035-0065

PIN 43035-0098

SCP-098 SCP-099 SCP-100 SCP-101 SCP-102 SCP-103 SCP-104 SCP-105 SCP-106 SCP-107 SCP-108 SCP-109 SCP-110 SCP-111 SCP-112 SCP-113 SCP-114 SCP-115

PIN 43035-0067

JERICHO ROAD

PIN 43035-0099

PIN 43035-0100

PIN 43035-0052

THOMSON ROAD

PIN 43042-0107

PIN 43041-0053

PIN 43041-0054

PIN 43041-0058

LEGEND:

- LEGAL LIMIT OF ROAD ALLOWANCE
- PROPOSED TRANSMISSION STRUCTURE
- PROPOSED 115kV CLASS TRANSMISSION CONDUCTOR
- PROPOSED OPGW / SHEILDWIRE

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
A	15/01/2014	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	RY	EK				

ISS	D/M/Y	ISSUED FOR	REF	NUMBER	TITLE
A	15/01/2014	APP ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	REFERENCES		

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO. | ACTIVITY NO. | SCALE: NTS | PACKAGE CODE

	BY	D/M/Y
DSN	EK	14/01/14
DRN	RY	14/01/14
CHK	KW	
APP		

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE OVERALL SITE PLAN DRAWINGS SHEET 7

amec

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Markham, On., L3R 0A9
Email: chimax@chimax.ca

CLIENT DWG. NO.

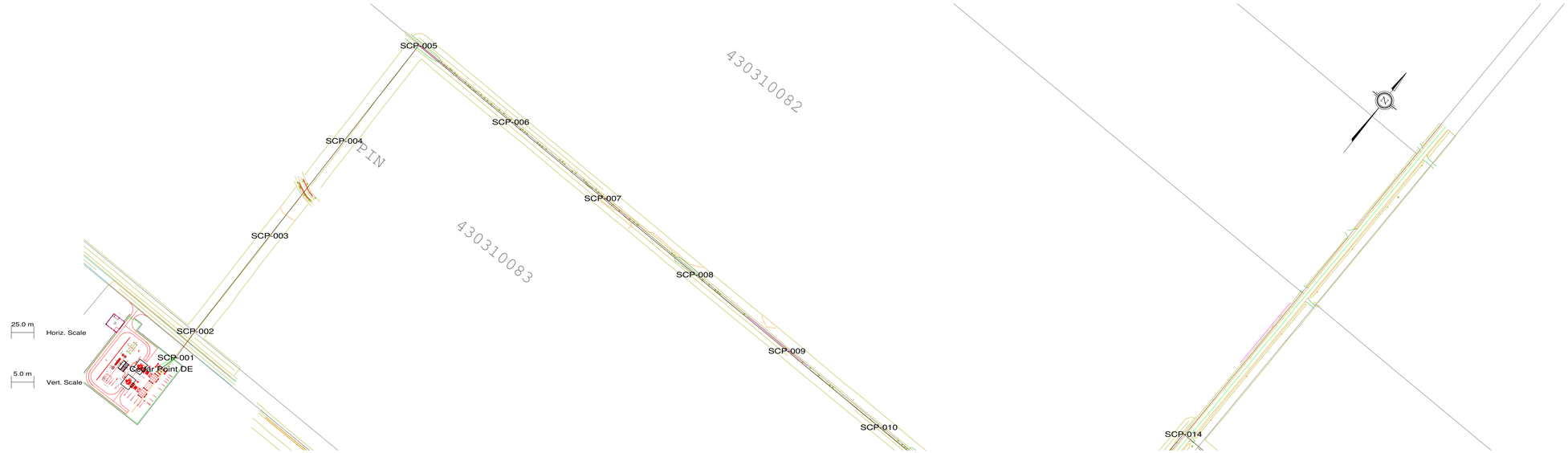
DRAWING NO. 1325-P001-S07

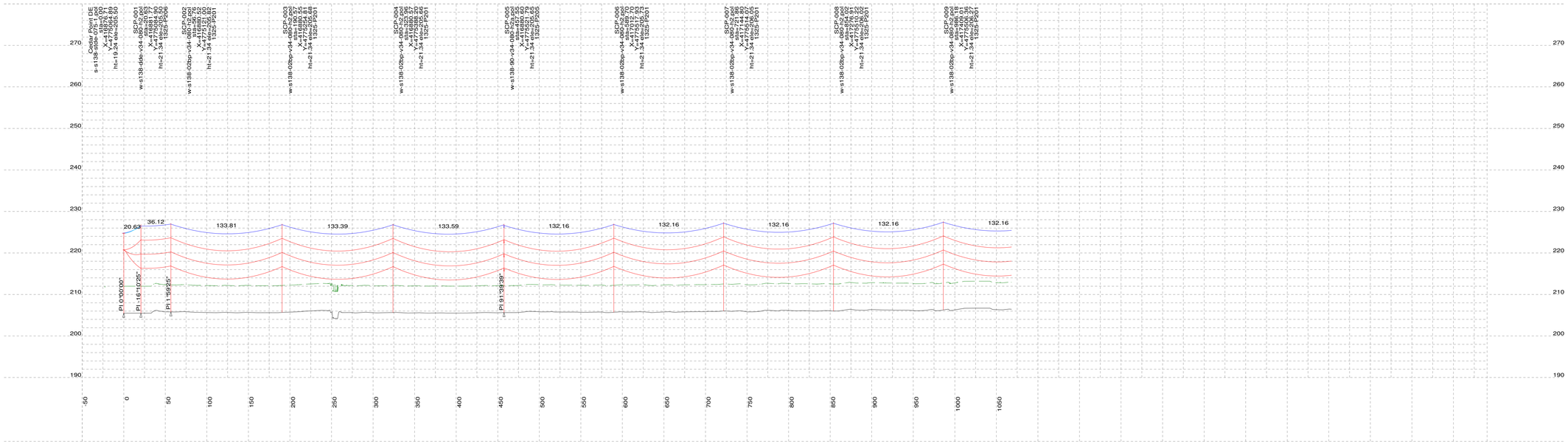
REV. A

PLS-CADD Drawing

TENTHS 0 INCHES 1 2 3 4 5 6 7 8 9 10 EIGHTHS

0 MM 10 20 30 40 50 60 70 80 90 100





PLAN & PROFILE LEGEND:

- 115kV TRANSMISSION LINE CONDUCTOR (795MCM ACSR DRAKE)
- OPGW
- SHIELD WIRE
- GROUND CLEARANCE LINE
- EXISTING HYDRO LINE

STRUCTURE DESCRIPTION LEGEND:

w-s138-02bp-v34-080-h1.pol	PLS-POLE FILE IDENTIFICATION
sta	STATION CHAINAGE
X	UTM EASTING
Y	UTM NORTHING
ht	STRUCTURE HEIGHT ABOVE GROUND (M)
ele	GROUND ELEVATION (M)
SCP-002	STRUCTURE NO.
1325-P201	FRAMING DRAWING NO.

NOTES:

1. GROUND CLEARANCE LINE SHOWN AT 6.5M (FOR VEHICULAR TRAFFIC).
2. CONDUCTOR (795MCM ACSR DRAKE) SAG AT 75°C.
3. OPGW & SHIELD WIRE SAG AT 40°C.
4. ALL DIMENSIONS ARE IN METERS U.N.O.

REV	DDMMYY	REVISION	DR	CHK	APP	APP	APP	APP	ISS	DDMMYY	APP	ISSUED FOR	REF	NUMBER	TITLE
B	15/01/14	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION							B	15/01/14		ISSUED FOR LEAVE TO CONSTRUCT APPLICATION			
A	11/15/13	ISSUED FOR REVIEW	R.Y.	E.K.					A	11/15/13		ISSUED FOR INTERNAL REVIEW			

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

PROJECT NO.	ACTIVITY NO.		BY	DDMMYY
		DSN	E.KWONG	11/12/13
		DRN	R.YIP	11/12/13
		CHK		
		APP		

SUBJECT: PLAN & PROFILE DRAWINGS SHEET 1 of 10

SCALE: N.T.S.

PACKAGE CODE

CLIENT DWG. NO.

DRAWING NO. 1325-P002-S1

REV. B

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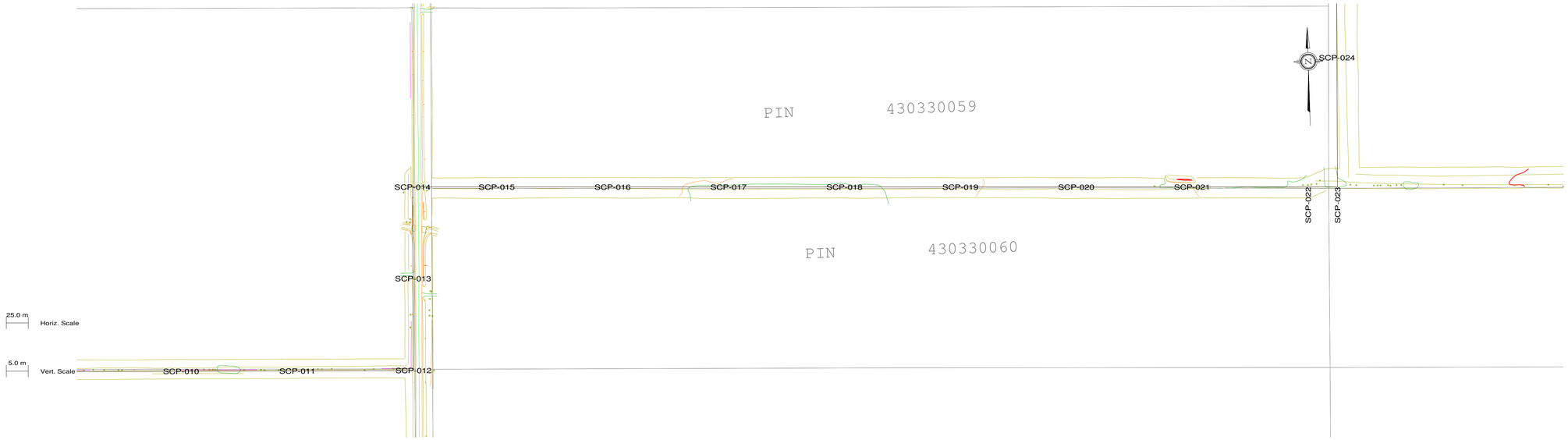
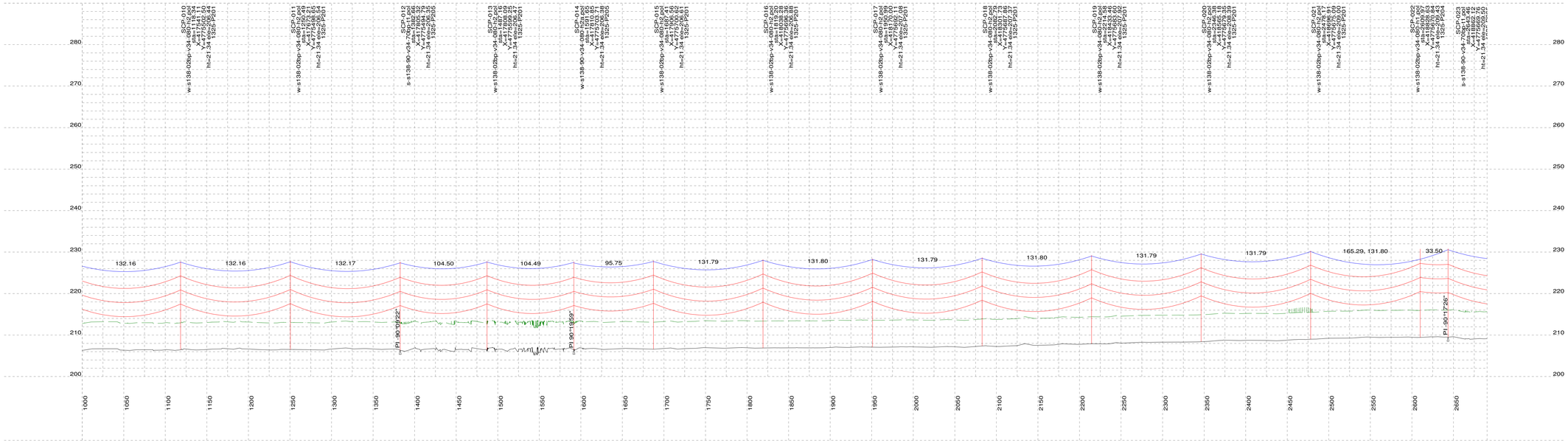
Markham, On., L3R 0A9
Email: chimax@chimax.ca

CAD FILE: PLS-CADD 1325-P002

PLS-CADD Drawing





PLAN & PROFILE LEGEND:

- 115kV TRANSMISSION LINE CONDUCTOR (795MCM ACSR DRAKE)
- OPGW
- SHIELD WIRE
- GROUND CLEARANCE LINE
- EXISTING HYDRO LINE

STRUCTURE DESCRIPTION LEGEND:

w-s138-02bp-v34-080-h1.pol	PLS-POLE FILE IDENTIFICATION
sta	STATION CHAINAGE
X	UTM EASTING
Y	UTM NORTHING
ht	STRUCTURE HEIGHT ABOVE GROUND (M)
ele	GROUND ELEVATION (M)
SCP-002	STRUCTURE NO.
1325-P201	FRAMING DRAWING NO.

NOTES:

1. GROUND CLEARANCE LINE SHOWN AT 6.5M (FOR VEHICULAR TRAFFIC).
2. CONDUCTOR (795MCM ACSR DRAKE) SAG AT 75°C.
3. OPGW & SHIELD WIRE SAG AT 40°C.
4. ALL DIMENSIONS ARE IN METERS U.N.O.

REV	DDMMYY	REVISION	DR	CHK	APP	APP	APP	APP	ISS	DDMMYY	APP	ISSUED FOR	REF	NUMBER	TITLE
B	15/01/14	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION							B	15/01/14		ISSUED FOR LEAVE TO CONSTRUCT APPLICATION			
A	11/15/13	ISSUED FOR REVIEW	R.Y.	E.K.					A	11/15/13		ISSUED FOR INTERNAL REVIEW			

STAMP/SEAL

CLIENT PROJECT MGR.	DEPARTMENT MGR.	PROJECT MGR.
PROJECT PHASE		
PROJECT NO.	ACTIVITY NO.	
SCALE: N.T.S.	PACKAGE CODE	

	BY	DDMMYY
DSN	E.KWONG	11/12/13
DRN	R.YIP	11/12/13
CHK		
APP		

AREA: SUNCOR ENERGY
CEDAR POINT WIND PROJECT

SUBJECT: PLAN & PROFILE DRAWINGS
SHEET 2 of 10

CLIENT DWG. NO.

DRAWING NO.: 1325-P002-S2

REV.: B

amec

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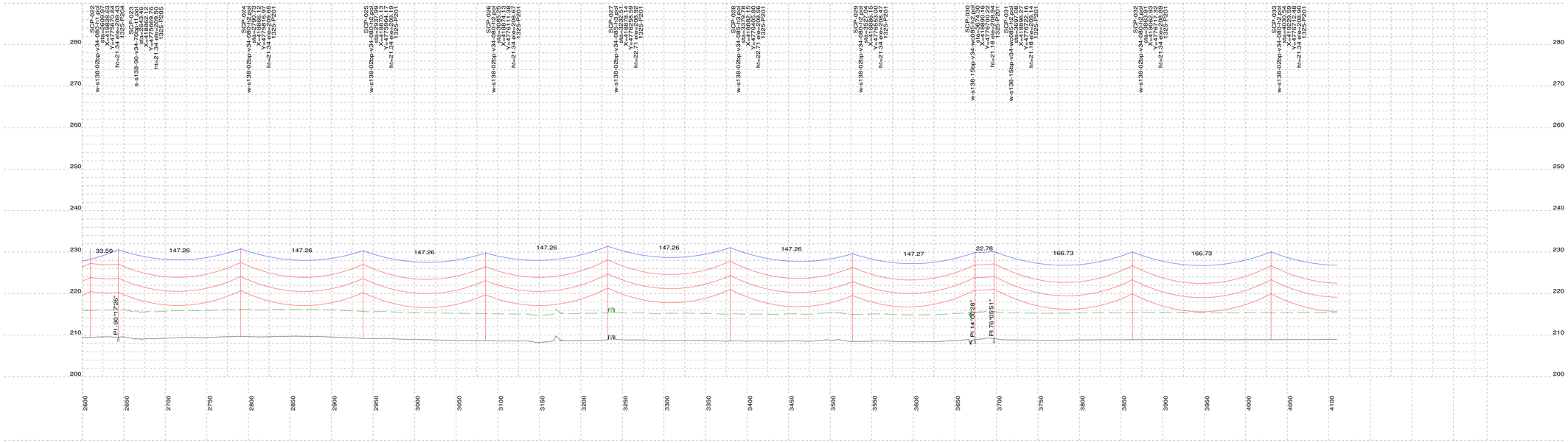
Markham, On., L3R 0A9
Email: chimax@chimax.ca

CAD FILE: PLS-CADD 1325-P002

PLS-CADD Drawing



PLAN & PROFILE LEGEND:

- 115kV TRANSMISSION LINE CONDUCTOR (795MCM ACSR DRAKE)
- OPGW
- SHIELD WIRE
- GROUND CLEARANCE LINE
- EXISTING HYDRO LINE

STRUCTURE DESCRIPTION LEGEND:

w-s138-02bp-v34-080-h1.pol	PLS-POLE FILE IDENTIFICATION
sta	STATION CHAINAGE
X	UTM EASTING
Y	UTM NORTHING
ht	STRUCTURE HEIGHT ABOVE GROUND (M)
ele	GROUND ELEVATION (M)
SCP-002	STRUCTURE NO.
1325-P201	FRAMING DRAWING NO.

NOTES:

1. GROUND CLEARANCE LINE SHOWN AT 6.5M (FOR VEHICULAR TRAFFIC).
2. CONDUCTOR (795MCM ACSR DRAKE) SAG AT 75°C.
3. OPGW & SHIELD WIRE SAG AT 40°C.
4. ALL DIMENSIONS ARE IN METERS U.N.O.

REV	DDMMYY	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/14	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION						
A	11/15/13	ISSUED FOR REVIEW	R.Y.	E.K.				

ISS	DDMMYY	APP	ISSUED FOR	REF	NUMBER	TITLE
B	15/01/14		ISSUED FOR LEAVE TO CONSTRUCT APPLICATION			
A	11/15/13		ISSUED FOR INTERNAL REVIEW			

REFERENCES

STAMP/SEAL

CLIENT PROJECT MGR. | DEPARTMENT MGR. | PROJECT MGR.

PROJECT PHASE

AREA: SUNCOR ENERGY
CEDAR POINT WIND PROJECT

PROJECT NO. | ACTIVITY NO.

	BY	DDMMYY
DSN	E.KWONG	11/12/13
DRN	R.YIP	11/12/13
CHK		
APP		

SUBJECT: PLAN & PROFILE DRAWINGS
SHEET 3 of 10

SCALE: N.T.S.

PACKAGE CODE

CLIENT DWG. NO.

DRAWING NO.: 1325-P002-S3

REV.: B

CAD FILE: PLS-CADD 1325-P002

Chimax Inc.
Engineering Company
3950 Fourteenth Ave. East, Suite 506
Markham, On., L3R 0A9
Email: chimax@chimax.ca

PLS-CADD Drawing

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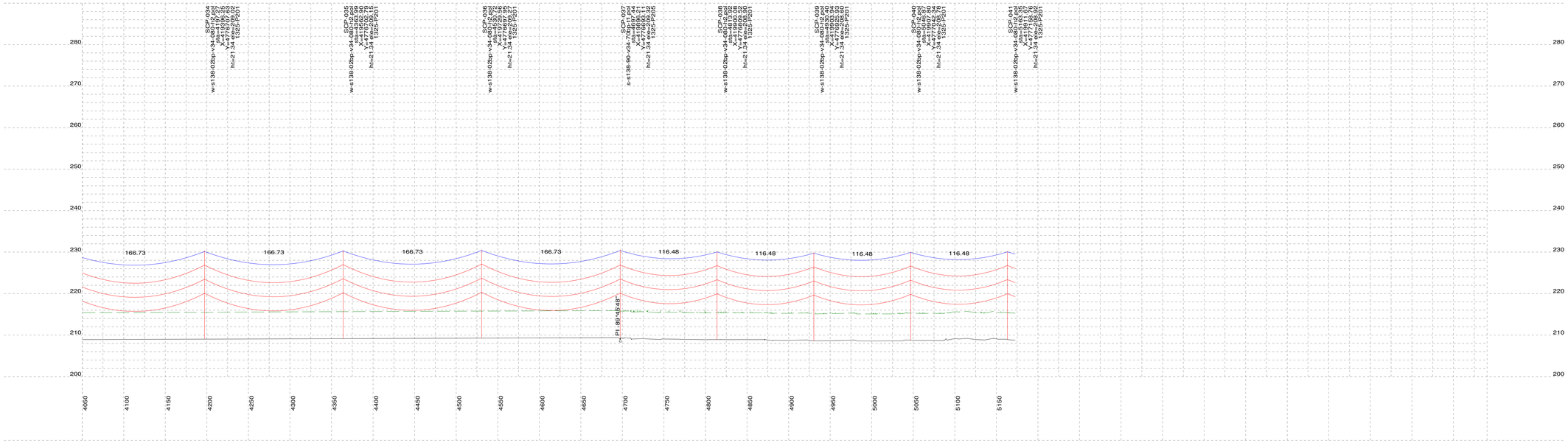

PLAN & PROFILE LEGEND:

- 115kV TRANSMISSION LINE CONDUCTOR (795MCM ACSR DRAKE)
- OPGW
- SHIELD WIRE
- GROUND CLEARANCE LINE
- EXISTING HYDRO LINE

STRUCTURE DESCRIPTION LEGEND:

w-s138-02bp-v34-080-h1.pol	PLS-POLE FILE IDENTIFICATION
sta	STATION CHAINAGE
X	UTM EASTING
Y	UTM NORTHING
ht	STRUCTURE HEIGHT ABOVE GROUND (M)
ele	GROUND ELEVATION (M)
SCP-002	STRUCTURE NO.
1325-P201	FRAMING DRAWING NO.

NOTES:

1. GROUND CLEARANCE LINE SHOWN AT 6.5M (FOR VEHICULAR TRAFFIC).
2. CONDUCTOR (795MCM ACSR DRAKE) SAG AT 75°C.
3. OPGW & SHIELD WIRE SAG AT 40°C.
4. ALL DIMENSIONS ARE IN METERS U.N.O.

REV.	DDMMYY	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/14	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	R.Y.	E.K.				
A	11/15/13	ISSUED FOR REVIEW						

ISS	DDMMYY	APP	ISSUED FOR	REF	NUMBER	TITLE
B	15/01/14		ISSUED FOR LEAVE TO CONSTRUCT APPLICATION			
A	11/15/13		ISSUED FOR INTERNAL REVIEW			

REFERENCES

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

PROJECT NO. | ACTIVITY NO.

	BY	DDMMYY
DSN	E.KWONG	11/12/13
DRN	R.YIP	11/12/13
CHK		
APP		

SUBJECT: PLAN & PROFILE DRAWINGS SHEET 4 of 10

SCALE: N.T.S.

PACKAGE CODE

CLIENT DWG. NO.

DRAWING NO.: 1325-P002-S4

REV.: B

amec

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Engineering Company
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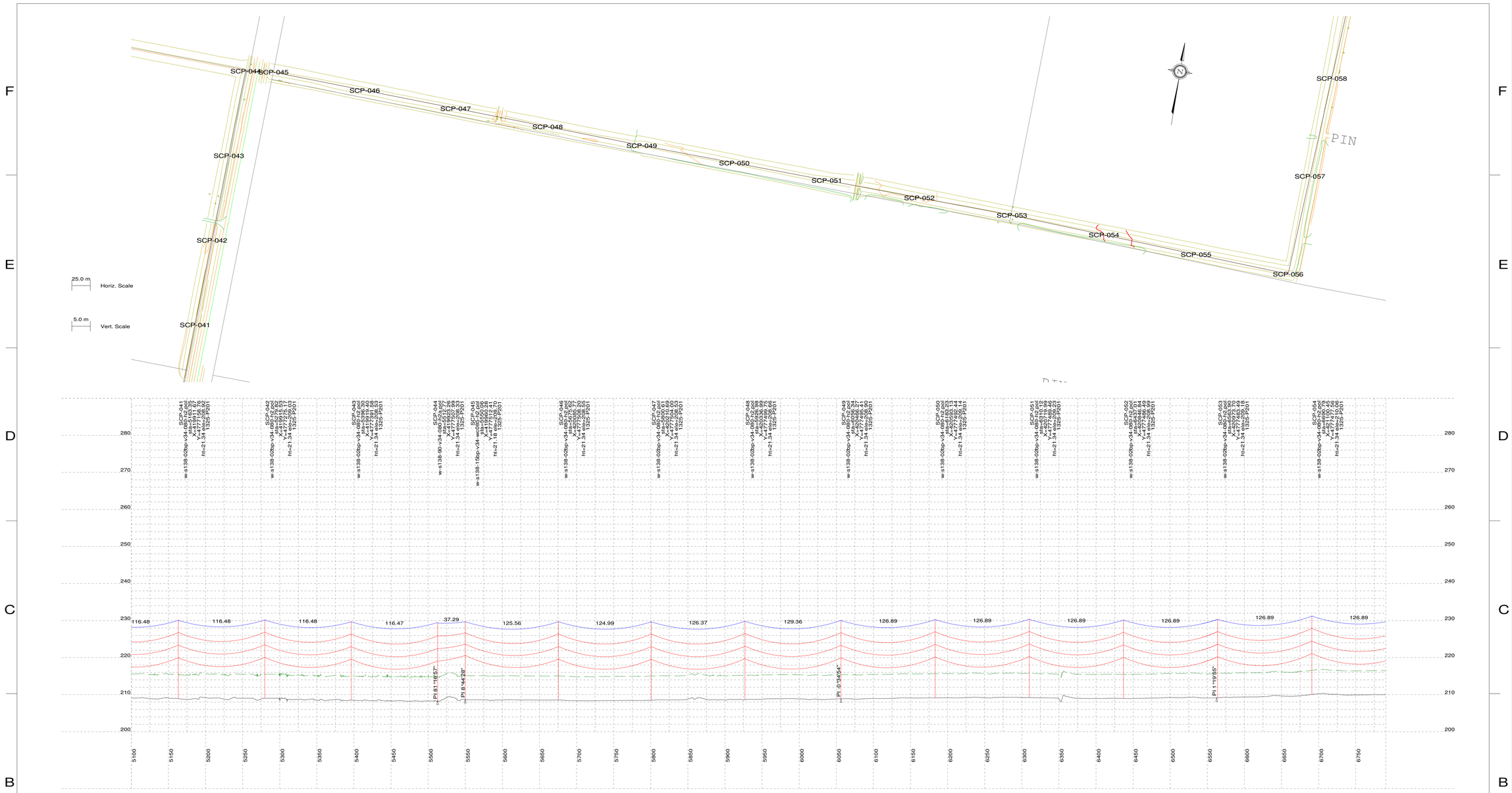
Markham, On., L3R 0A9
Email: chimax@chimax.ca

CAD FILE: PLS-CADD 1325-P002

9 8 7 6 5 4 3 2 1

A B C D E F

PLS-CADD Drawing



PLAN & PROFILE LEGEND:

- 115kV TRANSMISSION LINE CONDUCTOR (795MCM ACSR DRAKE)
- OPGW
- SHIELD WIRE
- GROUND CLEARANCE LINE
- EXISTING HYDRO LINE

STRUCTURE DESCRIPTION LEGEND:

w-s138-02bp-v34-080-h1.pol	PLS-POLE FILE IDENTIFICATION
sta	STATION CHAINAGE
X	UTM EASTING
Y	UTM NORTHING
ht	STRUCTURE HEIGHT ABOVE GROUND (M)
ele	GROUND ELEVATION (M)
SCP-002	STRUCTURE NO.
1325-P201	FRAMING DRAWING NO.

NOTES:

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4. ALL DIMENSIONS ARE IN METERS U.N.O.

REV	DDMMYY	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/14	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION						
A	11/15/13	ISSUED FOR REVIEW	R.Y.	E.K.				

ISS	DDMMYY	APP	ISSUED FOR	REF	NUMBER	TITLE
B	15/01/14		ISSUED FOR LEAVE TO CONSTRUCT APPLICATION			
A	11/15/13		ISSUED FOR INTERNAL REVIEW			

REFERENCES

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

PROJECT NO. | ACTIVITY NO.

	BY	DDMMYY
DSN	E.KWONG	11/12/13
DRN	R.YIP	11/12/13
CHK		
APP		

SUBJECT: PLAN & PROFILE DRAWINGS SHEET 5 of 10

SCALE: N.T.S.

PACKAGE CODE

CLIENT DWG. NO.

DRAWING NO.: 1325-P002-S5

REV.: B

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Engineering Company
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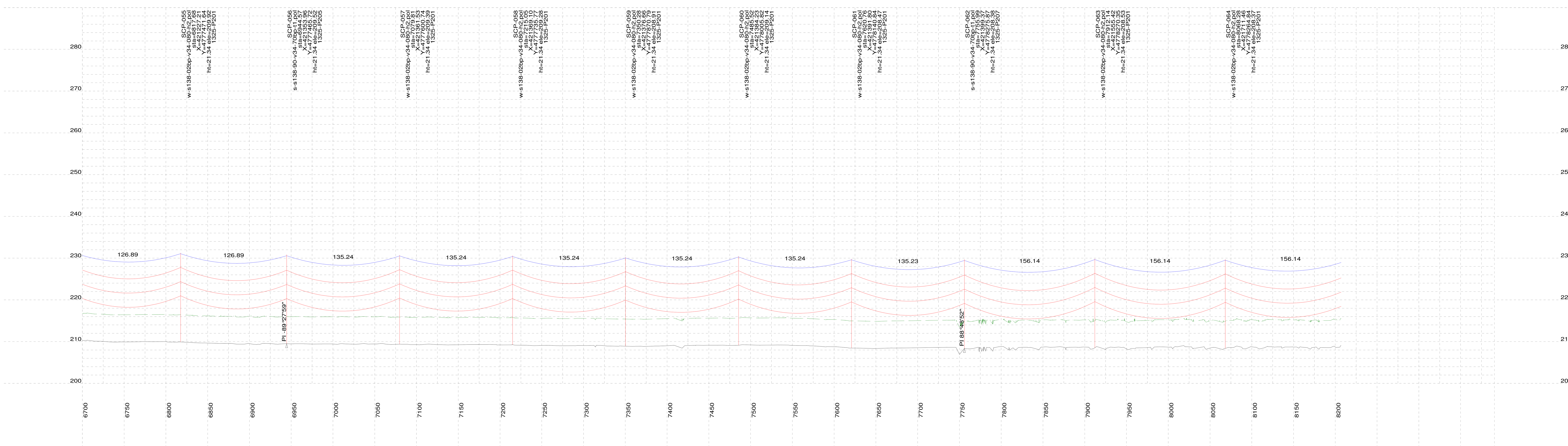
Markham, On., L3R 0A9
Email: chimax@chimax.ca

CAD FILE: PLS-CADD 1325-P002



PLAN & PROFILE LEGEND:

- 115kV TRANSMISSION LINE CONDUCTOR (795MCM ACSR DRAKE)
- OPGW
- SHIELD WIRE
- GROUND CLEARANCE LINE
- EXISTING HYDRO LINE

STRUCTURE DESCRIPTION LEGEND:

w-s138-02bp-v34-080-h1.pol	PLS-POLE FILE IDENTIFICATION
sta	STATION CHAINAGE
X	UTM EASTING
Y	UTM NORTHING
ht	STRUCTURE HEIGHT ABOVE GROUND (M)
ele	GROUND ELEVATION (M)
SCP-002	STRUCTURE NO.
1325-P201	FRAMING DRAWING NO.

NOTES:

1. GROUND CLEARANCE LINE SHOWN AT 6.5M (FOR VEHICULAR TRAFFIC).
2. CONDUCTOR (795MCM ACSR DRAKE) SAG AT 75°C.
3. OPGW & SHIELD WIRE SAG AT 40°C.
4. ALL DIMENSIONS ARE IN METERS U.N.O.

amec

REV	DDMMYY	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/14	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION						
A	11/15/13	ISSUED FOR REVIEW	R.Y.	E.K.				

ISS	DDMMYY	APP	ISSUED FOR	REF	NUMBER	TITLE
B	15/01/14		ISSUED FOR LEAVE TO CONSTRUCT APPLICATION			
A	11/15/13		ISSUED FOR INTERNAL REVIEW			

REFERENCES

STAMP/SEAL

CLIENT PROJECT MGR. | DEPARTMENT MGR. | PROJECT MGR.

PROJECT PHASE

PROJECT NO.	ACTIVITY NO.		BY	DDMMYY
		DSN	E.KWONG	11/12/13
		DRN	R.YIP	11/12/13
SCALE N.T.S.	PACKAGE CODE	CHK		
		APP		

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

SUBJECT: PLAN & PROFILE DRAWINGS SHEET 6 of 10

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CLIENT DWG. NO.

DRAWING NO. 1325-P002-S6 REV. B

CAD FILE: PLS-CADD 1325-P002

PLS-CADD Drawing

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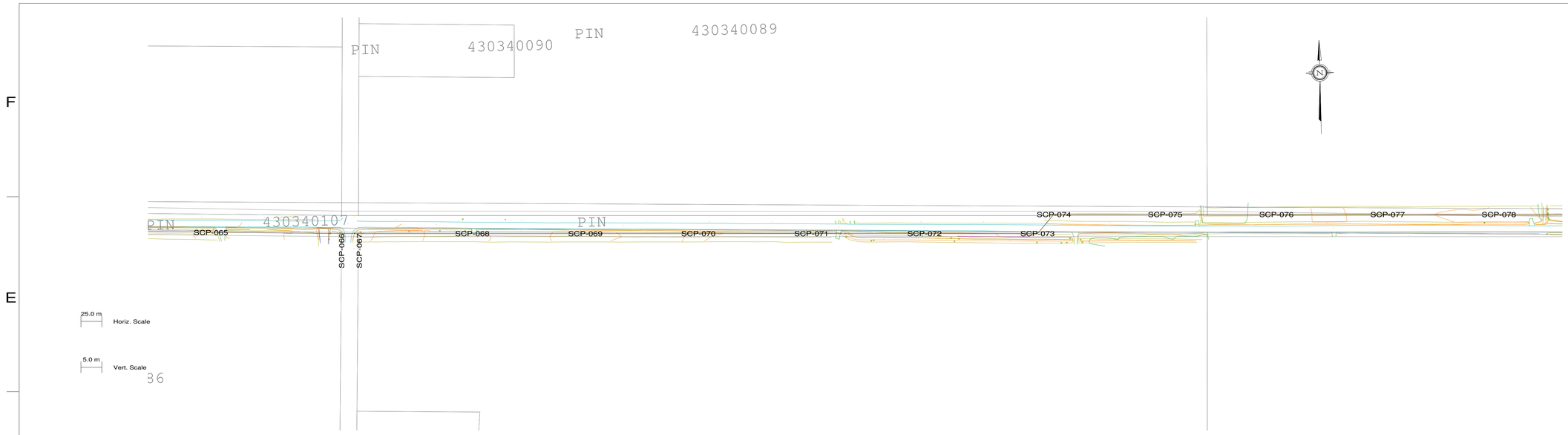

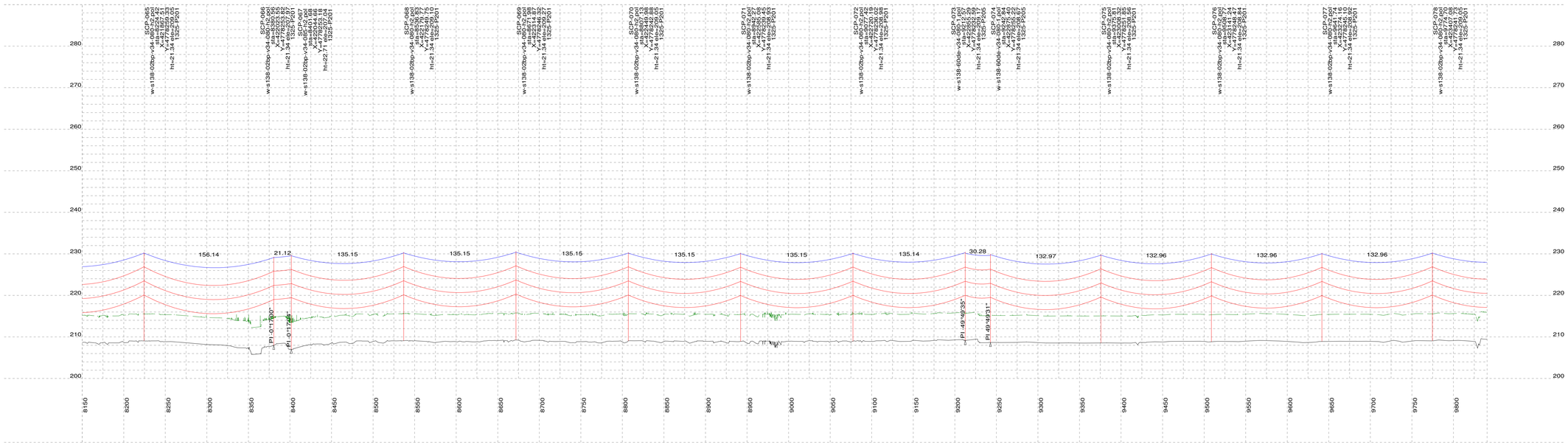

PLAN & PROFILE LEGEND:

- 115kV TRANSMISSION LINE CONDUCTOR (795MCM ACSR DRAKE)
- OPGW
- SHIELD WIRE
- GROUND CLEARANCE LINE
- EXISTING HYDRO LINE

STRUCTURE DESCRIPTION LEGEND:

w-s138-02bp-v34-080-h1.pol	PLS-POLE FILE IDENTIFICATION
sta	STATION CHAINAGE
X	UTM EASTING
Y	UTM NORTHING
ht	STRUCTURE HEIGHT ABOVE GROUND (M)
ele	GROUND ELEVATION (M)
SCP-002	STRUCTURE NO.
1325-P201	FRAMING DRAWING NO.

NOTES:

1. GROUND CLEARANCE LINE SHOWN AT 6.5M (FOR VEHICULAR TRAFFIC).
2. CONDUCTOR (795MCM ACSR DRAKE) SAG AT 75°C.
3. OPGW & SHIELD WIRE SAG AT 40°C.
4. ALL DIMENSIONS ARE IN METERS U.N.O.

REV.	DDMMYY	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/14	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION						
A	11/15/13	ISSUED FOR REVIEW	R.Y.	E.K.				

ISS	DDMMYY	APP	ISSUED FOR	REF	NUMBER	TITLE
B	15/01/14		ISSUED FOR LEAVE TO CONSTRUCT APPLICATION			
A	11/15/13		ISSUED FOR INTERNAL REVIEW		REFERENCES	

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

PROJECT NO. | ACTIVITY NO.

	BY	DDMMYY
DSN	E.KWONG	11/12/13
DRN	R.YIP	11/12/13
CHK		
APP		

SUBJECT: PLAN & PROFILE DRAWINGS SHEET 7 of 10

SCALE: N.T.S.

PACKAGE CODE

CLIENT DWG. NO.

DRAWING NO. 1325-P002-S7

REV. B

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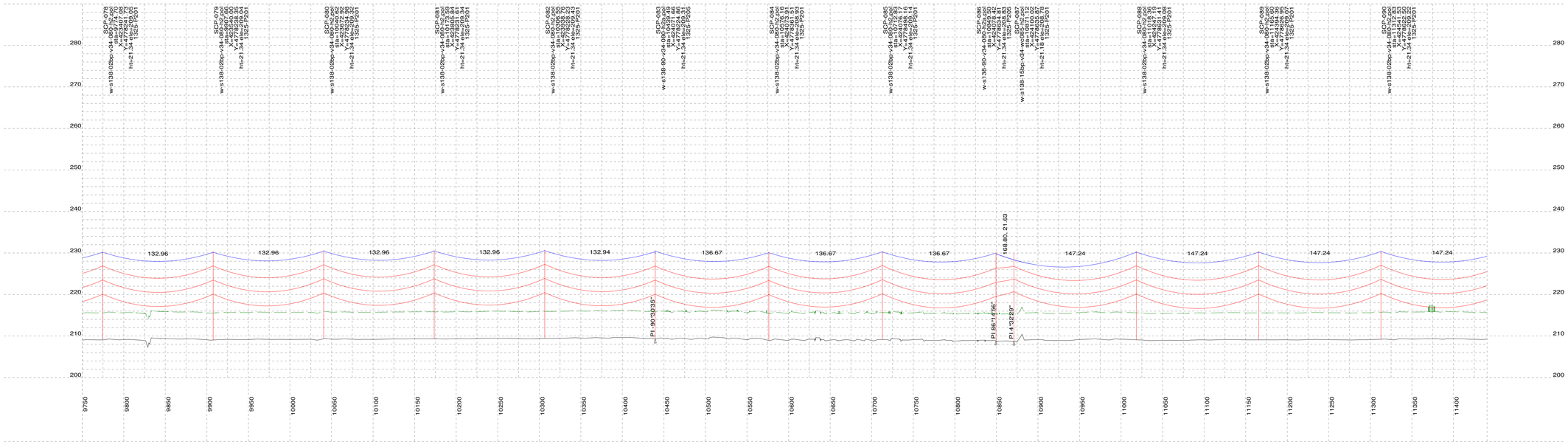
Markham, On., L3R 0A9
Email: chimax@chimax.ca

CAD FILE: PLS-CADD 1325-P002

PLS-CADD Drawing



PLAN & PROFILE LEGEND:

- 115kV TRANSMISSION LINE CONDUCTOR (795MCM ACSR DRAKE)
- OPGW
- SHIELD WIRE
- GROUND CLEARANCE LINE
- EXISTING HYDRO LINE

STRUCTURE DESCRIPTION LEGEND:

w-s138-02bp-v34-080-h1.pol	PLS-POLE FILE IDENTIFICATION
sta	STATION CHAINAGE
X	UTM EASTING
Y	UTM NORTHING
ht	STRUCTURE HEIGHT ABOVE GROUND (M)
ele	GROUND ELEVATION (M)
SCP-002	STRUCTURE NO.
1325-P201	FRAMING DRAWING NO.

NOTES:

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REV.	DDMMYY	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/14	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	R.Y.	E.K.				
A	11/15/13	ISSUED FOR REVIEW						

ISS	DDMMYY	APP	ISSUED FOR	REF	NUMBER	TITLE
B	15/01/14		ISSUED FOR LEAVE TO CONSTRUCT APPLICATION			
A	11/15/13		ISSUED FOR INTERNAL REVIEW			

REFERENCES

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

AREA: SUNCOR ENERGY
CEDAR POINT WIND PROJECT

PROJECT NO. | ACTIVITY NO.

	BY	DDMMYY
DSN	E.KWONG	11/12/13
DRN	R.YIP	11/12/13
CHK		
APP		

SUBJECT: PLAN & PROFILE DRAWINGS
SHEET 8 of 10

SCALE: N.T.S.

PACKAGE CODE

CLIENT DWG. NO.

DRAWING NO.: 1325-P002-S8

REV.: B

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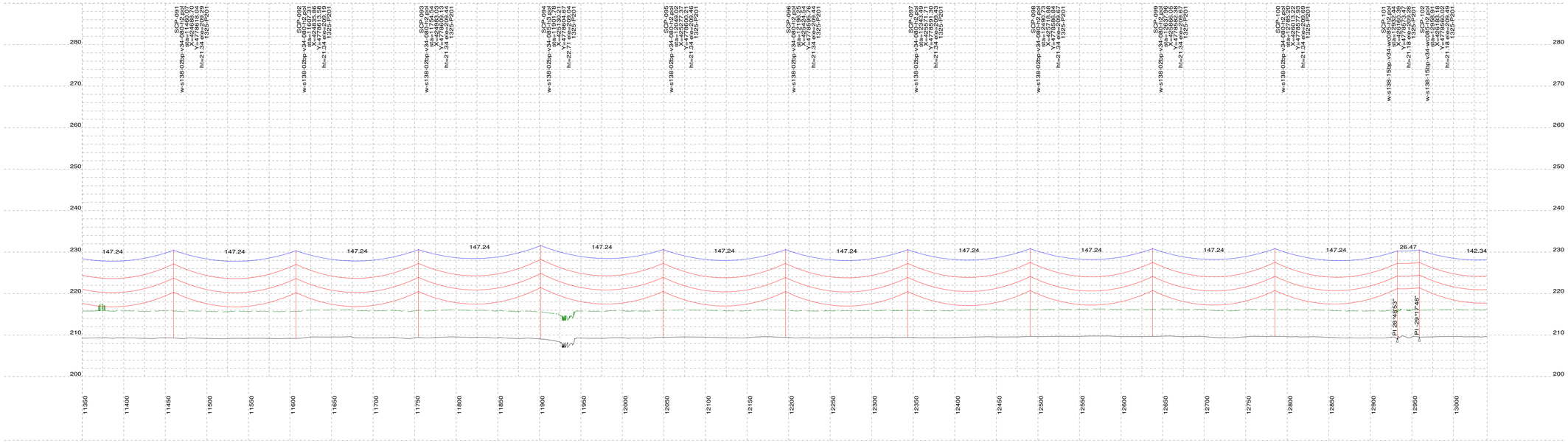
Engineering Company
3950 Fourteenth Ave. East, Suite 506
Markham, On., L3R 0A9
Email: chimax@chimax.ca

CAD FILE: PLS-CADD 1325-P002

PLS-CADD Drawing



PLAN & PROFILE LEGEND:

- 115kV TRANSMISSION LINE CONDUCTOR (795MCM ACSR DRAKE)
- OPGW
- SHIELD WIRE
- GROUND CLEARANCE LINE
- EXISTING HYDRO LINE

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sta	STATION CHAINAGE
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Y	UTM NORTHING
ht	STRUCTURE HEIGHT ABOVE GROUND (M)
ele	GROUND ELEVATION (M)
SCP-002	STRUCTURE NO.
1325-P201	FRAMING DRAWING NO.

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REV.	DDMMYY	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/14	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION						
A	11/15/13	ISSUED FOR REVIEW	R.Y.	E.K.				

ISS	DDMMYY	APP	ISSUED FOR	REF	NUMBER	TITLE
B	15/01/14		ISSUED FOR LEAVE TO CONSTRUCT APPLICATION			
A	11/15/13		ISSUED FOR INTERNAL REVIEW			

REFERENCES

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

PROJECT NO. | ACTIVITY NO.

	BY	DDMMYY
DSN	E.KWONG	11/12/13
DRN	R.YIP	11/12/13
CHK		
APP		

SUBJECT: PLAN & PROFILE DRAWINGS SHEET 9 of 10

SCALE: N.T.S.

PACKAGE CODE

CLIENT DWG. NO.

DRAWING NO.: 1325-P002-S9

REV.: B

Chimax Inc.
Engineering Company
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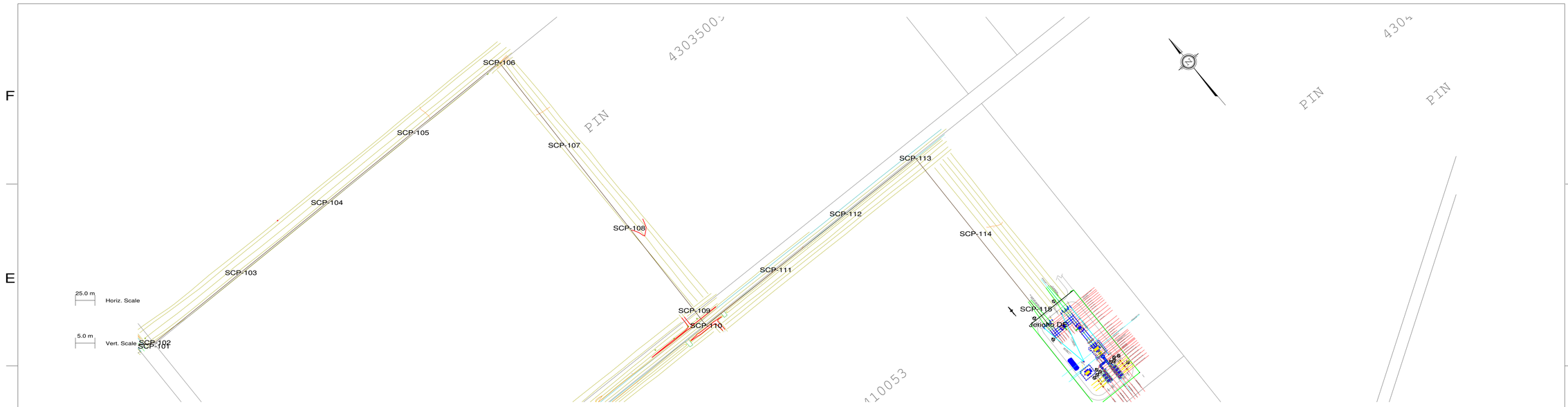
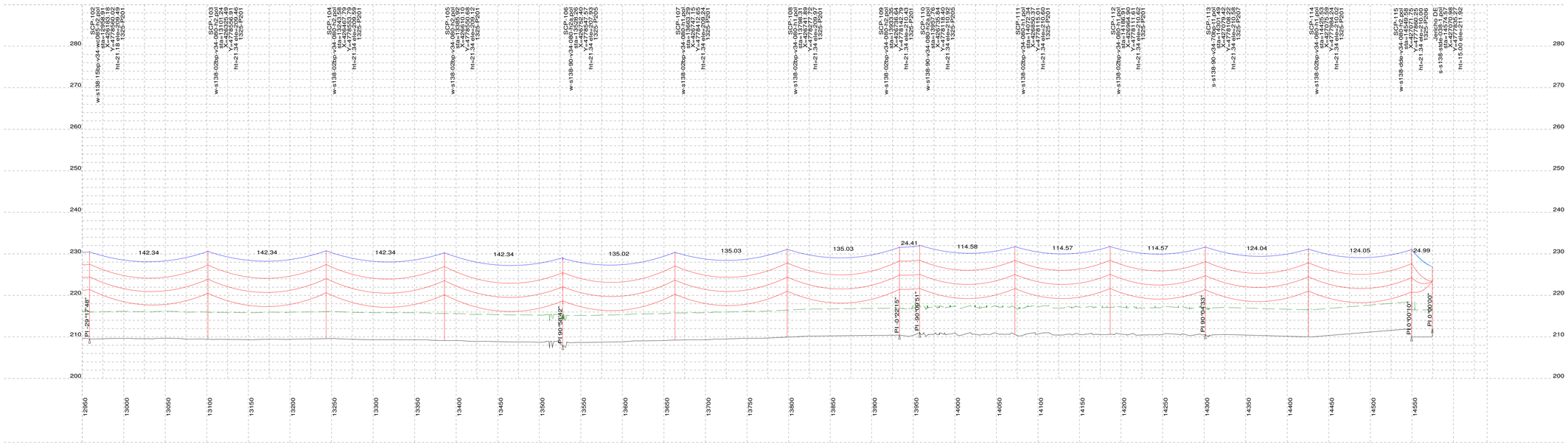
Markham, On., L3R 0A9
Email: chimax@chimax.ca

CAD FILE: PLS-CADD 1325-P002

PLS-CADD Drawing





PLAN & PROFILE LEGEND:

- 115kV TRANSMISSION LINE CONDUCTOR (795MCM ACSR DRAKE)
- OPGW
- SHIELD WIRE
- GROUND CLEARANCE LINE
- EXISTING HYDRO LINE

STRUCTURE DESCRIPTION LEGEND:

w-s138-02bp-v34-080-h1.pol	PLS-POLE FILE IDENTIFICATION
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X	UTM EASTING
Y	UTM NORTHING
ht	STRUCTURE HEIGHT ABOVE GROUND (M)
ele	GROUND ELEVATION (M)
SCP-002	STRUCTURE NO.
1325-P201	FRAMING DRAWING NO.

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B	15/01/14	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION						
A	11/15/13	ISSUED FOR REVIEW	R.Y.	E.K.				

ISS	DDMMYY	APP	ISSUED FOR	REF	NUMBER	TITLE
B	15/01/14		ISSUED FOR LEAVE TO CONSTRUCT APPLICATION			
A	11/15/13		ISSUED FOR INTERNAL REVIEW		REFERENCES	

STAMP/SEAL

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

PROJECT NO. | ACTIVITY NO.

	BY	DDMMYY
DSN	E.KWONG	11/12/13
DRN	R.YIP	11/12/13
CHK		
APP		

SUBJECT: PLAN & PROFILE DRAWINGS SHEET 10 of 10

SCALE: N.T.S.

PACKAGE CODE

CLIENT DWG. NO.

DRAWING NO.: 1325-P002-S10

REV.: B

CAD FILE: PLS-CADD 1325-P002

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Chimax Inc.
Engineering Company
3950 Fourteenth Ave. East, Suite 506
Markham, On., L3R 0A9
Email: chimax@chimax.ca

Exhibit B, Tab 2, Schedule 5
Drawings and Illustrations

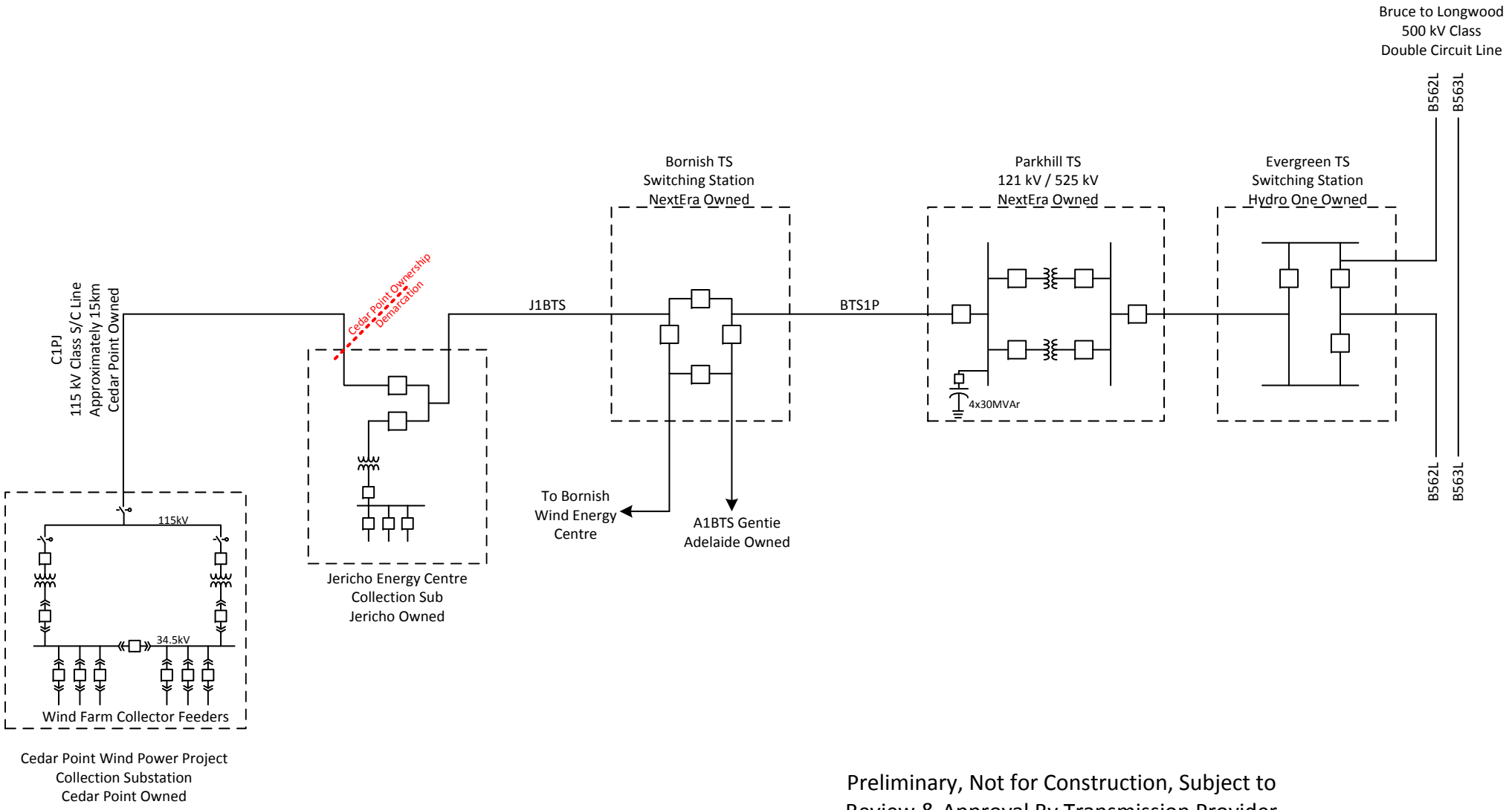
DRAWINGS AND ILLUSTRATIONS

(1) Figure 1 - Single Line Diagram.

(2) Figure 2 - Station Layout - Cedar Point Transformer Station.

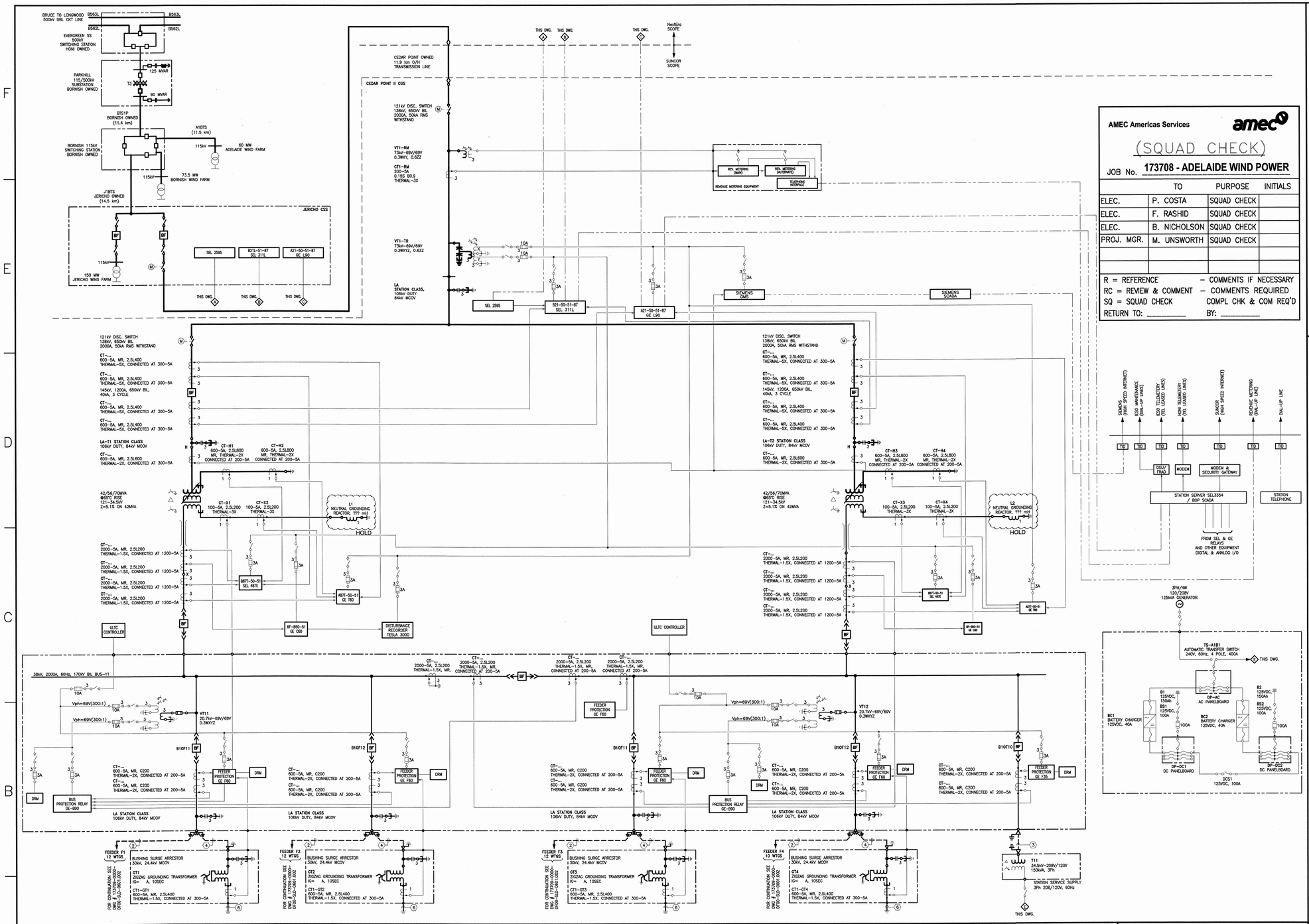
(3) Pole Structures and Framing.

Cedar Point Wind Power Project (100MW)
Conceptual One Line Diagram



Preliminary, Not for Construction, Subject to Review & Approval By Transmission Provider

Last Updated: 2013-12-19



KEY PLAN

AMEC Americas Services amec

(SQUAD CHECK)

JOB No. **173708 - ADELAIDE WIND POWER**

	TO	PURPOSE	INITIALS
ELEC.	P. COSTA	SQUAD CHECK	
ELEC.	F. RASHID	SQUAD CHECK	
ELEC.	B. NICHOLSON	SQUAD CHECK	
PROJ. MGR.	M. UNSWORTH	SQUAD CHECK	

R = REFERENCE — COMMENTS IF NECESSARY
RC = REVIEW & COMMENT — COMMENTS REQUIRED
SQ = SQUAD CHECK — COMPL CHK & COM REQ'D
RETURN TO: _____ BY: _____

LEGEND:

- 21 – DISTANCE PROTECTION
- 29 – ISOLATING SWITCH
- 43 – MANUAL SWITCH
- 50 – INSTANTANEOUS OVERCURRENT PROTECTION
- 51 – INV. TIME OVERCURRENT PROTECTION
- 51N – NEUTRAL OVERCURRENT PROTECTION
- 52(F) – CIRCUIT BREAKER WITH BF PROTECTION
- 52a/b – CIRCUIT BREAKER AUXILIARY "a" & "b" CONTACTS
- 59 – OVERVOLTAGE PROTECTION
- 67 – DIRECTIONAL OVERCURRENT
- 79 – AUTO RECLOSE CONTROL
- 81 – FREQUENCY
- 87 – DIFFERENTIAL PROTECTION
- 87L – LINE DIFFERENTIAL PROTECTION
- 94 – TRIPPING RELAY
- (K) – KEY INTERLOCKS
- × – TEST SWITCH
- (M) – MOTOR OPERATOR
- TID – TELECOM ISOLATING DEVICE
- DR – DISTURBANCE RECORDER INPUTS
- HONI OPERATING DESIGNATION

- (1) 3X1C – 750MCM AL. 35kV, 100% INSUL. XLPE U/G CABLE
- (2) 3X1C – 500MCM AL. 35kV, 100% INSUL. XLPE U/G CABLE
- (3) 3X1C – #4/0 AWG 35 kV, 100% INSUL. XLPE U/G CABLE
- (4) 3X1C – #1/0 AWG AL, 35 kV, 100% INSUL. XLPE U/G CABLE
- (5) 1X1C – #4/0 CU, 1 kV, 100% INSUL. XLPE CABLE
- (6) 1X1C – #4/0 CU, BARE CABLE

NOTES:

1. FOR NOTES AND LEGEND, REFER TO DWG # 173709-0000-DF00-SDD-0000-001.
2. REFER TO DWG # 173709-0000-DF00-BLD-0645-001 FOR COMMUNICATION DIAGRAM.
3. REVENUE METERING CT/PT ARE MOUNTED IN A SEPARATE LOCKABLE AND SEALABLE COMPARTMENT.
4. REVENUE METERING EQUIPMENT ARE INSTALLED BY CONTRACTOR.

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP
A	13SEP13	ISSUED FOR SQUAD CHECK	RS	FR	FC	MU	

REF	NUMBER	TITLE
1	DF00-SLD-0000-001	ELECTRICAL SYMBOLS & GENERAL NOTES

STAMP/SEAL

SUNCOR ENERGY

amec

PROJECT NO.	ACTIVITY NO.
173709	
SCALE	PACKAGE CODE
NTS	

	BY	DDMMMYY
DES	FC	SEP'13
DRN	RS	SEP'13
CHK	BJN	SEP'13
APP	MU	SEP'13

SUBJECT

115kV SUBSTATION SINGLE LINE DIAGRAM (SHEET 1/2)

AREA 0200 — SUNCOR ENERGY CEDAR POINT WIND POWER PROJECT

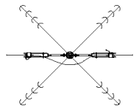
CLIENT DWG. NO.

DRAWING NO. 173709-0200-DF00-SLD-0601.001 REV. A

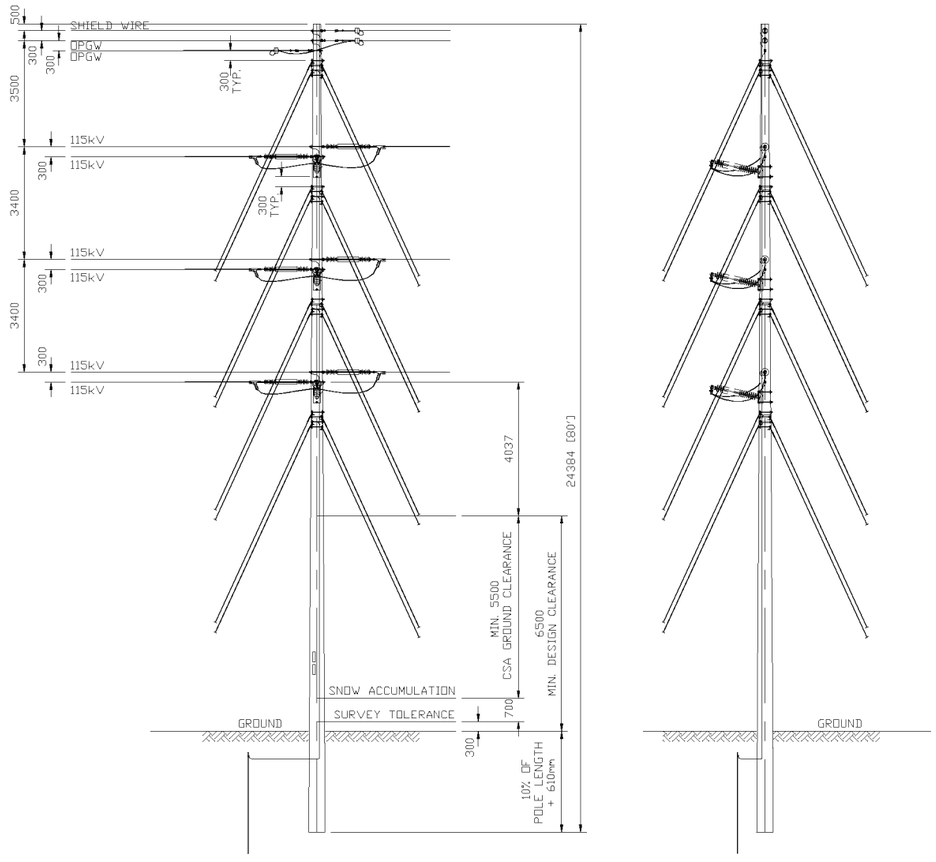
SAVED: 13-Sep-13 1:35 PM PLOTTED: 13-Sep-13 1:35 PM USER: SHAHBAZIAN, RAZMIK

CAD FILE: P:\CAD\ELEC\173709-0200-DF00-SLD-0601.001.DWG

ISO A1-594x841



PLAN VIEW



1CCT 115kV TRANSMISSION LINE
DOUBLE DEADEND FRAMING
(FOR STATION TAP)

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA:

A. DESIGN CRITERIA

1. METEOROLOGICAL LOCATION:	FOREST/GODERICH
2. MINIMUM DESIGN LOADING	
2.1. CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
HOURLY WIND	400 Pa
RADIAL ICE THICKNESS	12.7 mm (1/2")
CONDUCTOR TEMPERATURE	-20°C
2.2. CSA 22.3 No.60826 (IEC RELIABILITY DESIGN) - 1/50 PERIOD	
(i) IEC ICE (1/50)	22 mm @ -10°C
(ii) IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
(iii) COMBINED ICE (85%) & WIND (60%)	18.7 mm & 210 Pa @ -10°C

WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826.

B. CLEARANCE CRITERIA

1. MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2. ADDITIONAL SURVEY TOLERANCE:	0.3 m
3. VERTICAL GROUND CLEARANCE:	
3.1. MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	5.50 m
3.2. DESIGN VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	6.50 m
4. VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1. PHASE CONDUCTOR	
(i) MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii) DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
(iii) RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5. PHASE CLEARANCE CONDITIONS:	
(i) HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
(ii) HOURLY WIND (NATIONAL BUILDING CODE 1/30)	480 Pa (~100 km/hr)
(iii) GALLOPING	
GALLOPING SWING	290 Pa
GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1. MERCHANT CIRCUIT(S)	
1.1. NOMINAL SYSTEM VOLTAGE	124 kV
1.2. NUMBER OF PHASES	3 (THREE)
1.3. SYSTEM FREQUENCY	60 Hz
1.4. SYSTEM GROUNDING	LOW IMPEDANCE
1.5. NUMBER OF CIRCUIT	1 (ONE)
1.6. MAXIMUM CIRCUIT CURRENT	560A PER CIRCUIT
1.7. PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8. DESIGN CONDUCTOR TEMPERATURE	75°C

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
A	15/01/14	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	R.Y.	E.K.				

ISS	D/M/Y	ISSUED FOR	APP
A	15/01/14	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	

REF	NUMBER	REFERENCES

STAMP/SEAL

APPROVED FOR CONSTRUCTION

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO.	ACTIVITY NO.	PACKAGE CODE

SCALE: N.T.S. (11"x17")

	BY	D/M/Y
DSN.	E.KWONG	23/10/13
DRN.	R.YIP	23/10/13

AREA: SUNCOR ENERGY
CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE
DOUBLE DEADEND FRAMING
(FOR STATION TAP)

amec

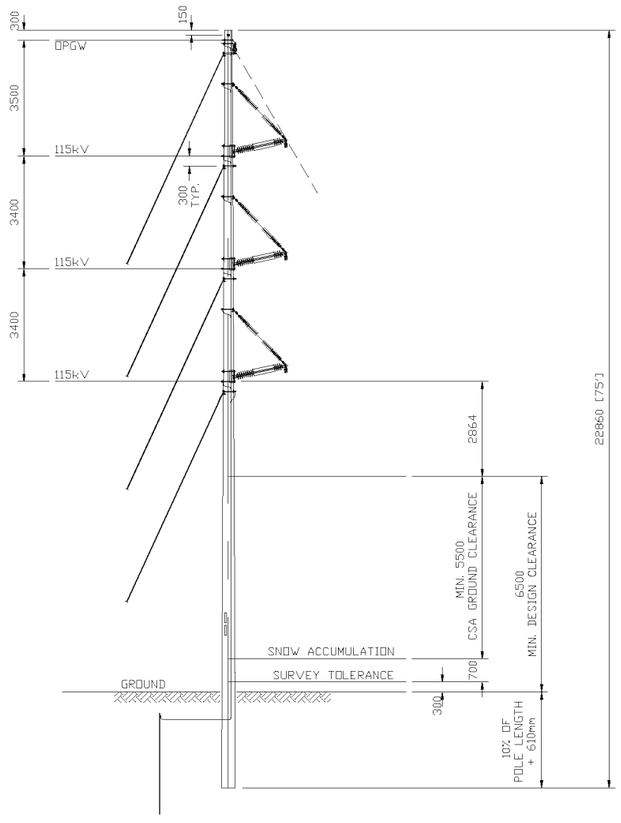
Chimax Inc.
Engineering Company
3950 Fourteenth Ave. East, Suite 506
Markham, On., L3R 0A9
Email: chimax@chimax.ca

CLIENT DWG. NO.

DRAWING NO. 1325-P208

REV. A

CADD FILE ADDRESS
1325-P208-A



1CCT 115kV TRANSMISSION LINE
LIGHT ANGLE (2 - 15°) FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA:

A. DESIGN CRITERIA

1. METEOROLOGICAL LOCATION:	FOREST/GODERICH
2. MINIMUM DESIGN LOADING	
2.1. CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
HOURLY WIND	400 Pa
RADIAL ICE THICKNESS	12.7 mm (1/2")
CONDUCTOR TEMPERATURE	-20°C
2.2. CSA 22.3 No.60826 (IEC RELIABILITY DESIGN) - 1/50 PERIOD	
(i) IEC ICE (1/50)	22 mm @ -10°C
(ii) IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
(iii) COMBINED ICE (85%) & WIND (60%)	18.7 mm & 210 Pa @ -10°C

WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826.

B. CLEARANCE CRITERIA

1. MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2. ADDITIONAL SURVEY TOLERANCE:	0.3 m
3. VERTICAL GROUND CLEARANCE:	
3.1. MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	5.50 m
3.2. DESIGN VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	6.50 m
4. VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1. PHASE CONDUCTOR	
(i) MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii) DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
(iii) RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5. PHASE CLEARANCE CONDITIONS:	
(i) HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
(ii) HOURLY WIND (NATIONAL BUILDING CODE 1/30)	480 Pa (~100 km/hr)
(iii) GALLOPING	
GALLOPING SWING	290 Pa
GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1. MERCHANT CIRCUIT(S)	
1.1. NOMINAL SYSTEM VOLTAGE	124 kV
1.2. NUMBER OF PHASES	3 (THREE)
1.3. SYSTEM FREQUENCY	60 Hz
1.4. SYSTEM GROUNDING	LOW IMPEDANCE
1.5. NUMBER OF CIRCUIT	1 (ONE)
1.6. MAXIMUM CIRCUIT CURRENT	560A PER CIRCUIT
1.7. PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8. DESIGN CONDUCTOR TEMPERATURE	75°C

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/13	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	D.W.	R.Y.				
A	15/11/13	CONCEPTUAL ISSUE	R.Y.	E.K.				

ISS	D/M/Y	APP	ISSUED FOR	REF	NUMBER	TITLE
B	15/01/13		ISSUED FOR LEAVE TO CONSTRUCT APPLICATION			
A	15/11/13		ISSUED FOR REVIEW			

REFERENCES

STAMP/SEAL

APPROVED FOR CONSTRUCTION

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO.	ACTIVITY NO.	PACKAGE CODE

SCALE: N.T.S. (11"x17")

	BY	D/M/Y
DSN.	E.KWONG	23/10/13
DRN.	R.YIP	23/10/13

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE
LIGHT ANGLE (2 - 15°) FRAMING

amec

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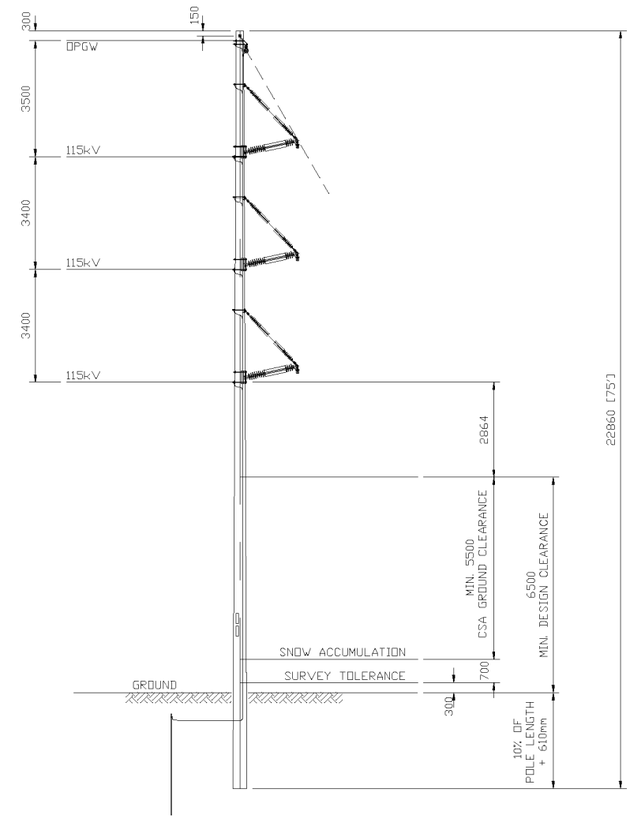
3950 Fourteenth Ave. East, Suite 506
Markham, On., L3R 0A9
Email: chimax@chimax.ca

CLIENT DWG. NO.

DRAWING NO. 1325-P202

REV. B

CADD FILE ADDRESS
1325-P202-B



1CCT 115kV TRANSMISSION LINE
TANGENT (0 - 2°) FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA:

A. DESIGN CRITERIA

1. METEOROLOGICAL LOCATION:	FOREST/GODERICH
2. MINIMUM DESIGN LOADING	
2.1. CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
HOURLY WIND	400 Pa
RADIAL ICE THICKNESS	12.7 mm (1/2")
CONDUCTOR TEMPERATURE	-20°C
2.2. CSA 22.3 No.60826 (IEC RELIABILITY DESIGN) - 1/50 PERIOD	
(i) IEC ICE (1/50)	22 mm @ -10°C
(ii) IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
(iii) COMBINED ICE (85%) & WIND (60%)	18.7 mm & 210 Pa @ -10°C

WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826.

B. CLEARANCE CRITERIA

1. MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2. ADDITIONAL SURVEY TOLERANCE:	0.3 m
3. VERTICAL GROUND CLEARANCE:	
3.1. MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	5.50 m
3.2. DESIGN VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	6.50 m
4. VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1. PHASE CONDUCTOR	
(i) MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii) DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
(iii) RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5. PHASE CLEARANCE CONDITIONS:	
(i) HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
(ii) HOURLY WIND (NATIONAL BUILDING CODE 1/30)	480 Pa (~100 km/hr)
(iii) GALLOPING	
GALLOPING SWING	290 Pa
GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1. MERCHANT CIRCUIT(S)	
1.1. NOMINAL SYSTEM VOLTAGE	124 kV
1.2. NUMBER OF PHASES	3 (THREE)
1.3. SYSTEM FREQUENCY	60 Hz
1.4. SYSTEM GROUNDING	LOW IMPEDANCE
1.5. NUMBER OF CIRCUIT	1 (ONE)
1.6. MAXIMUM CIRCUIT CURRENT	560A PER CIRCUIT
1.7. PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8. DESIGN CONDUCTOR TEMPERATURE	75°C

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/13	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	D.W.	R.Y.				
A	15/11/13	CONCEPTUAL ISSUE	R.Y.	E.K				

ISS	D/M/Y	APP	ISSUED FOR
B	15/01/13		ISSUED FOR LEAVE TO CONSTRUCT APPLICATION
A	15/11/13		ISSUED FOR REVIEW

REF	NUMBER	REFERENCES

STAMP/SEAL

APPROVED FOR CONSTRUCTION

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO.	ACTIVITY NO.	PACKAGE CODE

SCALE	BY	D/M/Y
N.T.S. (11"x17")	DSN. E.KWONG	23/10/13
	DRN. R.YIP	23/10/13

AREA: SUNCOR ENERGY
CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE
TANGENT (0 - 2°) FRAMING

amec

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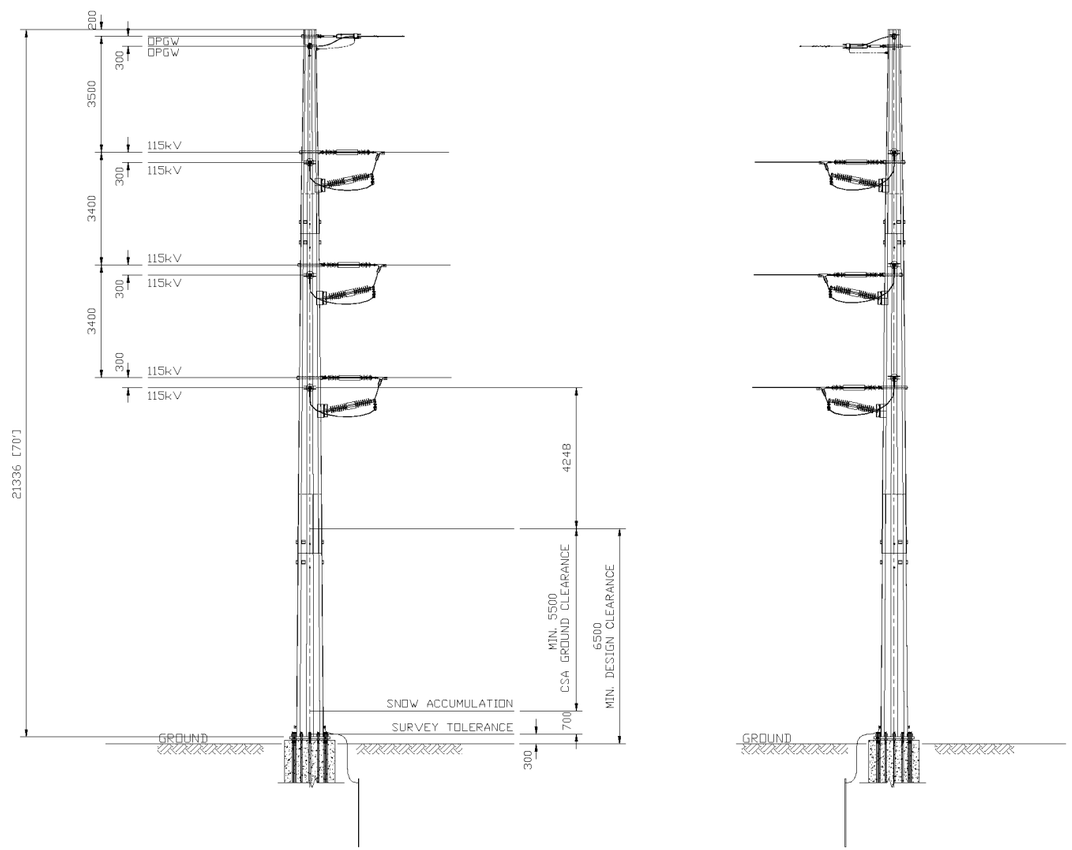
Email: chimax@chimax.ca

CLIENT DWG. NO.

DRAWING NO. 1325-P201

REV. B

CADD FILE ADDRESS
1325-P201-B



1CCT 115kV TRANSMISSION LINE
STEEL POLE HEAVY ANGLE (60 - 90°) FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA:

A. DESIGN CRITERIA

1. METEOROLOGICAL LOCATION:	FOREST/GODERICH
2. MINIMUM DESIGN LOADING	
2.1. CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
HOURLY WIND	400 Pa
RADIAL ICE THICKNESS	12.7 mm (1/2")
CONDUCTOR TEMPERATURE	-20°C
2.2. CSA 22.3 No.60826 (IEC RELIABILITY DESIGN) - 1/50 PERIOD	
(i) IEC ICE (1/50)	22 mm @ -10°C
(ii) IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
(iii) COMBINED ICE (85%) & WIND (60%)	18.7 mm & 210 Pa @ -10°C
WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826.	

B. CLEARANCE CRITERIA

1. MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2. ADDITIONAL SURVEY TOLERANCE:	0.3 m
3. VERTICAL GROUND CLEARANCE:	
3.1. MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	5.50 m
3.2. DESIGN VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	6.50 m
4. VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1. PHASE CONDUCTOR	
(i) MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii) DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
(iii) RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5. PHASE CLEARANCE CONDITIONS:	
(i) HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
(ii) HOURLY WIND (NATIONAL BUILDING CODE 1/30)	480 Pa (~100 km/hr)
(iii) GALLOPING	
GALLOPING SWING	290 Pa
GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1. MERCHANT CIRCUIT(S)	
1.1. NOMINAL SYSTEM VOLTAGE	124 kV
1.2. NUMBER OF PHASES	3 (THREE)
1.3. SYSTEM FREQUENCY	60 Hz
1.4. SYSTEM GROUNDING	LOW IMPEDANCE
1.5. NUMBER OF CIRCUIT	1 (ONE)
1.6. MAXIMUM CIRCUIT CURRENT	560A PER CIRCUIT
1.7. PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8. DESIGN CONDUCTOR TEMPERATURE	75°C

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/13	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	D.M.	R.Y.				
A	15/11/13	CONCEPTUAL ISSUE	R.Y.	E.K.				

ISS	D/M/Y	ISSUED FOR
B	15/01/13	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION
A	15/11/13	ISSUED FOR REVIEW

REF	NUMBER	REFERENCES TITLE

STAMP/SEAL

APPROVED FOR CONSTRUCTION

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO.	ACTIVITY NO.	PACKAGE CODE

SCALE: N.T.S. (11"x17")

BY		D/M/Y
DSN.	E.KWONG	23/10/13
DRN.	D.MAO	23/10/13

AREA: SUNCOR ENERGY
CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE
HEAVY ANGLE (60 - 90°)
STEEL POLE FRAMING

amec

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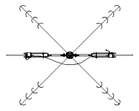
Email: chimax@chimax.ca

CLIENT DWG. NO.

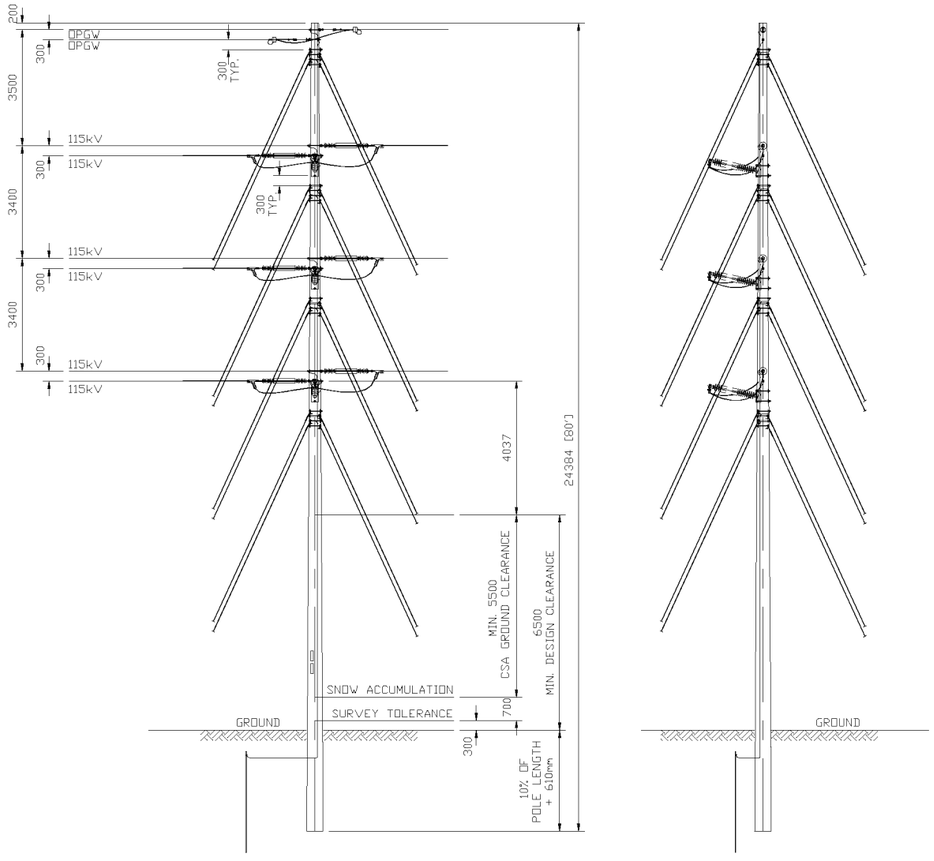
DRAWING NO. 1325-P207

REV. B

CADD FILE ADDRESS
1325-P207-B



PLAN VIEW



1CCT 115kV TRANSMISSION LINE
DOUBLE DEADEND FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA:

A. DESIGN CRITERIA

1. METEOROLOGICAL LOCATION:	FOREST/GODERICH
2. MINIMUM DESIGN LOADING	
2.1. CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
HOURLY WIND	400 Pa
RADIAL ICE THICKNESS	12.7 mm (1/2")
CONDUCTOR TEMPERATURE	-20°C
2.2. CSA 22.3 No.60826 (IEC RELIABILITY DESIGN) - 1/50 PERIOD	
(i) IEC ICE (1/50)	22 mm @ -10°C
(ii) IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
(iii) COMBINED ICE (85%) & WIND (60%)	18.7 mm & 210 Pa @ -10°C

WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826.

B. CLEARANCE CRITERIA

1. MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2. ADDITIONAL SURVEY TOLERANCE:	0.3 m
3. VERTICAL GROUND CLEARANCE:	
3.1. MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	5.50 m
3.2. DESIGN VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	6.50 m
4. VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1. PHASE CONDUCTOR	
(i) MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii) DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
(iii) RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5. PHASE CLEARANCE CONDITIONS:	
(i) HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
(ii) HOURLY WIND (NATIONAL BUILDING CODE 1/30)	480 Pa (~100 km/hr)
(iii) GALLOPING	
GALLOPING SWING	290 Pa
GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1. MERCHANT CIRCUIT(S)	
1.1. NOMINAL SYSTEM VOLTAGE	124 kV
1.2. NUMBER OF PHASES	3 (THREE)
1.3. SYSTEM FREQUENCY	60 Hz
1.4. SYSTEM GROUNDING	LOW IMPEDANCE
1.5. NUMBER OF CIRCUIT	1 (ONE)
1.6. MAXIMUM CIRCUIT CURRENT	560A PER CIRCUIT
1.7. PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8. DESIGN CONDUCTOR TEMPERATURE	75°C

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/13	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	D.W.	R.Y.				
A	15/11/13	CONCEPTUAL ISSUE	R.Y.	E.K.				

ISS	D/M/Y	ISSUED FOR	APP
B	15/01/13	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	
A	15/11/13	ISSUED FOR REVIEW	

REF	NUMBER	REFERENCES TITLE

STAMP/SEAL

APPROVED FOR CONSTRUCTION

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO. | ACTIVITY NO. | PACKAGE CODE

SCALE: N.T.S. (11"x17")

	BY	D/M/Y
DSN.	E.KWONG	23/10/13
DRN.	R.YIP	23/10/13

AREA: SUNCOR ENERGY
CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE
DOUBLE DEADEND FRAMING

CLIENT DWG. NO.

DRAWING NO. 1325-P206 | REV. B

CADD FILE ADDRESS
1325-P206-B

amec

Chimax Inc.
Engineering Company
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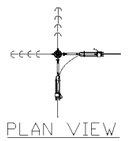
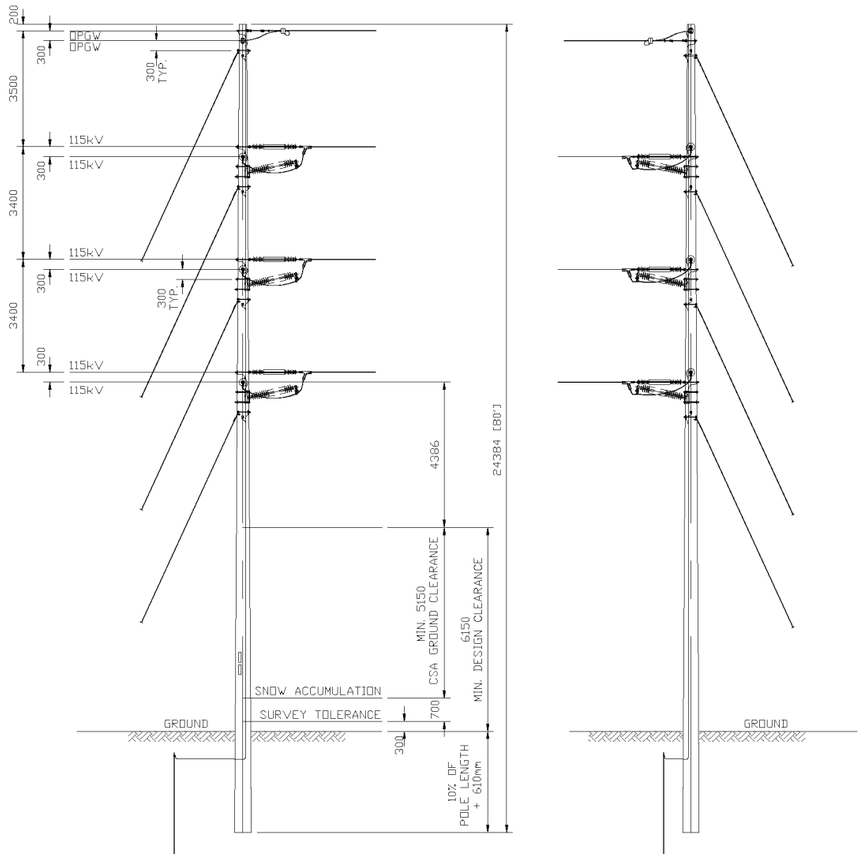
Email: chimax@chimax.ca





1CCT 115kV TRANSMISSION LINE
HEAVY ANGLE (60 - 90°) DEADEND FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA:

A. DESIGN CRITERIA

1. METEOROLOGICAL LOCATION:	FOREST/GODERICH
2. MINIMUM DESIGN LOADING	
2.1. CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
HOURLY WIND	400 Pa
RADIAL ICE THICKNESS	12.7 mm (1/2")
CONDUCTOR TEMPERATURE	-20°C
2.2. CSA 22.3 No.60826 (IEC RELIABILITY DESIGN) - 1/50 PERIOD	
(i) IEC ICE (1/50)	22 mm @ -10°C
(ii) IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
(iii) COMBINED ICE (85%) & WIND (60%)	18.7 mm & 210 Pa @ -10°C
WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826.	

B. CLEARANCE CRITERIA

1. MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2. ADDITIONAL SURVEY TOLERANCE:	0.3 m
3. VERTICAL GROUND CLEARANCE:	
3.1. MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	5.50 m
3.2. DESIGN VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	6.50 m
4. VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1. PHASE CONDUCTOR	
(i) MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii) DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
(iii) RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5. PHASE CLEARANCE CONDITIONS:	
(i) HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
(ii) HOURLY WIND (NATIONAL BUILDING CODE 1/30)	480 Pa (~100 km/hr)
(iii) GALLOPING	
GALLOPING SWING	290 Pa
GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1. MERCHANT CIRCUIT(S)	
1.1. NOMINAL SYSTEM VOLTAGE	124 kV
1.2. NUMBER OF PHASES	3 (THREE)
1.3. SYSTEM FREQUENCY	60 Hz
1.4. SYSTEM GROUNDING	LOW IMPEDANCE
1.5. NUMBER OF CIRCUIT	1 (ONE)
1.6. MAXIMUM CIRCUIT CURRENT	560A PER CIRCUIT
1.7. PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8. DESIGN CONDUCTOR TEMPERATURE	75°C

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/13	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	D.M.	R.Y.				
A	15/11/13	CONCEPTUAL ISSUE	R.Y.	E.K.				

ISS	D/M/Y	ISSUED FOR
B	15/01/13	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION
A	15/11/13	ISSUED FOR REVIEW

REF	NUMBER	TITLE
		REFERENCES

STAMP/SEAL

APPROVED FOR CONSTRUCTION

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO.	ACTIVITY NO.	PACKAGE CODE

SCALE: N.T.S. (11"x17")

	BY	D/M/Y
DSN.	E.KWONG	23/10/13
DRN.	R.YIP	23/10/13

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE
HEAVY ANGLE (60 - 90°) DEADEND FRAMING

amec

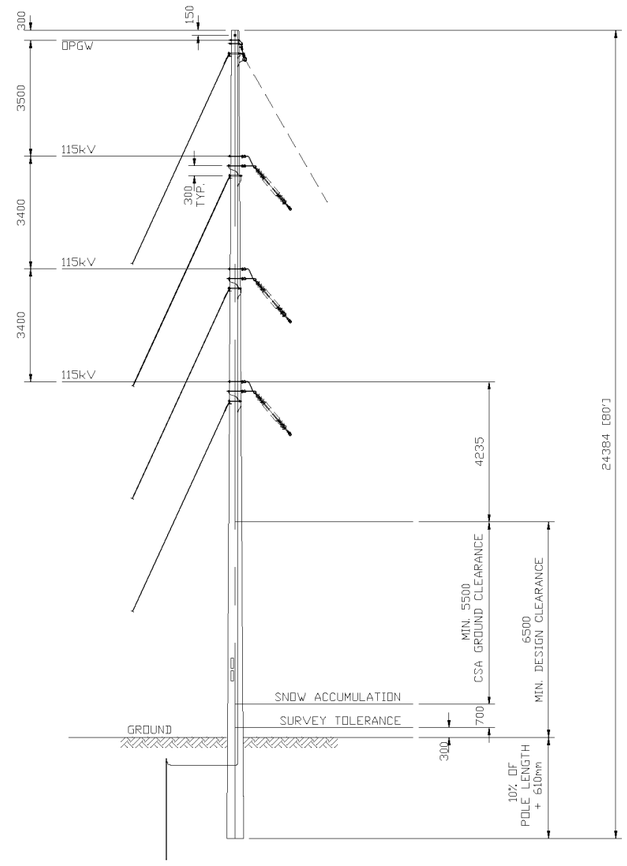
Chimax Inc.
Engineering Company
3850 Fourteenth Ave. East, Suite 506
Markham, On., L3R 0A9
Email: chimax@chimax.ca

CLIENT DWG. NO.

DRAWING NO. 1325-P205

REV. B

CADD FILE ADDRESS 1325-P205-B



1CCT 115kV TRANSMISSION LINE
MEDIUM ANGLE (15 - 30°) FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA:

A. DESIGN CRITERIA

1. METEOROLOGICAL LOCATION:	FOREST/GODERICH
2. MINIMUM DESIGN LOADING	
2.1. CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
HOURLY WIND	400 Pa
RADIAL ICE THICKNESS	12.7 mm (1/2")
CONDUCTOR TEMPERATURE	-20°C
2.2. CSA 22.3 No.60826 (IEC RELIABILITY DESIGN) - 1/50 PERIOD	
(i) IEC ICE (1/50)	22 mm @ -10°C
(ii) IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
(iii) COMBINED ICE (85%) & WIND (60%)	18.7 mm & 210 Pa @ -10°C
WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826.	

B. CLEARANCE CRITERIA

1. MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2. ADDITIONAL SURVEY TOLERANCE:	0.3 m
3. VERTICAL GROUND CLEARANCE:	
3.1. MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	5.50 m
3.2. DESIGN VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	6.50 m
4. VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1. PHASE CONDUCTOR	
(i) MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii) DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
(iii) RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5. PHASE CLEARANCE CONDITIONS:	
(i) HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
(ii) HOURLY WIND (NATIONAL BUILDING CODE 1/30)	480 Pa (~100 km/hr)
(iii) GALLOPING	
GALLOPING SWING	290 Pa
GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1. MERCHANT CIRCUIT(S)	
1.1. NOMINAL SYSTEM VOLTAGE	124 kV
1.2. NUMBER OF PHASES	3 (THREE)
1.3. SYSTEM FREQUENCY	60 Hz
1.4. SYSTEM GROUNDING	LOW IMPEDANCE
1.5. NUMBER OF CIRCUIT	1 (ONE)
1.6. MAXIMUM CIRCUIT CURRENT	560A PER CIRCUIT
1.7. PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8. DESIGN CONDUCTOR TEMPERATURE	75°C

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/13	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	D.W.	R.Y.				
A	15/11/13	CONCEPTUAL ISSUE	R.Y.	E.K.				

ISS	D/M/Y	ISSUED FOR	APP
B	15/01/13	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	
A	15/11/13	ISSUED FOR REVIEW	

REF	NUMBER	REFERENCES TITLE

STAMP/SEAL

APPROVED FOR CONSTRUCTION

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO.	ACTIVITY NO.	PACKAGE CODE

SCALE	BY	D/M/Y
N.T.S. (11"x17")	DSN. E.KWONG	23/10/13
	DRN. R.YIP	23/10/13

AREA: SUNCOR ENERGY
CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE
TANGENT (15 - 30°) FRAMING

CLIENT DWG. NO.

DRAWING NO. 1325-P203

REV. B

CADD FILE ADDRESS
1325-P203-B

amec

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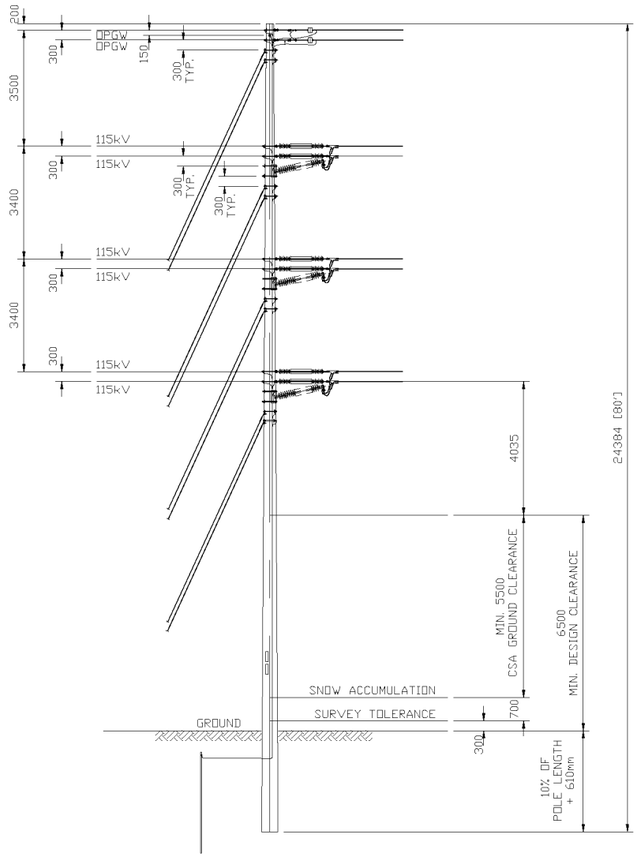

1CCT 115kV TRANSMISSION LINE
MEDIUM ANGLE (30 - 60°) DEADEND FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA:

A. DESIGN CRITERIA

1. METEOROLOGICAL LOCATION:	FOREST/GODERICH
2. MINIMUM DESIGN LOADING	
2.1. CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
HOURLY WIND	400 Pa
RADIAL ICE THICKNESS	12.7 mm (1/2")
CONDUCTOR TEMPERATURE	-20°C
2.2. CSA 22.3 No.60826 (IEC RELIABILITY DESIGN) - 1/50 PERIOD	
(i) IEC ICE (1/50)	22 mm @ -10°C
(ii) IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
(iii) COMBINED ICE (85%) & WIND (60%)	18.7 mm & 210 Pa @ -10°C

WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826.

B. CLEARANCE CRITERIA

1. MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2. ADDITIONAL SURVEY TOLERANCE:	0.3 m
3. VERTICAL GROUND CLEARANCE:	
3.1. MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	5.50 m
3.2. DESIGN VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	6.50 m
4. VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1. PHASE CONDUCTOR	
(i) MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii) DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
(iii) RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5. PHASE CLEARANCE CONDITIONS:	
(i) HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
(ii) HOURLY WIND (NATIONAL BUILDING CODE 1/30)	480 Pa (~100 km/hr)
(iii) GALLOPING	
GALLOPING SWING	290 Pa
GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1. MERCHANT CIRCUIT(S)	
1.1. NOMINAL SYSTEM VOLTAGE	124 kV
1.2. NUMBER OF PHASES	3 (THREE)
1.3. SYSTEM FREQUENCY	60 Hz
1.4. SYSTEM GROUNDING	LOW IMPEDANCE
1.5. NUMBER OF CIRCUIT	1 (ONE)
1.6. MAXIMUM CIRCUIT CURRENT	560A PER CIRCUIT
1.7. PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8. DESIGN CONDUCTOR TEMPERATURE	75°C

REV	D/M/Y	REVISION	DR	CHK	APP	APP	APP	APP
B	15/01/13	ISSUED FOR LEAVE TO CONSTRUCT APPLICATION	D.W.	R.Y.				
A	15/11/13	CONCEPTUAL ISSUE	R.Y.	E.K.				

ISS	D/M/Y	APP	ISSUED FOR
B	15/01/13		ISSUED FOR LEAVE TO CONSTRUCT APPLICATION
A	15/11/13		ISSUED FOR REVIEW

REF	NUMBER	TITLE

REFERENCES

STAMP/SEAL

APPROVED FOR CONSTRUCTION

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO.	ACTIVITY NO.	PACKAGE CODE

SCALE: N.T.S. (11"x17")

	BY	D/M/Y
DSN.	E.KWONG	23/10/13
DRN.	R.YIP	23/10/13

AREA: SUNCOR ENERGY CEDAR POINT WIND PROJECT

SUBJECT: 1CCT 115kV TRANSMISSION LINE
MEDIUM ANGLE (30 - 60°) FRAMING

amec

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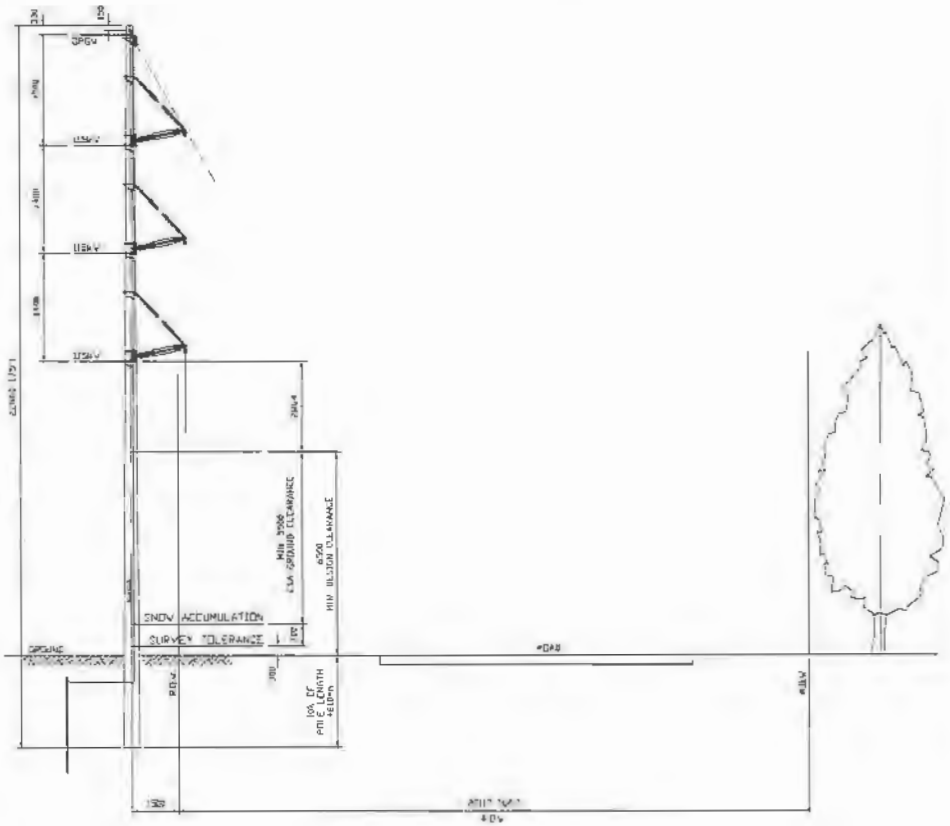
CLIENT DWG. NO.

DRAWING NO. 1325-P204

REV. B

CADD FILE ADDRESS
1325-P204-B



DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA.

A. DESIGN CRITERIA

1.	METEOROLOGICAL LOCATION:	FORESTGODERICH
2.	MINIMUM DESIGN LOADING	
2.1.	CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
	HOURLY WIND	400 Pa
	RADIAL ICE THICKNESS	12.7 mm (1/2")
	CONDUCTOR TEMPERATURE	-20°C
2.2.	CSA 22.3 No 60826 (IEC RELIABILITY DESIGN) - 150 PERIOD	
(i)	IEC ICE (1/50)	22 mm @ -10°C
(ii)	IEC WIND (1/50)	111 km/h (382.77 Pa) @ -10°C
(iii)	COMBINED ICE (2.5%) & WIND (50%)	18.7 mm & 210 Pa @ -30°C
	WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826	

B. CLEARANCE CRITERIA

1.	MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2.	ADDITIONAL SURVEY TOLERANCE:	0.3 m
3.	VERTICAL GROUND CLEARANCE:	
3.1.	MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
	115kV / 138kV CONDUCTOR	5.50 m
3.2.	DESIGN VERTICAL GROUND CLEARANCE	
	115kV / 138kV CONDUCTOR	6.50 m
4.	VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1.	PHASE CONDUCTOR:	
(i)	MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii)	DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD 738)	75°C
(iii)	RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5.	PHASE CLEARANCE CONDITIONS:	
(i)	HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
(ii)	HOURLY WIND (NATIONAL BUILDING CODE 1/10)	400 Pa (~100 km/hr)
(iii)	GALLOPING	
	GALLOPING SWING	290 Pa
	GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1.	MERCHANT CIRCUIT(S)	
1.1.	NOMINAL SYSTEM VOLTAGE	124 kV
1.2.	NUMBER OF PHASES	3 (THREE)
1.3.	SYSTEM FREQUENCY	60 Hz
1.4.	SYSTEM GROUNDING	LOW IMPEDANCE
1.5.	NUMBER OF CIRCUIT	1 (ONE)
1.6.	MAXIMUM CIRCUIT CURRENT	560A PER CIRCUIT
1.7.	PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8.	DESIGN CONDUCTOR TEMPERATURE	75°C

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Chimaux Inc.

SUNCOR ENERGY
COMP POINT WIND PROJECT

1CCT 115kV TRANSMISSION LINE
TANGENT STRUCTURE
CONCEPTUAL RIGHT OF WAY DESIGN

13251-P003

ICCT 115kV TRANSMISSION LINE
TANGENT (0 – 2°) FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA:

A. DESIGN CRITERIA

1.	METEOROLOGICAL LOCATION:	FORESTGODERICH
2.	MINIMUM DESIGN LOADING	
2.1.	CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
	HOURLY WIND	400 Pa
	RADIAL ICE THICKNESS	12.7 mm (1/2")
	CONDUCTOR TEMPERATURE	-20°C
2.2.	CSA 22.3 No. 60826 (IEC RELIABILITY DESIGN) – 1/50 PERIOD	
	(i) IEC ICE (1/50)	22 mm @ -10°C
	(ii) IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
	(iii) COMBINED ICE (65%) & WIND (60%)	18.7 mm & 210 Pa @ -40°C
	WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826.	

B. CLEARANCE CRITERIA

1.	MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2.	ADDITIONAL SURVEY TOLERANCE:	0.3 m
3.	VERTICAL GROUND CLEARANCE:	
3.1.	MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
	115kV / 138kV CONDUCTOR	5.50 m
3.2.	DESIGN VERTICAL GROUND CLEARANCE	
	115kV / 138kV CONDUCTOR	6.50 m
4.	VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1.	PHASE CONDUCTOR	
	(i) MAXIMUM CONDUCTOR TEMPERATURE	100°C
	(ii) DESIGN CONDUCTOR TEMPERATURES (AS PER IEEE STD 738)	75°C
	(iii) RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5.	PHASE CLEARANCE CONDITIONS:	
	(i) HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
	(ii) HOURLY WIND (NATIONAL BUILDING CODE 1/30)	490 Pa (~100 km/hr)
	(iii) GALLOPING	
	GALLOPING SWING	290 Pa
	GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1.	MERCHANT CIRCUIT(S)	
1.1.	NOMINAL SYSTEM VOLTAGE	134 kV
1.2.	NUMBER OF PHASES	3 (THREE)
1.3.	SYSTEM FREQUENCY	60 Hz
1.4.	SYSTEM GROUNDING	LOW IMPEDANCE
1.5.	NUMBER OF CIRCUIT	1 (ONE)
1.6.	MAXIMUM CIRCUIT CURRENT	560A PER CIRCUIT
1.7.	PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8.	DESIGN CONDUCTOR TEMPERATURE	75°C

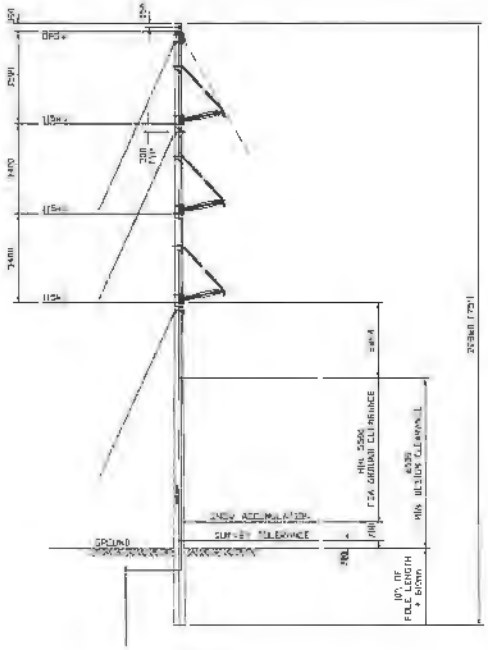
amec

Chimax Inc.

SUNCOR ENERGY
CEDAR POINT WIND PROJECT

ICCT 115kV TRANSMISSION LINE
TANGENT (0 – 2°) FRAMING

DRAWING NO. 1325-F201 REV. B



115kV TRANSMISSION LINE
LIGHT ANGLE (2 – 15°) FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA.

A. DESIGN CRITERIA

1.	METEOROLOGICAL LOCATION:	FOREST/GODERICH
2.	MINIMUM DESIGN LOADING	
2.1.	CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
	HOURLY WIND	400 Pa
	RADIAL ICE THICKNESS	12.7 mm (1/2")
	CONDUCTOR TEMPERATURE	-20°C
2.2.	CSA 22.3 No 60826 (IEC RELIABILITY DESIGN) - 150 PERIOD	
(i)	IEC ICE (1/50)	22 mm @ -10°C
(ii)	IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
(iii)	COMBINED ICE (65%) & WIND (60%)	18.7 mm & 210 Pa @ -10°C
	WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826.	

B. CLEARANCE CRITERIA

1.	MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2.	ADDITIONAL SURVEY TOLERANCE:	0.3 m
3.	VERTICAL GROUND CLEARANCE:	
3.1.	MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
	115kV / 138kV CONDUCTOR	5.50 m
3.2.	DESIGN VERTICAL GROUND CLEARANCE	
	115kV / 138kV CONDUCTOR	6.50 m
4.	VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1.	PHASE CONDUCTOR	
(i)	MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii)	DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
(iii)	RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5.	PHASE CLEARANCE CONDITIONS:	
(i)	HOURLY WIND (NATIONAL BUILDING CODE 1/50)	530 Pa (~104 km/hr)
(ii)	HOURLY WIND (NATIONAL BUILDING CODE 1/20)	400 Pa (~100 km/hr)
(iii)	GALLOPING	
	GALLOPING SWING	290 Pa
	GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1.	MERCHANT CIRCUIT(S)	
1.1.	NOMINAL SYSTEM VOLTAGE	124 kV
1.2.	NUMBER OF PHASES	3 (THREE)
1.3.	SYSTEM FREQUENCY	60 Hz
1.4.	SYSTEM GROUNDING	LOW IMPEDANCE
1.5.	NUMBER OF CIRCUIT	1 (ONE)
1.6.	MAXIMUM CIRCUIT CURRENT	564A PER CIRCUIT
1.7.	PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8.	DESIGN CONDUCTOR TEMPERATURE	75°C

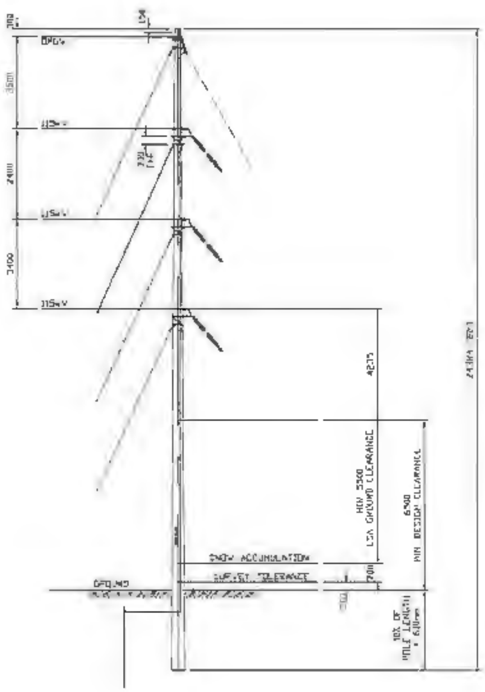
amec

Chimax Inc.

SUNCOR ENERGY
CEDAR POINT WIND PROJECT

115kV TRANSMISSION LINE
LIGHT ANGLE (2 – 15°) FRAMING

1325-P202



ICCT 115kV TRANSMISSION LINE
MEDIUM ANGLE (15 – 30°) FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA:

A. DESIGN CRITERIA

1. METEOROLOGICAL LOCATION:	FOREST/GODERICH
2. MINIMUM DESIGN LOADING	
2.1. CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
HOURLY WIND	400 Pa
RADIAL ICE THICKNESS	12.7 mm (1/2")
CONDUCTOR TEMPERATURE	-20°C
2.2. CSA 22.3 No.60826 (IEC RELIABILITY DESIGN) - 1/50 PERIOD	
(i) IEC ICE (1/50)	22 mm @ -10°C
(ii) IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
(iii) COMBINED ICE (85%) & WIND (60%)	18.7 mm & 210 Pa @ -10°C
WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826	

B. CLEARANCE CRITERIA

1. MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2. ADDITIONAL SURVEY TOLERANCE:	0.3 m
3. VERTICAL GROUND CLEARANCE:	
3.1. MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	5.50 m
3.2. DESIGN VERTICAL GROUND CLEARANCE	
115kV / 138kV CONDUCTOR	6.50 m
4. VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1. PHASE CONDUCTOR	
(i) MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii) DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
(iii) RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5. PHASE CLEARANCE CONDITIONS:	
(i) HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
(ii) HOURLY WIND (NATIONAL BUILDING CODE 1/30)	480 Pa (~100 km/hr)
(iii) GALLOPING	
GALLOPING SWING	290 Pa
GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1. MERCHANT CIRCUIT(S)	
1.1. NOMINAL SYSTEM VOLTAGE	124 kV
1.2. NUMBER OF PHASES	3 (THREE)
1.3. SYSTEM FREQUENCY	60 Hz
1.4. SYSTEM GROUNDING	LOW IMPEDANCE
1.5. NUMBER OF CIRCUIT	1 (ONE)
1.6. MAXIMUM CIRCUIT CURRENT	560A PER CIRCUIT
1.7. PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8. DESIGN CONDUCTOR TEMPERATURE	75°C

amec

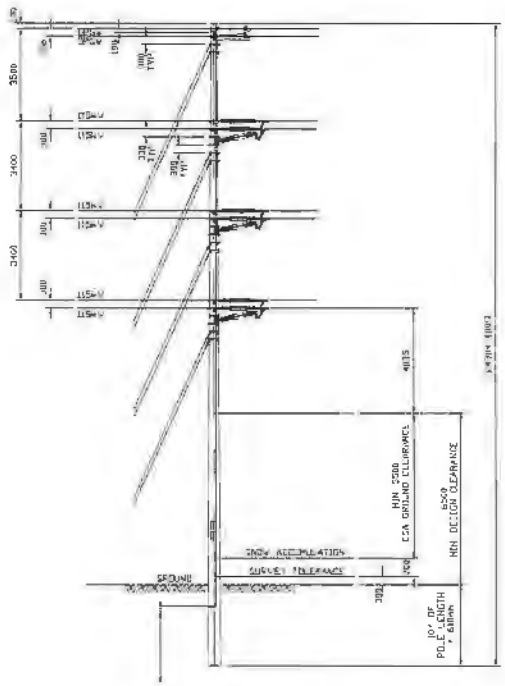
Chimax Inc.
Engineering Company

SUNCOR ENERGY
CEDAR POINT WIND PROJECT

SUBJECT: ICCT 115kV TRANSMISSION LINE
TANGENT (0 – 2°) FRAMING

DRAWING NO. 1325-P201
REV. A

PLAN VIEW



CCT 115kV TRANSMISSION LINE
MEDIUM ANGLE (30 - 60°) DEADEND FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA.

A. DESIGN CRITERIA

1.	METEOROLOGICAL LOCATION:	FOREST/GODERICH
2.	MINIMUM DESIGN LOADING	
2.1.	CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
	HOURLY WIND	400 Pa
	RADIAL ICE THICKNESS	12.7 mm (1/2")
	CONDUCTOR TEMPERATURE	-20°C
2.2.	CSA 22.3 No.60826 (DEC RELIABILITY DESIGN) – 150 PERIOD	
	(i) IEC ICE (1/50)	22 mm @ -10°C
	(ii) IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
	(iii) COMBINED ICE (85%) & WIND (60%)	18.7 mm & 210 Pa @ -10°C
	WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826.	

B. CLEARANCE CRITERIA

1.	MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2.	ADDITIONAL SURVEY TOLERANCE:	0.3 m
3.	VERTICAL GROUND CLEARANCE:	
3.1.	MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE:	
	115kV / 138kV CONDUCTOR	5.50 m
3.2.	DESIGN VERTICAL GROUND CLEARANCE	
	115kV / 138kV CONDUCTOR	6.50 m
4.	VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1.	PHASE CONDUCTOR:	
	(i) MAXIMUM CONDUCTOR TEMPERATURE	100°C
	(ii) DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
	(iii) RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5.	PHASE CLEARANCE CONDITIONS:	
	(i) HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
	(ii) HOURLY WIND (NATIONAL BUILDING CODE 1/30)	400 Pa (~100 km/hr)
	(iii) GALLOPING	
	GALLOPING SWING	290 Pa
	GALLOPING ICE	12.7 mm (1/2")

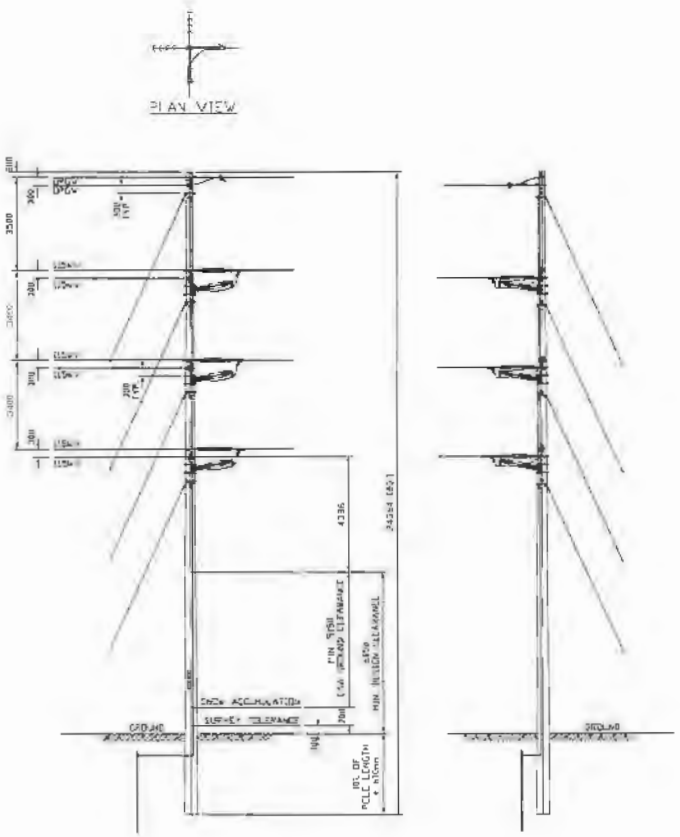
C. WIND POWER PROJECT CIRCUITS DATA

1.	MERCHANT CIRCUIT(S)	
1.1.	NOMINAL SYSTEM VOLTAGE	124 kV
1.2.	NUMBER OF PHASES	3 (THREE)
1.3.	SYSTEM FREQUENCY	60 Hz
1.4.	SYSTEM GROUNDING	LOW IMPEDANCE
1.5.	NUMBER OF CIRCUIT	1 (ONE)
1.6.	MAXIMUM CIRCUIT CURRENT	500A PER CIRCUIT
1.7.	PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8.	DESIGN CONDUCTOR TEMPERATURE	75°C

amec

Chimex Inc.

SUBJECT	CCT 115kV TRANSMISSION LINE
	MEDIUM ANGLE (30 - 60°) FRAMING
DRAWING NO	1325-P204
REV	A



1CCT 115kV TRANSMISSION LINE
HEAVY ANGLE (60 - 90°) DEADEND FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA:

A. DESIGN CRITERIA

1.	METEOROLOGICAL LOCATION:	FORESTAS/PERCH
2.	MINIMUM DESIGN LOADING	
2.1.	CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
	HOURLY WIND	400 Pa
	RADIAL ICE THICKNESS	12.7 mm (1/2")
	CONDUCTOR TEMPERATURE	-20°C
2.2.	CSA 22.3 No. 60826 (IEC RELIABILITY DESIGN) - 1/50 PERIOD	
(i)	IEC ICE (1/50)	22 mm @ -10°C
(ii)	IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
(iii)	COMBINED ICE (85%) & WIND (60%)	18.7 mm & 230 Pa @ -10°C
	WIRE ADJUSTMENT MODELS & MATERIAL FACTOR$ AS PER CSA 22.3 No. 60826.	

B. CLEARANCE CRITERIA

1.	MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2.	ADDITIONAL SURVEY TOLERANCE:	0.3 m
3.	VERTICAL GROUND CLEARANCE:	
3.1.	MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
	115kV / 138kV CONDUCTOR	5.50 m
3.2.	DESIGN VERTICAL GROUND CLEARANCE	
	115kV / 138kV CONDUCTOR	6.50 m
4.	VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1.	PHASE CONDUCTOR	
(i)	MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii)	DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
(iii)	RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5.	PHASE CLEARANCE CONDITIONS:	
(i)	HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
(ii)	HOURLY WIND (NATIONAL BUILDING CODE 1/50)	400 Pa (~100 km/hr)
(iii)	GALLOPING	
	GALLOPING SWING	290 Pa
	GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1.	MERCHANT CIRCUIT(S)	
1.1.	NOMINAL SYSTEM VOLTAGE	124 kV
1.2.	NUMBER OF PHASES	3 (THREE)
1.3.	SYSTEM FREQUENCY	60 Hz
1.4.	SYSTEM GROUNDING	LOW IMPEDANCE
1.5.	NUMBER OF CIRCUIT	1 (ONE)
1.6.	MAXIMUM CIRCUIT CURRENT	560A PER CIRCUIT
1.7.	PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8.	DESIGN CONDUCTOR TEMPERATURE	75°C

amec

Chimax Inc.

SENIOR ENERGY
SCAN POINT WIND PROJECT

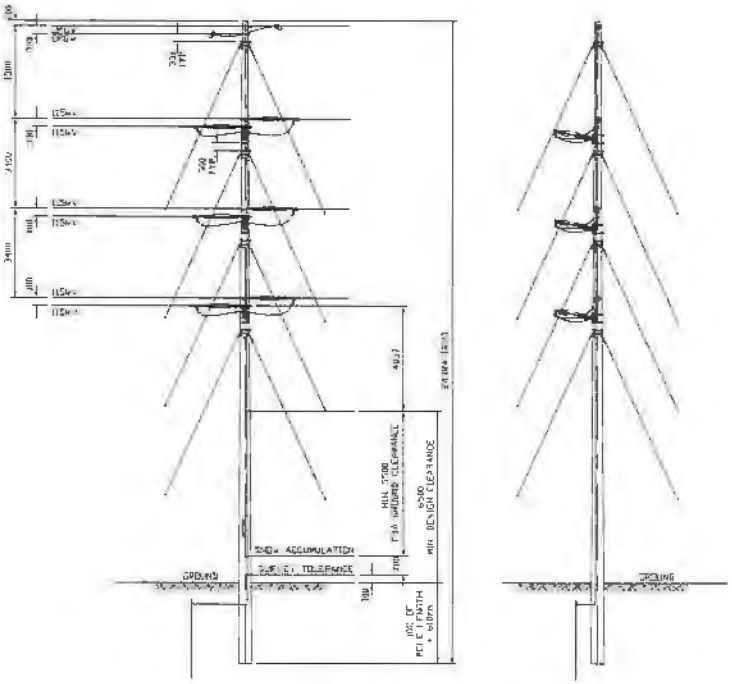
1CCT 115kV TRANSMISSION LINE

HEAVY ANGLE (60 - 90°)
DEADEND FRAMING

1505-P205

REV. A

PLAN VIEW



1CCT 115kV TRANSMISSION LINE
DOUBLE DEADEND FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA:

A. DESIGN CRITERIA

1.	METEOROLOGICAL LOCATION:	FORESTGODERICH
2.	MINIMUM DESIGN LOADING:	
2.1.	CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
	HOURLY WIND	400 Pa
	RADIAL ICE THICKNESS	12.7 mm (1/2")
	CONDUCTOR TEMPERATURE:	-20°C
2.2.	CSA 22.3 No.60826 (IEC RELIABILITY DESIGN) - 150 PERIOD	
(i)	IEC ICE (1/50)	22 mm @ -10°C
(ii)	IEC WIND (1/50)	111 km/h (582.77 Pa) @ -10°C
(iii)	COMBINED ICE (85%) & WIND (60%)	18.7 mm & 210 Pa @ -40°C
	WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826.	

B. CLEARANCE CRITERIA

1.	MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2.	ADDITIONAL SURVEY TOLERANCE:	0.3 m
3.	VERTICAL GROUND CLEARANCE:	
3.1.	MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
	115kV / 138kV CONDUCTOR	5.50 m
3.2.	DESIGN VERTICAL GROUND CLEARANCE	
	115kV / 138kV CONDUCTOR	6.50 m
4.	VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1.	PHASE CONDUCTOR	
(i)	MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii)	DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
(iii)	RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5	PHASE CLEARANCE CONDITIONS:	
(i)	HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~104 km/hr)
(ii)	HOURLY WIND (NATIONAL BUILDING CODE 1/10)	430 Pa (~100 km/hr)
(iii)	GALLOPING	
	GALLOPING SWING	290 Pa
	GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1.	MERCHANT CIRCUIT(S)	
1.1.	NOMINAL SYSTEM VOLTAGE	124 kV
1.2.	NUMBER OF PHASES	3 (THREE)
1.3.	SYSTEM FREQUENCY	60 Hz
1.4.	SYSTEM GROUNDING	LOW IMPEDANCE
1.5.	NUMBER OF CIRCUIT	1 (ONE)
1.6.	MAXIMUM CIRCUIT CURRENT	560A PER CIRCUIT
1.7.	PHASE CONDUCTOR SIZE	795 MCM ACSR (DRAKE)
1.8.	DESIGN CONDUCTOR TEMPERATURE	75°C

amec

Chimax Inc.

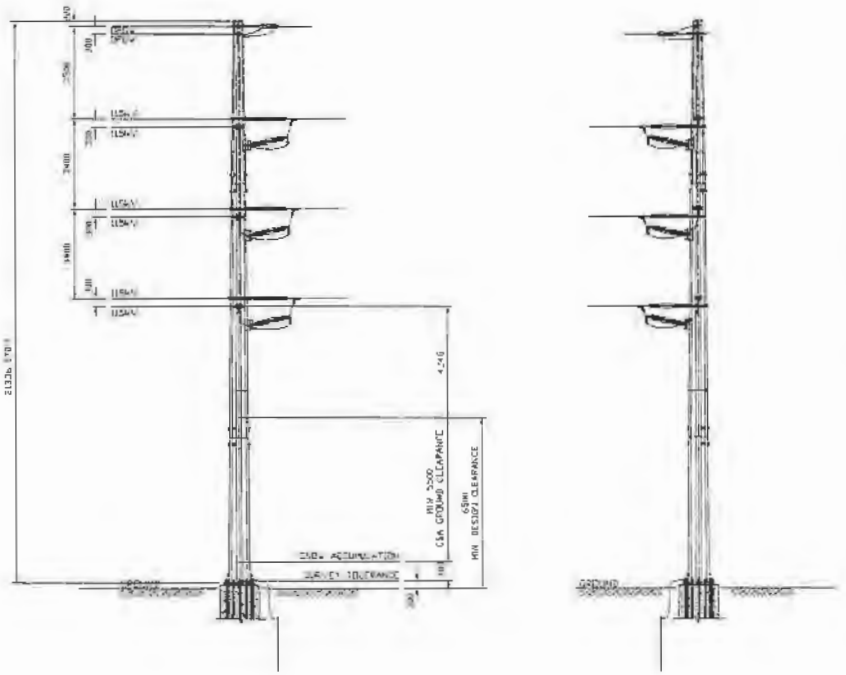
ZEPHYR ENERGY
ZEPHYR POINT WIND PROJECT

1CCT 115kV TRANSMISSION LINE

DOUBLE DEADEND FRAMING

DRAWING NO: 1325-P228

REV: A



1CCT 115kV TRANSMISSION LINE
STEEL POLE HEAVY ANGLE (60 - 90°) FRAMING

DESIGN NOTES:

THE PROPOSED STRUCTURE FRAMING, POLE REQUIREMENT AND RECOMMENDATION STANDARD SPAN ARE BASED ON THE FOLLOWING DESIGN DATA:

A. DESIGN CRITERIA

1.	METEOROLOGICAL LOCATION:	FOREST/GODERICH
2.	MINIMUM DESIGN LOADING	
2.1.	CSA 22.3 No.1 (LIMIT STATE DESIGN) - CSA HEAVY CONDITION	
	HOURLY WIND	400 Pa
	RADIAL ICE THICKNESS	12.7 mm (1/2")
	CONDUCTOR TEMPERATURE:	-20°C
2.2.	CSA 22.3 No.60826 (IEC RELIABILITY DESIGN) - 1/50 PERIOD	
(i)	IEC ICE (1/50)	22 mm @ -10°C
(ii)	IEC WIND (1/50)	111 km/h (382.77 Pa) @ -10°C
(iii)	COMBINED ICE (50%) & WIND (90%)	18.7 mm & 210 Pa @ -10°C
	WIRE ADJUSTMENT MODELS & MATERIAL FACTORS AS PER CSA 22.3 No. 60826.	

B. CLEARANCE CRITERIA

1.	MEAN ANNUAL SNOW ACCUMULATION:	0.7 m
2.	ADDITIONAL SURVEY TOLERANCE:	0.3 m
3.	VERTICAL GROUND CLEARANCE:	
3.1.	MINIMUM CSA 22.3 No.1 VERTICAL GROUND CLEARANCE	
	115kV / 138kV CONDUCTOR	5.50 m
3.2.	DESIGN VERTICAL GROUND CLEARANCE	
	115kV / 138kV CONDUCTOR	6.50 m
4.	VERTICAL GROUND CLEARANCE LOADING CONDITIONS	
4.1.	PHASE CONDUCTOR	
(i)	MAXIMUM CONDUCTOR TEMPERATURE	100°C
(ii)	DESIGN CONDUCTOR TEMPERATURE (AS PER IEEE STD. 738)	75°C
(iii)	RADIAL ICE THICKNESS (CLEARANCE)	12.7 mm (1/2")
5.	PHASE CLEARANCE CONDITIONS:	
(i)	HOURLY WIND (NATIONAL BUILDING CODE 1/50)	520 Pa (~164 km/hr)
(ii)	HOURLY WIND (NATIONAL BUILDING CODE 1/50)	400 Pa (~100 km/hr)
(iii)	GALLOPING	
	GALLOPING SWING	290 Pa
	GALLOPING ICE	12.7 mm (1/2")

C. WIND POWER PROJECT CIRCUITS DATA

1.	MERCHANT CIRCUIT(S)	
1.1.	NOMINAL SYSTEM VOLTAGE	124 kV
1.2.	NUMBER OF PHASES	3 (THREE)
1.3.	SYSTEM FREQUENCY	60 Hz
1.4.	SYSTEM GROUNDING	LOW IMPEDANCE
1.5.	NUMBER OF CIRCUIT	1 (ONE)
1.6.	MAXIMUM CIRCUIT CURRENT	596A PER CIRCUIT
1.7.	PHASE CONDUCTOR SIZE:	795 MCM ACSR (DRAKE)
1.8.	DESIGN CONDUCTOR TEMPERATURE:	75°C

amec

Chimax inc.

SUNCOR ENERGY
DEAD POINT WIND PROJECT

1CCT 115kV TRANSMISSION LINE
HEAVY ANGLE (60 - 90°)
STEEL POLE FRAMING

DRAWING NO.: 1325-F207
REV.: A

Exhibit B, Tab 3, Schedule 1
Need for the Project

NEED FOR THE PROJECT

In July 2011, the OPA awarded Suncor a FIT contract in respect of the Cedar Point Wind Power Project. This project will further the Government of Ontario's policy objective of increasing the amount of renewable energy generation that forms part of Ontario's energy supply mix. In particular, the Cedar Point Project will contribute approximately 100 MW of renewable energy capacity towards this objective. The Proposed Transmission Facilities are needed to connect the generation plant to the IESO-controlled grid. As the development of the projects promotes the use of renewable energy sources in a manner consistent with the policies of the Government of Ontario, the Proposed Transmission Facilities are in the public interest pursuant to paragraph 96(2)2 of the *Ontario Energy Board Act, 1998*, which provides as follows:

> **96.(2)** In an application under section 92, the Board shall only consider the following when, under subsection (1), it considers whether the construction, expansion or reinforcement of the electricity transmission line or electricity distribution line, or the making of the interconnection, is in the public interest:
>
> 1. The interests of consumers with respect to prices and the reliability and quality of electricity service.
>
> 2. Where applicable and in a manner consistent with the policies of the Government of Ontario, the promotion of the use of renewable energy sources.

Exhibit B, Tab 4, Schedule 1
Transmission Alternatives Considered

TRANSMISSION ALTERNATIVES CONSIDERED

This Schedule discusses the process that Suncor undertook in selecting the route for the Proposed Transmission Facilities, as well as in reviewing potential alternative routes that were ultimately rejected. At a high level, the location of Suncor's Cedar Point Project, and NextEra's Bornish, Jericho, and Adelaide projects, relative to the IESO grid, suggested that the most economic, least intrusive path for electricity generated by the Cedar Point Project to the IESO grid was through NextEra's proposed transmission facilities, including the Shared Transmission Facilities, and the Jericho Shared Transmission Line.

Suncor has obtained an option from NextEra to interconnect with the Jericho Substation, the Jericho Shared Transmission Line and the Shared Transmission Facilities, as well as an option to licence capacity on those facilities sufficient to convey the electricity output from the Cedar Point Project to the IESO controlled grid for the term of the FIT Agreement.

1. Selection Process

With respect to the best route for the transmission line from Cedar Point Transformer Station to the Jericho Station, Suncor identified and considered two alternative routes. Suncor selected its preferred route, following extensive consultations with members of the community, municipal officials, Hydro One and other stakeholders, as well as comprehensive technical and environmental reviews. As part of its Renewable Energy Approval ("**REA**") process, Suncor issued notices, delivered presentations, participated in public meetings, and met with local government officials. A discussion of Suncor's community and aboriginal, agency and municipal consultations is found in Exhibit G, Tab 1, Schedule 1. During the course of these consultations, Suncor shared information and received feedback concerning the potential routes for the transmission facilities needed to connect the Cedar Point Project to the Jericho Station. This feedback was considered, together with Suncor's technical and environmental reviews, in order to help identify the range of transmission options available to Suncor and any relevant concerns.

Through this process, as noted below, Suncor identified several potential transmission routes, as well as various constraints on these potential routes. Suncor then evaluated the two most attractive route options in detail (see below) and the related constraints and determined that the preferred Transmission Line route is that proposed for the Proposed Transmission Facilities. For reason of cost-effectiveness and ease of service, Suncor has chosen to use an overhead transmission line.

Suncor considered several alternatives for the Transmission Line. The principal alternative had the Transmission Line starting at the same substation location, travelling East along the Cedar Point Line Right of way for approximately 6100m to an abandoned and removed rail line where the line would travel North East across private land for approximately 4800m . This rail line has split the land parcels in the area and runs past the Jericho Substation location. This alternative route would have followed a natural property line boundary and been a very direct route

(approximately 11,000m) compared to the preferred path of approximately 15,000m. However, Suncor does not have property control along the abandoned rail line. The alternative placement would also impact farming operations as the Transmission Line would require crossing lands at an angle and structures would interrupt farming operations significantly.

Minor deviations from the Preferred Transmission Line path were also considered, these including routing the line along road Right of Way on Rawlings Road to Proof Line. However in all cases a path was chosen that routed the Transmission Line along Suncor-controlled lands to minimize the amount of Road Right Of Way required.

Exhibit C, Tab 1, Schedule 1
Construction and In-Service Schedule

CONSTRUCTION & IN-SERVICE SCHEDULE

The timing for construction of the Proposed Transmission Facilities will depend in part upon the timing of the Board's decision in this Application and Renewable Energy Approval. It is currently expected that:

- construction of the Cedar Point Transformer Substation will commence in September 2014 and be completed by March 2015;

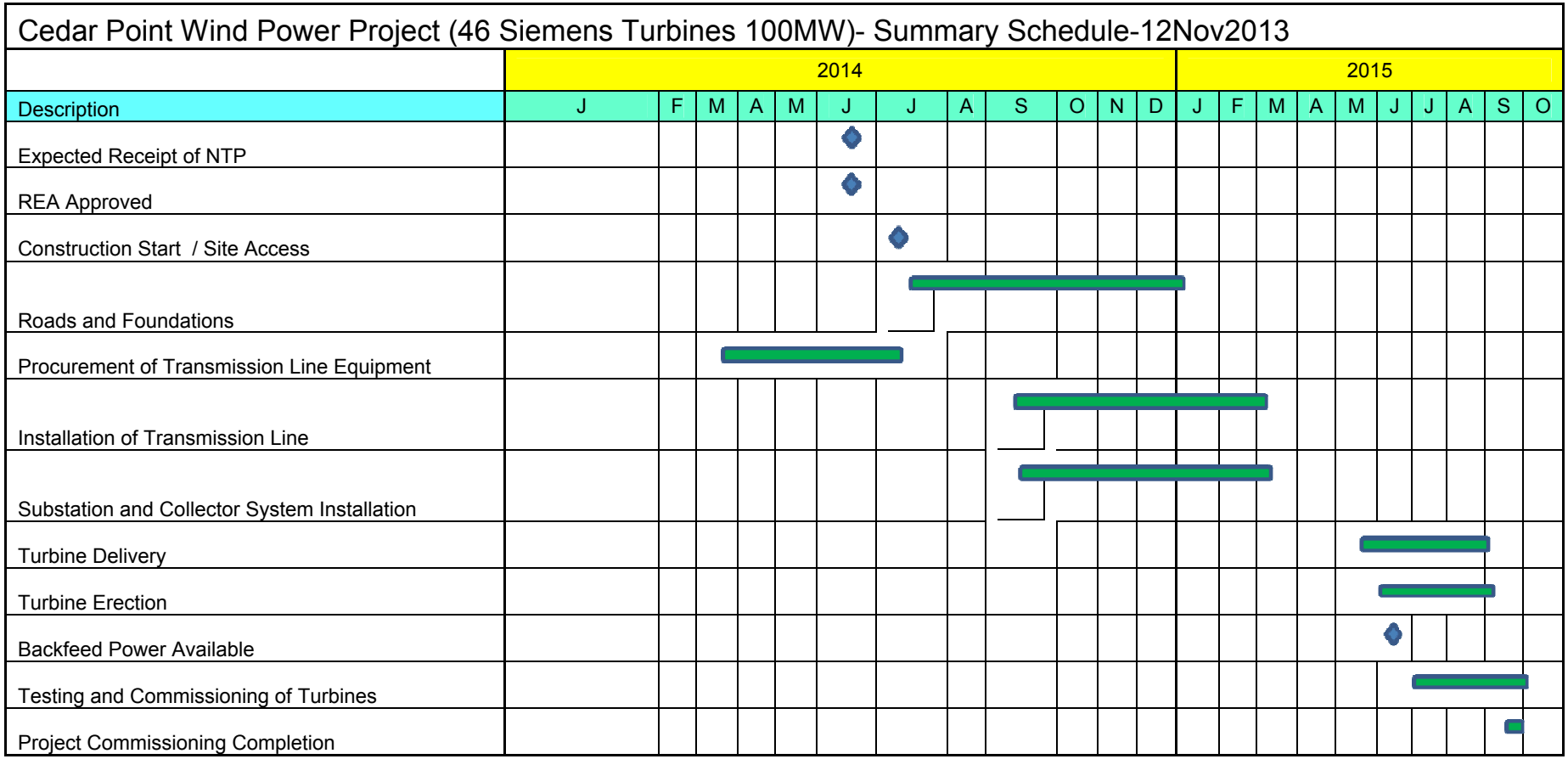
- construction of the 15 km 115 kV transmission line will commence in September 2014 and be completed by March 2015.

As noted above, Suncor needs the Jericho Substation, the Jericho Shared Transmission Facilities, and the Shared Transmission Facilities to be constructed and in-service in order to convey electricity from the Cedar Point Transmission Line to the IESO Grid.

Suncor understands that Hydro One began construction in May 2013 of the Evergreen Switching Station, which it plans to complete by May 2014.

Suncor estimates that the Proposed Transmission Facilities will go into service by June 2015. A Gantt Chart setting out the planned construction schedule is provided in Figure 1.

Figure 1 - Gantt Chart



Cedar Point Wind Power Project (46 Siemens Turbines 100MW)- Summary Schedule-12Nov2013

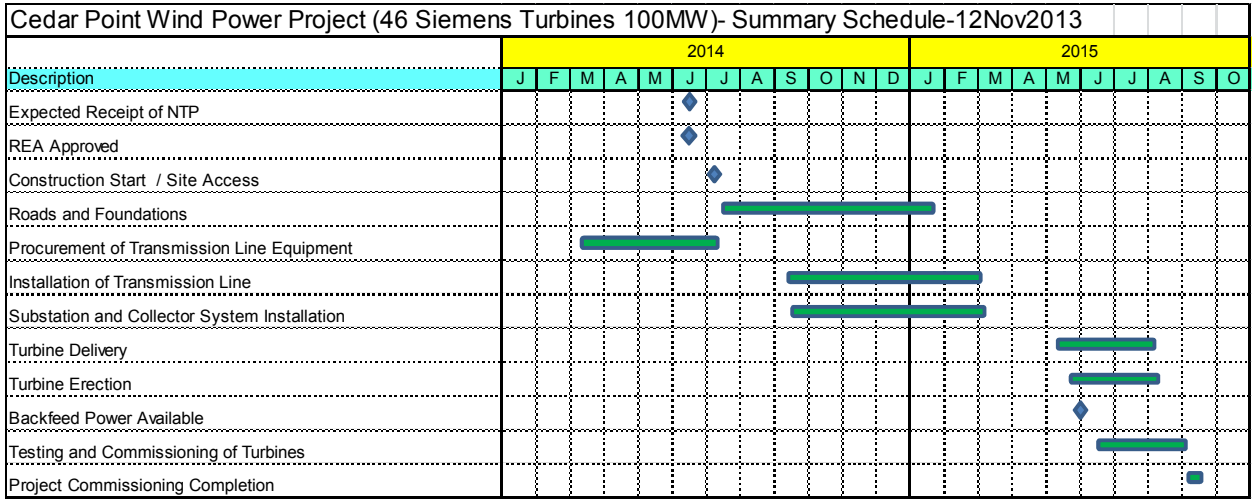


Exhibit D, Tab 1, Schedule 1
Physical Design Features

PHYSICAL DESIGN FEATURES

The Proposed Transmission Facilities are required to connect the Transformer Station to the Jericho Station, which will allow the output of the Cedar Point wind turbines to enter the IESO grid at Hydro One's Evergreen Switching Station, all as described above. To provide context for the descriptions of the physical design features of the Proposed Transmission Facilities, this schedule also includes technical descriptions of the related generation facilities.

1. Wind Generation Facilities

(a) Transformer Station

As indicated in Exhibit B, Tab 2, Schedule 3, the Transformer Station will be located on Parcel PIN 430310087, Partial Lot 8 Concession 16 Township of Bosanquet, in the Municipality of Lambton Shores. The station will have an area of approximately 23,600 square meters. The site for the Cedar Point Collection Substation was determined based on its proximity to the wind turbines associated with the Cedar Point Project, as well as it being at a reasonable distance from Jericho Station. As noted above, the purpose of the Transformer Station is to collect the electricity from the wind turbines, and step-up the voltage of the 34.5 kV collector system to the 115kV Transmission Line voltage. The two transformers will have a nominal voltage rating of 115 kV/34.5 kV and power ratings of 42/56/70 MVA. Other equipment, including circuit breakers, buswork, outdoor switches, surge arresters, instrument transformers, protection and control equipment, and telecommunication equipment will also be installed at the site.The entire substation will be surrounded by a security fence. The high voltage buswork and equipment will be constructed in an open-air design. An indoor metalclad switchgear will be utilized for the medium voltage bus.

(b) Transmission Line

A three phase single circuit 115 kV transmission line, approximately 15 km in length will connect the Transformer Station to the Jericho Substation. The Transmission Line will connect to the high voltage side of the Jericho Substation through a 115 kV circuit breaker and related equipment, located within that station. The proposed corridor is shown in Figures 1 and 2 of Exhibit B, Tab 2, Schedule 4. The location of the Transmission Line route was selected as being the most direct feasible route between the Transformer Station and the Jericho Station.

The Transmission Line will have steel, monopole structures with an average pole height of approximately 70 to 100 ft. above ground. Some corner structure poles may require

guying and anchoring. Nominal pole spacing will be approximately 130 m. Approximately 114 poles will be required along the entire length of the Transmission Line. The Transmission Line will be strung with 795 kcmil ACSR (aluminum conductor steel reinforced) phase conductors (the conductor size may change based on optimization of losses, relative to material and construction costs). A 0.530 inch (395 kcmil) diameter Optical Ground Wire for lightning protection and communication will also be placed on the structures. Illustrations of the proposed pole structures and framing designs are provided above at Exhibit B, Tab 2, Schedule 5, Figure 3.

(c) A diagram showing the basic design features of the Transformer Station is found at Exhibit B, Tab 2, Schedule 5, Figure 2.

Exhibit E, Tab 1, Schedule 1
Operational Details

OPERATIONAL DETAILS

The Proposed Transmission Facilities will be monitored from the O&M facility as well as remotely from the operator of the Proposed Transmission Facilities. Fault detecting protection systems along with remote control capability of electrical isolation devices will be installed.

The Proposed Transmission Facilities will include maintenance, protection and control systems capable of minimizing the severity and extent of disturbances to the Transmission Line. Visual transmission line inspections will be scheduled at least once every year to ensure continued compliance with all applicable codes and standards. Detailed thermography scans will be conducted on critical connection points after energization. Further, a regular vegetation and right of way management program will be developed in maintaining vegetation proximity to energized components and minimize hazards within the right of way. A maintenance program will also be developed to maintain the health of the major equipment within the Substation. This includes periodic testing of equipment electrical insulation systems as well as other equipment functional tests.

While the metering plan is still under development, it is anticipated that there will be revenue meters located at the transformer station, with the metering points located at the 34.5kV side of each of the two main substation transformers.

Exhibit E, Tab 2, Schedule 1
Codes, Standards, and Other Regulatory Approvals

CODES, STANDARDS & OTHER REGULATORY APPROVALS

1. Codes and Standards

The Proposed Transmission Facilities will be constructed in accordance with applicable technical codes and standards, including the Canadian Electrical Code, Part III (which incorporates by reference CSA Standard C22.3), as well as applicable IEEE transmission line design and construction standards. The Proposed Transmission Facilities will also comply with applicable requirements of the Transmission System Code and the Market Rules for the Ontario Electricity Market.

2. Renewable Energy Approval

Renewable energy projects (other than waterpower projects) are no longer subject to the *Environmental Assessment Act*. Rather, the environmental protections of the environmental assessment process have been incorporated into the Renewable Energy Approval ("**REA**") process. Most renewable energy projects in Ontario therefore require a REA from the Ministry of the Environment. As a Class 4 wind facility (as defined in subsection 6(1) of the REA Regulation, O. Reg. 359/09 under the *Environmental Protection Act*), the Cedar Point Project is no exception. Cedar Point is currently undergoing its REA process, as noted above. Renewable energy projects are no longer subject to land use planning instruments under the *Planning Act*.

3. Licences

Although the Proposed Transmission Facilities are for the transmission of electricity generated by the Cedar Point Project, to the Jericho Station, Ontario Regulation 161/99 to the Ontario Energy Board Act exempts Suncor from the requirement to obtain a licence to own or operate transmission facilities pursuant to Section 57(b) of the Act. The exemption is based on the fact that Suncor will be a transmitter that is also a generator and the Proposed Transmission Facilities will be used exclusively to transmit electricity to the IESO-controlled grid.

Suncor will apply for a generator licence in respect of its generation facility in due course. In accordance with the instructions set out on the Board's form, Application for an Electricity Generation Licence under the Feed-in Tariff Program, Suncor will file its generator licence application following receipt of the Notice to Proceed from the OPA pursuant to its FIT Contract. Suncor will also provide its "Section 81 Notice" to the Board at the time this Application is filed.

4. Other Permits, Approvals and Authorizations

In addition to the codes, standards and REA requirements set out above, a number of other permits, licenses and approvals from other governmental authorities may be required before the Proposed Transmission Facilities can be constructed and operated. These are set out in Table 1, below.

Table 1 - Potentially Applicable Permits, Approvals and Authorizations

Government	Authority	Potentially Required Permit or Approval	Status
Federal	Fisheries and Oceans Canada	Authorization under Subsection 35(2) of the *Fisheries Act* for watercourse crossings (or Letter of Advice)	Not Required as there is no crossing of a navigable water way.
Provincial	Ministry of Natural Resources	Approval and permitting requirements under the Renewable Energy Approval process	obtained
Provincial	Ministry of Natural Resources	Species at Risk Permit under the *Endangered Species Act* (if designated species habitat is impacted, which is to be confirmed)	Required for the project to be obtained
Provincial	Conservation Authorities	Generic Regulations Permit for water crossings and works within floodplain	Required to be obtained
Provincial	Ministry of Tourism, Culture and Sport	Archaeological and Cultural Heritage Clearances under the *Heritage Act*	obtained
Provincial	Ministry of Transportation	Compliance with the *Highway Traffic Act* and *Road Safety Regulations* - Highway Entrance Permit, Transportation Permits (e.g. Oversize, Overweight Permit or Special Vehicle Configuration Permit), Crossing Permits	Required to obtain crossing permits of MTO highway 21.

Government	Authority	Potentially Required Permit or Approval	Status
Provincial	Ontario Energy Board	Notice of Proposal under Section 81 of the *Ontario Energy Board Act*	Required to be obtained
Provincial	Ministry of Labour	Notice of Project prior to commencing construction (to be obtained by contractor)	Required to be obtained
Provincial	Hydro One Networks Inc.	Transmission Connection Agreement (will be obtained by NextEra)	Obtained by Bornish and copies provided to Suncor.
Provincial	Independent Electricity System Operator	Facility Registration	Required to be obtained
Provincial	Independent Electricity System Operator	Metering Registration	Required to be obtained.
Provincial	Independent Electricity System Operator	Connection Assessment Approval (obtained)	SIA completed and obtained. (need to determine if it requires amendment)
Provincial	Electrical Safety Authority	Connection Authorization	To be obtained
Municipal	County and Municipal Governments	Road Use Agreements and/or Building Permits (as applicable)	To be obtained
Provincial	Hydro One Networks Inc.	Customer Impact Assessment (obtained)	complete

Exhibit F, Tab 1, Schedule 1
Land Matters

LAND MATTERS

1. Land Area Required and Land Rights Acquired/to be Acquired

The land area required for the Proposed Transmission Facilities consists of (a) the lands required for the Transformer Station, (b) the lands required for the Transmission Line, and (c) the lands required for Suncor's switching and related assets at the Jericho Station. If Suncor owns equipment in the Jericho Station yard, it will lease the required land from Jericho (NextEra). The land requirements for the Transformer Station and the Transmission Line are described below.

(a) Transformer Station

As described in Exhibit B, Tab 2, Schedule 3, the Transformer Station will have a footprint of approximately 23,000 square meters and will be situated at Parcel PIN 430310087, Partial Lot 8 Concession 16 Township of Bosanquet, in the Municipality of Lambton Shores, in Lambton County. The land for the Transformer Station is comprised of a single, privately owned parcel. Suncor entered into an Option to Lease Agreement with the owner of the land.

(b) Transmission Line

As described in Exhibit B, Tab 2, Schedule 3, the Transmission Line will be approximately 15 km in length and will run from the Transformer Station to the Jericho Station. The Transmission Line will run entirely on private land, as depicted in Figure 2 of Exhibit B, Tab 2, Schedule 4. The Landowners Line List is contained in the Attachment. Final engineering and construction planning may determine that some ROWs may be required, but the need for ROWs is not currently anticipated.

Suncor has options to lease all the land it requires for the Transmission Line. Suncor standard Option for Ontario Ground Leases including the Ontario Ground Lease as a Schedule is attached at Exhibit F, Tab 2, Schedule 1.

The anticipated detailed routing for the Proposed Transmission Line is described in Exhibit B, Tab 4, Schedule 1. Although pursuant to Subsection 41(10) of the *Electricity Act* the Board does not have the authority to determine the specific location of structures, equipment or facilities in public streets and highways where the facilities are also subject to the need for leave to construct pursuant to Section 92 of the *Ontario Energy Board Act*, it is Suncor's understanding that the Board has such authority either ancillary to its powers under Section 92 or pursuant to Section 101 of the *Ontario Energy Board Act*, under which the Board may grant authority to construct works upon, under or over a highway, utility line or ditch.

3. **Land Rights Acquisition Process**

Land agents for Suncor have been working in the area since December 2006 to secure the necessary private land rights. Other than exercising the rights it currently has under option, Suncor has now secured all of the permanent, private land rights that it requires in respect of the Proposed Transmission Facilities. Suncor has signed an option to acquire the land rights necessary to construct and operate its transmission line in the form of an Option for Ontario Ground Lease, included in Exhibit F, Tab 2, Schedule 1, with each landowner from whom it requires such rights. It intends to exercise its options and sign an Ontario Ground Lease in the form attached in Exhibit F, Tab 2, Schedule 1, with each of those landowners, once it has obtained the necessary project approvals, including the Leave to Construct.

ATTACHMENT

The following Landowner Line List is organized geographically commencing at the Transformer Station and ending at the Jericho Substation. The Landowner Line List includes those parcels upon which the Proposed Transmission Facilities will be situated. [Although not currently anticipated, as a result of final engineering and project planning Suncor may determine that the use of certain municipal road ROWs may be required for construction, access or other purposes.]

The Landowner Line List contains personal information of landowners and has therefore been filed in confidence with the Board pursuant to Rule 9A.01 of the Board's Rules of Practice and Procedure and in accordance with Section 4.3 of the Board's Practice Direction on Confidential Filings.

PIN Number	Legal Description	Suncor File Number	Landowner Names
[redacted]			

Exhibit F, Tab 2, Schedule 1
Forms of Land Agreements

FORMS OF LAND AGREEMENTS

This schedule includes copies of the forms of land agreement that the Applicants have used and/or intend to use for the acquisition of the land rights required to construct, own, operate and maintain the Proposed Transmission Facilities. This consists of the following document:

Attachment 1 - Option for Ontario Ground Lease and Ontario Ground Lease

OPTION FOR ONTARIO GROUND LEASES
(WIND POWER PROJECT)

THIS AGREEMENT made the day of , 2012 (hereinafter called the **"Effective Date")**

BETWEEN:

_____,as joint tenants of the _____ of _____ in the Province of Ontario (hereinafter called the "**Owner**")

-and-

SUNCOR ENERGY PRODUCTS INC.,
a corporation incorporated under the laws of the Province of Ontario (hereinafter called "**SEPI**")

WHEREAS the Owner is the registered owner, subject however to the exceptions, conditions and Encumbrances registered on title of and in that certain parcel or tract of land situate, lying and being in the Province of Ontario hereinafter called the **"Lands"**, more particularly described in Schedule "F", attached hereto;

AND WHEREAS SEPI desires to obtain an option to lease from time to time portions of the Lands for the purposes and uses as set out in this Agreement.

THIS AGREEMENT WITNESSES THAT the parties hereto covenant and agree with each other as follows:

ARTICLE I

PURPOSE, DEFINITIONS AND USE

1.1 **Purpose:**
The purpose of this Agreement is to grant to SEPI an exclusive option over the Lands to allow SEPI the opportunity to assess the wind resources over such Lands and, if suitable for the purposes of SEPI, to lease from the Owner some or all of such Lands either for the installation of anemometers to further measure such wind resources or for the installation of windpower electricity generating facilities including wind driven turbines, substations and the transmission of electricity for use or sale created therefrom. During the Option Period, SEPI will pay to the Owner a fee for the Option for the unrestricted, exclusive use of the Lands to complete any and all testing as required by SEPI in order to determine the suitability of the Lands.

1.2 **Definitions:**
The words and phrases defined in Schedule "A" shall have the meaning in this Agreement as set out in Schedule "A".

1.3 **Use:**
SEPI intends to use the Lands during the Option Period to conduct surveys of the Lands related to the measurement of wind over the Lands by anemometers and any other testing devices required for the generation of electricity by wind turbines and transmission of such electricity for use or sale and for the exercise of other Rights and, in the sole discretion of SEPI, in the event the Lands are suitable, to Lease the Lands or a portion thereof as determined by SEPI for the construction of wind turbines and anemometers and all related equipment and installations.

ARTICLE II

GRANT OF OPTION AND PAYMENT OF OPTION FEE

2.1 **Grant of Option(s):**
The Owner HEREBY GRANTS to SEPI the sole and exclusive Option, irrevocable for a period of **three (3) YEARS** from the Effective Date (such period called the "**First Option Period**"), to acquire at any time or times during the term of this Agreement one or more leases and grants of the Rights to parts or portions of the Lands, whether for any one or more of wind turbine sites, anemometer sites or permanent access roads (such portions called the "**Leased Lands**") and, if reasonably required by SEPI, to use parts or portions of the Lands for temporary workspace in connection with the Leased Lands (such portions called the "**Temporary Workspace**"), in each case, subject to the terms of this Agreement, in the form of the Ground Lease annexed hereto as Schedule "B" (hereinafter called the "**Ground Lease**").

In consideration of the grant of such Option, SEPI will pay to the Owner a basic annual fee in the sum

of ____ ----------00/100 ($ .00) dollars, plus GST, if applicable, (the "**Option Fee**") payable annually on or before each anniversary date of the Effective Date of this Agreement during the First Option Period, the receipt and sufficiency of which sum for the initial year in the First Option Period is hereby acknowledged. A separate Ground Lease shall be prepared for wind turbines, anemometers or any other surface improvement required for windpower electricity generating, as further provided in subsection 3.1hereof, as the case may be.

The Optionee (Lessee) agrees that all rent to be paid to the Optionor (Lessor) during the term of this Option or Ground Lease, as the case may be, shall not be less than the maximum rate paid to any other party within the Cedar Point wind farm project.

2.2 **Renewal Option Period:**

If SEPI is not in default in respect of any of the covenants and conditions contained in this Agreement at the date of expiration of the First Option Period, and whether or not SEPI has exercised its option to acquire one or more Ground Leases hereunder, and unless SEPI gives to the Owner notice of termination of this Agreement at least thirty (30) days prior to the end of the First Option Period, then this Agreement and the option herein provided shall be renewed automatically and the term extended for a further term of **three (3) YEARS**, (hereinafter called the "Renewal Option Period") which renewal (subject to the provisions of Section 6.4) shall include the within automatic renewal provision. Each Renewal Option Period shall commence on the date of the expiration of the previous Option Period.

Notwithstanding anything written herein, the term of this Agreement including all renewals shall not exceed twenty-one (21) years from the Effective Date.

2.3 **Renewal Option Period Fee:**

The Option Fee shall be revised (which revision may result in an increase) effective as of the first day of each Renewal Option Period, by multiplying the Option Fee for the previous Option Period by the percentage increase or decrease in the OCPI on the first day of each Renewal Option Period from the OCPI on the first day of the previous Option Period, such result to be rounded up to the next nearest whole dollar value, and that sum shall become the Option Fee payable for each year of the next Option Period. Such increase or decrease in the OCPI will be determined by comparing (a) the OCPI that was in effect on the first day of the previous Option Period; and (b) the OCPI that was in effect on the first day of the next Option Period. The Option Fee for each Renewal Option Period thereafter and any renewals thereof shall be similarly calculated, based on the Option Fee for the Option Period immediately preceding it.

2.4 **Right of Entry:**

SEPI and its employees, agents and contractors are hereby further granted the additional and non-exclusive right by the Owner to enter onto the Lands, upon providing reasonable prior verbal notice to the Owner, for the purposes of conducting legal, environmental, archeological, engineering, meteorological, soil and property surveys and such other surveys, tests, investigations and other activities as SEPI may deem necessary, and to install temporary fences and construction facilities including mobile trailers, and for ingress to and egress from the Lands or both, all of which shall include the right to use any vehicles or equipment, including monitoring equipment, on the Lands as may be necessary to conduct such surveys, tests, activities or investigations. SEPI and its employees, agents and contractors are granted all rights of ingress to and egress from, on and over the Lands reasonably necessary for those purposes as determined by SEPI.

2.5 **Surveys and Registrations:**

SEPI may file or register any such surveys to legally describe the Leased Lands and Temporary Workspace to be granted under any Ground Lease, on or in respect of title to the Lands at the appropriate Land Registry Office or other public offices, and the Owner shall cooperate in promptly signing or cause all persons whose consent is required to sign such survey plans and executing such related consents or other documents as may be required.

2.6 **Exercise of Option:**
During the First Option Period or any Renewal Option Period, SEPI may, from time to time, exercise its option to acquire a Ground Lease for portions of the Lands by delivering to the Owner an Exercise Notice, in duplicate, which shall be effective from the Exercise Date. SEPI shall have the right to select and determine the location, configuration and area of the Leased Lands and Temporary Workspace to be granted under any Ground Lease, subject to the approval of the Owner, which approval shall not be unreasonably delayed or withheld. Any disputes as to the reasonableness of such approval shall be resolved pursuant to the dispute resolution provisions hereof. SEPI shall seek such approval of the Owner for such location prior to SEPI's exercise of each option to lease, and such approval shall be indicated by the Owner's initials on the survey plan and the sketch.

2.7 **Continuing Option:**
Notwithstanding the exercise by SEPI of its option in respect of portions of the Lands, SEPI's option to acquire a Ground Lease with respect of any portions of the Lands for which a Ground Lease has not yet been acquired shall remain in effect for the balance of any then-existing Option Period and any renewals thereof, subject to the terms of this Agreement.

ARTICLE III
GROUND LEASE

3.1 **Preparation of Ground Lease:**
Any Ground Lease for any part or portion of the Lands shall be prepared by and at the sole cost and expense of SEPI and shall be delivered to the Owner by SEPI upon delivery to the Owner of the Exercise Notice or so soon thereafter as is possible. The form of the Ground Lease shall be in the form of Schedule "B" attached hereto and shall set out:

(a) whether the use of the Leased Lands will be for wind turbines or permanent access roads thereto or both, or for anemometers with appropriate alterations to the Ground Lease as required;

(b) the annual rent as hereinafter described for the Leased Land together with any adjustments for the first year of the Ground Lease to be paid by SEPI from and after the Commencement Date;

(c) the consideration to be paid to the Owner by SEPI for the Temporary Workspace;

(d) a legal description of the Leased Lands and the Temporary Workspace (if applicable)

(e) a copy of a sketch or a plan of survey of the Leased Lands; and

(f) a sketch of any anticipated area of Temporary Workspace (if applicable)

Congruently with the execution of the Ground Lease, , SEPI shall also deliver a cheque payable to the Owner for the aggregate amount of the first year rent to be paid to the Owner for the Leased Lands and the consideration for the Temporary Workspace or both as set out in the Ground Lease, payable from the Exercise Date.

The Owner acknowledges that the Ground Lease is to be executed with the effective date of same being left blank. SEPI will, and is hereby authorized by the Owner to insert the Commencement Date as hereinafter determined, as the effective date of the Ground Lease.

3.2 **Execution of Ground Lease by Owner:**
Upon receipt by the Owner of the completed Gronnd Lease in quadruplicate and the payment referred to in Section 3.1, the Owner shall promptly execute all copies of the Ground Lease and complete any required consents or certificates in respect thereof and deliver to SEPI three (3) fully executed copies of such Ground Lease, undated, pending determination of the Commencement Date.

3.3 **Execution of Ground Lease by SEPI:**
Subsequent to each exercise of the option as provided in this Agreement, SEPI shall promptly proceed to obtain all necessary approvals, consents, licenses and orders as contemplated in Section 4.6. Upon determination by SEPI of the Commencement Date, SEPI shall:

(a) insert the Commencement Date of the Ground Lease;

(b) execute the three (3) copies of the Ground Lease in its possession; and

(c) personally deliver or mail one (1) executed copy of the Ground Lease to the Owner at its address for notices as hereinafter provided;

Once SEPI has personally delivered or mailed one (1) copy of the Ground Lease to the Owner, such Ground Lease shall be effective, valid and binding in accordance with its terms as of the Commencement Date.

Notwithstanding the foregoing, failure by the Owner to promptly execute and return a copy of the Ground Lease to SEPI shall not invalidate or otherwise void or render voidable the grant of the Ground Lease, and failure by SEPI to comply promptly with this Section 3.3 shall not invalidate an otherwise valid exercise of the option granted under this Agreement. With respect to the proposed Leased Lands in the interval between the Exercise Date and the Commencement Date, and with respect to the balance of the Lands, all rights granted to SEPI under this Agreement shall remain in full force and effect.

3.4 **Annual Rental and other Consideration for Ground Lease(s):**
If SEPI exercises its option to acquire a Ground Lease, then where such option is exercised:

(a) For the Leased Lands, within the First Option Period: the basic annual rental and any other rental payable for the Leased Lands from and after the Commencement Date shall be calculated as provided in Schedule "C" attached hereto as revised from time to time as provided in the Ground Lease;

(b) For the Leased Lands, in any Renewal Option Period: the basic annual rental payable for the Leased Lands shall be calculated by multiplying the basic annual rental that would have been payable on the Leased Lands if SEPI had leased the Leased Lands within the First Option Period as provided pursuant to subsection 3.4(a) by the percentage increase or decrease in the OCPI (as that term is defined in Schedule "A") as follows. Such increase or decrease in the OCPI will be determined by comparing (a) the OCPI that was in effect on the Effective Date of this Agreement; and (b) the OCPI that was in effect on the date three (3) months prior to the Exercise Notice in order to determine the change in OCPI over the intervening period. That sum will be rounded up to the next nearest whole dollar value, and the rounded up sum shall become the basic annual rental payable for the first five (5) year period of the term of such Ground Lease. Thereafter, the basic annual rental for the Ground Lease shall be revised as provided in the Ground Lease as set out in Schedule "B";

(c) For the Temporary Workspace, whether during the First Option Period or any Renewal Option Period: the consideration payable for any Temporary Workspace shall be calculated as provided in Schedule "C" attached hereto; and

(d) Adjustment of first year consideration and basic annual rental: On or before the Commencement Date of any Ground Lease, the first year consideration and basic annual rental to be paid under such Ground Lease and, if applicable, the consideration for the Temporary Workspace, if any, shall be adjusted, settled and paid by SEPI as follows:

(i) First year consideration: the payment made to the Owner by SEPI pursuant to Section 3.1 shall be deemed to have been made and applied to the rental due in respect of the first year of the term of the Ground Lease as and from the Commencement Date thereof; and

(ii) Payment equivalent to basic annual rental: SEPI shall pay the Owner a sum equivalent to the basic annual rental under the Ground Lease for the Leased Lands prorated on a per diem basis for the period of time between the Exercise Date and the Commencement Date using the respective amounts set forth as basic annual rental in Section 3.4(a) or 3.4(b), as the case may be, calculated by multiplying the number of days between the Exercise Date and the Commencement Date by the basic annual rental and dividing by 365 (Sample calculations using the above formula are provided on Schedule "D" attached hereto).

Upon such adjustments being made and upon the outstanding sum (equivalent to annual rental, as calculated in Section 3.4(d)(ii) above) being paid to the

Owner, SEPI shall be deemed to have timely paid to the Owner all of the consideration under and in respect of the Ground Lease, up to the first anniversary date of the Commencement Date of the Ground Lease. Basic annual rentals for the Leased Lands from and after the first anniversary date of such Commencement Date shall thereafter be paid as provided in Section 2.2 of that Ground Lease.

ARTICLE (IV)

THE LANDS

4.1 **Title to the Lands:**

The Owner warrants that the Owner has good and marketable title to the Lands and has the full power and authority to enter into and execute this Agreement and any Ground Lease to be issued under this Agreement. The Owner warrants that there are no other agreements in or pursuant to which any other person or entity has or may acquire the right to purchase or obtain a transfer of the Lands, or any portion thereof, from the Owner. The Owner further warrants that there are no Encumbrances except as registered on title to the Lands effective as of the Effective Date hereof, and the Owner covenants and agrees that no Encumbrances will be granted, created or suffered to exist without reasonable prior notice to SEPI, and there are no other Encumbrances on the title to the Lands that would prevent SEPI using the Lands for the uses intended by SEPI as set forth in the Ground Lease. Should the Owner propose to charge or encumber title to the Lands, it shall give SEPI prior notice of such intention and shall make it a condition of any such charge or encumbrance that the charging or encumbering Party agrees in writing with SEPI to be bound by and subordinate to all of the terms of this Agreement.

4.2 **Covenant Regarding Obstructions:**

The Owner hereby grants (on behalf of itself and its successors and permitted assigns) a covenant in favour of SEPI, not to construct or erect, or cause to be constructed or erected, during the term of this Agreement and all renewals thereof, on any of the Lands which were owned or controlled by the Owner as of the Effective Date, in any direction surrounding the Leased Lands from Exercise Date, any above-ground structure of any height located within two hundred (200) meters of the Leased Lands; and (without SEPI's prior written consent, which SEPI may withhold for any reason) any above ground structure having a height greater than twenty (20) meters located outside of the aforementioned two hundred (200) meter boundary but within eight hundred (800) meters of the Leased Lands. This covenant is for the benefit of all or any portion of the Leased Lands which are or will be acquired pursuant to this Agreement (being the dominant tenement) and shall run with and burden every portion of the Lands (as the servient tenement) for the duration of this Agreement and any Ground Lease of the Leased Land. The parties agree that damages will be an insufficient remedy for breach of this covenant by the Owner, and that SEPI may seek an equitable remedy of specific performance or an injunction or both in respect of such covenant, in addition to any other remedies available to it in equity or at law.

4.3 **Changes in Property:**

During the Option Period and any Renewal Option Period, if the Owner wishes to change the zoning or the land use designation of the Lands or any portion thereof, the Owner shall immediately and prior to initiating any activity to do so notify SEPI in writing. Notwithstanding the foregoing, the Owner shall not, without the prior written consent of SEPI, initiate, impose or consent to any such change or other restriction that would prevent or limit SEPI from using or exercising the Rights in respect of any portions of the Lands or any Leased Lands or Temporary Workspace for the uses intended by SEPI as described in this Agreement and in any Ground Lease.

4.4 **Assignment and Disposition; Binding Effect:**

(a) The intention of the parties with respect to the covenant contained in Section 4.2 is to ensure that all portions of the original Lands which were subject to this Agreement remain subject to the covenant as if no sale or assignment of the Sold Lands (as hereinafter defined) had occurred. Accordingly, should the Owner propose to sell, assign, transfer, convey or otherwise alienate or dispose of title to all or any portion of the Lands (the "**Sold Lands**") other than by the grant of the Leased Lands to SEPI under the Ground Lease, the Owner (as vendor or transferor) shall make it a condition of any such sale or transfer that the purchaser or transferee agrees with SEPI in writing under seal to assume the burden of the covenant contained in Section 4.2 in full against the Sold Lands as servient tenement, such that the benefit of this covenant accrues to all or any portion of the Leased Lands (whether located on the Sold Lands or the retained Lands) which are or will be acquired pursuant to this Agreement, as dominant tenement, as if the purchaser or transferee of the Sold Lands were an original party to this Agreement with SEPI. All assignment provisions of this Agreement shall apply to any successor or permitted assign of the Owner or of the above-referenced purchaser or transferee. Similarly, the covenant herein granted by the Owner shall continue to burden the Lands and shall continue to accrue to the benefit of any portion of the Lands to the extent same are comprised, or will be comprised at a future date, of the Leased Lands.

(b) If the estate and interest of either party in this Agreement or the Lands or both or any portion thereof is sold, assigned, transferred, conveyed or disposed of in any manner (which disposition is hereby expressly allowed, subject to compliance with the provisions of Sections 4.2 and 4.3 hereof) the provisions of this Agreement shall inure to the benefit of and be binding upon the parties hereto and each of them, their respective heirs, executors, administrators, successors and permitted assigns, and shall constitute a grant, interest and covenant in and running with the Lands.

(c) No such disposition shall be effective or binding on the non-assigning party: (i) until that non-assigning party has received notice thereof, which notice shall include the name and address of the assignee; (ii) with respect to the devolution of all or part of the estate in the Lands to any heir, administrator or executor of a party, until written notice of such devolution and copies of pertinent documents evidencing such devolution is provided to the non-assigning party; and (iii) in all other circumstances except those described in (ii) above, until the assignee of the assigning party has entered into an agreement in writing with the non-assigning party whereby such assignee has agreed to be bound by all of the terms hereof.

4.5 Transmission and Telecommunication Services:

During the Option Period and during the term of any Ground Lease, the Owner shall cooperate fully with SEPI, or with such third parties as may be requested by SEPI, in providing access, easements or utility corridors or rights of way as may be deemed necessary or required by SEPI for the conduct of its operations as authorized pursuant to the Ground Lease, by promptly signing such documents, easements or servitudes as are so required. In addition, the Owner hereby agrees to promptly grant such easements, rights of way or other access agreements to a transmitter or purchaser of electricity or telecommunication services as reasonably required by SEPI, either to SEPI or to the distributor, transmitter or purchaser of electricity or such third party as may be designated by SEPI, for use as an access corridor, utility easement or connecting corridor for such services.

4.6 Governmental Approvals:

SEPI shall at its sole cost and expense perform all acts associated with any zoning, land use, subdivision or other process or procedure necessary to obtain any certificate, permit, license, approval, consent, order, exemption or authorization that may be required by any federal, provincial, local or municipal authorities for the use of any portions of the Lands for the purposes contemplated herein or in the Ground Lease, including the *Planning Act,* R.S.O. 1990 c.P13, as amended, and the *Ontario Energy Board Act,* S.O. 1998 c.15 Sch B., as amended. The Owner shall promptly consent to and assist SEPI in performing all such acts, as required.

ARTICLE V

DAMAGES; DISPUTES

5.1 Default:

Notwithstanding anything herein contained to the contrary, SEPI shall not be in default in the performance of any of its covenants or obligations under this Agreement, including the payment of consideration under any of Articles II or III hereof, unless and until the Owner has notified SEPI of such default in writing and SEPI has failed to commence action to remedy the same within forty-five (45) days of receipt of such notice and fails thereafter to diligently continue to complete such remedial action.

5.2 Indemnity:

SEPI shall indemnify and hold the Owner harmless against loss or damage or personal injury and physical damage to the Lands or the property or person of third parties resulting from any operations of SEPI on the Lands, Leased Lands or Temporary Workspace, other than through wilful damage or gross negligence by the Owner.

5.3 Compensation for Damages:

SEPI shall pay compensation for damage done by it or its servants and agents which, without restricting the generality thereof, shall include growing crops, machinery or other equipment, livestock, fences, buildings, or other improvements of the Owner upon the Lands other than the Leased Lands. In the event the parties are unable to agree upon the compensation, if any, to be paid to the Owner, the liability for any compensation as well as the amount, if any, shall be determined pursuant to the dispute resolution provisions set out in Section 5.5.

5.4 Temporary Workspace Damage:

The provisions of Section 5.3 shall apply with respect to damage to the Temporary Workspace, after SEPI has completed its operations therein.

5.5 **Dispute Resolution:**

(a) Any matter or issue arising under or by virtue of this Agreement which cannot be agreed upon by the Owner and SEPI shall be determined by arbitration pursuant to the provisions of the *Arbitration Act,* 1991 S.O. 1991, as amended from time to time.

(b) For any arbitration, three (3) disinterested arbitrators shall be appointed, one by the Owner, one by SEPI, and the third to be appointed by the two arbitrators previously appointed. The arbitrators appointed shall be competent and have expertise with respect to the matter in dispute, and shall render their decision in writing within ten (10) days of the conclusion of the submissions. The responsibility for the arbitration costs shall be determined by the appointed arbitrators, whose decision shall be final and binding on the parties hereto.

(c) The arbitrators or adjudicator shall be required to consider the sums described in Schedule "C" of this Agreement if issues of compensation arise, by considering the equivalent market value of the Leased Lands excluding the value of all chattels, equipment, structures, buildings, and improvements, located on or under the Leased Lands which have been installed by SEPI or are owned by SEPI. ✓

The decision of the Arbitrators shall be final and binding on the parties hereto.

ARTICLE VI

MISCELLANEOUS

6.1 **Notices:**

All notices, communications, payments and deliveries (collectively the "**Notices**") required or permitted hereunder shall be in writing, unless otherwise expressed herein. All such Notices and all payments to be tendered hereunder may be given personally or by registered letter addressed to the party to whom the Notice is to be given. When delivered personally, such Notice shall be deemed received on the day of delivery, and when mailed, such Notice shall be deemed to be given to, and received by, the addressee four (4) days after the mailing thereof, postage prepaid, provided however that if a Notice is mailed and a disruption of postal services occurs before the date of deemed receipt of such Notice, such Notice shall not be deemed to be received until the expiration of four (4) days following the resumption of postal service.

The respective addresses for service of Notices shall be as follows:

Owner: _____

_____

_____

Phone # _____

GST # _____

Suncor Energy Products Inc: PO Box 2844
150 6th Avenue S.W.
Calgary, Alberta T2P 3E3

Attention: Manager, Contracts – Renewable Energy

Any party may change its address for service by Notice to the other party. At any time there shall be only one address for service of Notices for each party.

6.2 **Amendment and Waivers:**

Any amendments to the terms and conditions of this Agreement made as of the Effective Date hereof shall be detailed on Schedule "C" attached hereto, under the heading "Amendments to Option Agreement". No other amendment or waiver of any provision of this Agreement shall be binding on any party unless consented to in writing by such party. No waiver of any provision of this Agreement shall constitute a waiver of any other provision, nor shall any waiver constitute a continuing waiver unless otherwise expressly provided.

6.3 **Surrender:**

SEPI shall have the right at any time to surrender this Agreement upon no less than forty-five (45) days written notice to the Owner, provided however that there shall be no refund to SEPI of any annual rental or first year consideration which may have been paid in advance, and provided that SEPI shall have complied with all provisions for abandonment and reclamation in accordance with applicable laws.

6.4 **Owners Right to Terminate:**
In the event SEPI has not exercised any option to lease any part or portion of the Lands on or before sixty (60) days prior to the 6th anniversary of the Effective Date, the Owner shall have the right at any time within such sixty (60) days to notify SEPI that, unless SEPI exercises its option to lease all or any part or portion of the Lands before the 6th anniversary of the Effective Date, this Agreement and all rights of SEPI hereunder shall terminate on the 6th anniversary of the Effective Date.

6.5 **Non-Merger:**
The rights of SEPI pursuant to this Agreement shall not merge in any Ground Lease.

6.6 **Severability:**
If and to the extent that any Court of competent jurisdiction determines that any of the terms or provisions of the within Agreement are void or unenforceable, such determination shall not affect the validity of the other provisions of this Agreement which shall remain in full force and effect.

6.7 **Headings:**
The division of this Agreement into Articles and Sections and the insertion of headings are for convenience of reference only and shall not affect the construction or interpretation of this Agreement.

6.8 **Gender:**
In this Agreement, words importing the singular number only shall include the plural and vice versa, words importing gender shall include all genders and words importing persons shall include individuals, corporations, partnerships, associations, trusts, unincorporated organizations, governmental bodies and other legal and business entities.

6.9 **Counterparts:**
This Agreement may be executed in counterparts, each of which will constitute an original and all of which taken together will constitute one and the same instrument.

6.10 **Inurement:**
This Agreement and everything herein contained shall inure to the benefit of and be binding upon the Owner, his/her heirs, executors, administrators, successors and assigns and upon SEPI, its successors and assigns.

6.11 **Further Acts:**
The parties shall each do and perform such acts and things and execute and deliver all such instruments, documents or writings and give all such further assurances as may be necessary to give full effect to the provisions and the intent of this Agreement, including but not limited to registration of notice of this Agreement on title to the Lands.

6.12 **Perpetuities:**
Notwithstanding anything else hereinbefore contained, the rights of SEPI pursuant to this Agreement (including during any Renewal Option Period) to acquire Rights or a Ground Lease in or in respect of the Lands or for SEPI or any other person to otherwise acquire any interest in the Lands shall not extend beyond twenty–one (21) years as provided in Section 13(3) of the *Perpetuities Act,* R.S.O. 1990 c. P.9.

6.13 **Planning Act:**
This Agreement is subject to the provisions of *The Planning Act*, R.S.O. 1990 c.P.13, as amended. If any consent is required it shall be obtained by SEPI with the consent of the Owner and until such consent is obtained any term hereof, including any options to renew, shall be read as not exceeding twenty-one (21) years less one (1) day and in the event such consent is not obtained, the term hereof, including any options to renew, shall not exceed twenty-one (21) years less one (1) day.

6.14 **Governing Law:**
This Agreement shall for all purposes be construed according to the laws of the Province of Ontario and the laws of Canada as applicable therein. Any references herein to specific legislation shall be deemed a reference to amending or successor legislation thereto once same is enacted and in force.

6.15 **Personal Information Consent:**
By providing personal information to SEPI, the Owner consents to SEPI's collection, use, retention and disclosure of that information for any and all purposes and uses as permitted and contemplated under this Agreement and as needed to comply with any legal requirements.

6.16 **Time of Essence:**
Time shall be of the essence of this Agreement.

IN WITNESS WHEREOF the Owner has executed this Agreement under his/her/their hand(s) and SEPI has executed this Agreement under the hand of its proper officer duly authorized in that behalf, all as of the day and year first above written.

SIGNED, SEALED AND DELIVERED
in the presence of:

_____	_____
Witness	Owner –
	_____
	Date
_____	_____
Witness	Owner –
	_____
	Date
_____	_____
Witness	Owner –
	_____
	Date

SUNCOR ENERGY PRODUCTS INC.

Per: _____

Name & Title:

I have the authority to bind the corporation.

CONSENT OF SPOUSE

I, _____ being the spouse of the above named

_____ (Owner) do hereby give my consent to the transaction as set out in this Agreement pursuant to section 21 (Matrimonial Home) of the *Family Law Act*, R.S.O. 1990 Chap.F.3.

_____
Spouse of the Owner

SCHEDULE "A"

Definitions

"**Commencement Date**" means, with respect to a Ground Lease, that date which is the earlier of either:

(i) the date npon which SEPI takes possession of the Leased Lands as evidenced by the commencement of construction of the fonndations for a wind turbine or anemometer, as the case may be; or

(ii) the date upon which SEPI has obtained the last of all necessary approvals and orders contemplated in Section 4.6. If no approvals or orders are required, then the Commencement Date shall be the former date described above.

"**Encumbrances**" means any one or more of the following registered on title to the Lands:

(i) liens for taxes, assessments or governmental charges or levies not at the time due and delinquent;
(ii) restrictions, easements, rights of way, servitudes or other similar rights in land granted to or reserved by other persons which, in the opinion of Counsel to SEPI, in the aggregate do not materially impair the usefulness of the Lands for the business of SEPI subject to such restrictions, easements, right of way, servitudes or other similar rights;
(iii) the reservations, limitations, provisos and conditions, if any expressed in any original grants from the Crown and statutory exceptions to title;
(iv) title defects or irregularities which, in the opinion of Counsel to SEPI are of a minor nature and in the aggregate will not materially impair the use of the Lands for the purposes of SEPI;
(v) any outstanding mortgages, charges or liens upon any of the Lands issued prior to the date hereof provided the holder thereof fully subordinates and postpones all of its interest to SEPI and SEPI has received a non-disturbance agreement from such holder.

"**Exercise Date**" means the date upon which the Exercise Notice is received by the Owner (or is deemed to have been received pursuant to Section 6.1).

"**Exercise Notice**" means notice in writing to the Owner from SEPI in form and content similar to that attached as Schedule "E" pursuant to which SEPI exercises its option to acquire a ground lease for all or a portion of the Lands.

"**First Option Period**" means a period of years set out in Section 2.1 commencing on the Effective Date during which SEPI is granted the option to lease from the Owner all or any parts or portions of the Lands.

"**Ground Lease**" means a lease from the Owner to SEPI of those parts or portions of the Lands described in the Ground Lease in the form attached as Schedule "B".

"**OCPI**" means the Consumer Price Index for Ontario, for all items, published by Statistics Canada (base year 1992 = 100), or by any successor or other governmental agency including a provincial agency, for the Province of Ontario, or if not published for Ontario, then for Canada (or any index published in substitution for the Consumer Price Index or any other replacement index reasonably designated by SEPI if it is no louger published). In the case of any required substitution, SEPI shall be entitled to make all necessary conversions reasonably required for comparison purposes. Similarly, if the base year for the OCPI is changed, SEPI will make the necessary conversions.

"**Option**" means the option granted by the Owner to SEPI pursuant to the terms of this Agreement including both the use of the Lands during the Option Period as permitted hereunder and the option to lease the Lands or any portion thereof as determined by SEPI.

"**Option Fee**" means the annual fee payable by SEPI to the Owner for each year during the Option Period or any renewal, all as calculated as determined pursuant to this Agreement.

"**Option Period**" means a period of time as set out in Article II inclusive of the First Option Period and all Renewal Option Periods.

"**Owner**" means the registered owner or the person entitled to become the registered owner under an agreement for sale or an unregistered transfer or otherwise with an estate in the Lands in fee simple subject only to the exceptions, conditions and Encumbrances acceptable to SEPI.

"**Renewal Option Period**" means a period of years as set out in Section 2.2 commencing upon the expiry of the First Option Period or any Renewal Option Period during which SEPI has the option to lease parts or portions of the Lands.

"**Rights**" means the right, license, liberty and privilege to enter upon, use and occupy portions of the Lands in order to conduct surveys including:

(i) the right to enter into leases granting the aforementioned rights and additional rights to construct, operate, maintain, inspect, control, alter, improve, remove, reconstruct, replace and repair wind turbines and anemometers and all appurtenances thereto (including but not restricted to foundations, concrete pads, footings, wind turbine units, towers, guy wires, support fixtures, anchors, fences, all overhead and underground electrical cables, all overhead and underground telecommunication cables); and

(ii) the use of temporary workspace in respect to all of the aforementioned; and

(iii) all rights of ingress to and egress from, on and over the Lands reasonably necessary for the aforementioned purposes.

"**Temporary Workspace**" means parts or portions of the Lands required by SEPI, as solely determined by SEPI to be used by SEPI to access its equipment and machines and for the purpose of construction, repair, maintenance and decommissioning of SEPI's wind turbines and any of the appurtances thereto including temporary access for any equipment associated with or required for such purposes.

SCHEDULE "B"

Ontario Ground Lease
(Wind Power Project)

THIS INDENTURE OF LEASE made effective the ____ day of _____, A.D. 2004 (the "**Effective Date**")

BETWEEN:

_____ of _____, in the Province of Ontario (hereinafter called the "**Lessor**")

- and -

SUNCOR ENERGY PRODUCTS INC, a corporation incorporated under the laws of the Province of Ontario (hereinafter called the "Lessee")

WHEREAS the Lessor is the registered owner of an estate in fee simple, subject, however, to the exceptions, conditions, encumbrances, liens and interests as registered on title of and in that certain parcel or tract of land situate, lying and being in the Province of Ontario hereinafter called the "**Lands**", particularly described in Schedule "C", attached hereto.

AND WHEREAS the Lessor has agreed to lease and grant a certain portion of the Lands to the Lessee for the purposes and upon the terms and conditions hereinafter set forth.

NOW THEREFORE THIS INDENTURE WITNESSETH THAT, in consideration of the mutual covenants and agreements hereinafter contained, the parties hereto covenant and agree with each other as follows:

ARTICLE I

THE LANDS

LEASE AND GRANT

1.1 **THE LESSOR**, in consideration of one ($1.00) dollar (the receipt and sufficiency of which is hereby acknowledged) and at the rental hereinafter set forth, **HEREBY LEASES AND GRANTS** to the Lessee all and singular:

(a) Leased Lands: those parts or portions of the Lands shown outlined in red on the sketch or plan identified as Schedule "A" hereto attached from time to time (hereinafter called the "**Leased Lands**"), to be held exclusively by the Lessee as tenant for the Term of twenty-one (21) years less one (1) day from the Effective Date hereof (hereinafter called the "Term") and for so long thereafter as it may be renewed in accordance with the provisions hereof, for any and all purposes and uses as may be necessary or useful to assess and evaluate the wind resources over such Lands and, if suitable for the purposes of the Lessee, the installation of either or both of anemometers to further measure such wind resources or windpower electricity generating facilities including wind driven turbines and the transmission of electricity for use or sale created therefrom. Without restricting the generality of the foregoing, these purposes and uses include the right, license, liberty and privilege to enter upon, use and occupy the Leased Lands in order to conduct surveys, construct, operate, maintain, inspect, control, alter, improve, remove, reconstruct, replace and repair any wind turbines and all appurtenances thereto installed by the Lessee (including but not restricted to foundations, concrete pads, footings, wind turbine units, towers, guy wires, support fixtures, anchors, fences, all overhead and underground electrical cables, and all overhead and underground telecommunications cables), all of which, notwithstanding any rule of law or equity, shall at all times remain chattels of and the property of the Lessee even though attached to the Leased Lands. The Leased Lands may or may not initially include a permanent access road, as provided in subsection 1.1(c) below; and

(b) Temporary Workspace: those parts or portions of the Lands required for:

(i) the ongoing, non-exclusive and repeated right to enter upon, use, occupy and access additional portions of the Lands surrounding the Leased Lands as a temporary workspace (such areas hereinafter collectively called the **"Temporary Workspace"**) being those parts or portions of the Lands shown outlined in green on the sketch or plan identified as Schedule "B" hereto attached, for the purposes of construction, repair, maintenance or decommissioning of any wind turbines and any of the aforesaid appurtenances thereto installed by the Lessee, and including temporary access for any equipment associated with or required for such purposes. The Lessee's use of the Temporary Workspace on the Lands shall be subject to all of the provisions of this Lease, and consideration for such use by the Lessee throughout the Term of this Lease is included in the calculation of the consideration payable to the Lessor under Section 2.3 below;

(ii) all rights of ingress to and egress from, on and over the Lands reasonably necessary as determined by SEPI to access the Temporary Workspace. If required by the Lessee, temporary access roads for construction, repair, maintenance and decommissioning purposes will be acquired on the Lands as part of the Temporary Workspace, with the compensation for damages (as calculated under Section 4.6) to be based on crop loss if any; and

(c) Access Roads: all rights of ingress to and egress from, on and over the Lands reasonably necessary to access the Leased Lands, if Lessee has not included a permanent access road as part of the Leased Lands. In such case, the provisions of Section 4.6 shall apply, with compensation for damages to the Lands to be based on crop loss, if any. If Lessee subsequently decides, in its sole discretion, that it requires a permanent access road to the Leased Lands, this Lease (including a retroactive adjustment of first year consideration and adjustment of the basic annual rental, commencing with the month of first inclusion of such additional permanent access road as Leased Lands, to compensate for the portion of Leased Lands comprised of the permanent access road) shall be amended in writing to include such permanent access road as part of the Leased Lands including any required rights of way or easements, surface or subterranean or both as may be deemed necessary by SEPI for installation and maintenance of its equipment and services.

ARTICLE II

CONSIDERATION AND RENTAL

YIELDING AND PAYING UNTO THE LESSOR

2.1 First Year Consideration for Leased Lands:
For the first year of the Term, the sum of _____ 00/100) ($_____) Dollars, plus GST, if applicable for the Leased Lands (which without restricting the provisions of subsection 1.1, above, may contain associated electrical cables, telecommunications cables, and all permanent developed and undeveloped access roads, and ingress to and egress from, associated with the wind turbine site), together with any sums or amounts payable to the Lessor as calculated and set out in Schedule "D", if any which sums include initial consideration and basic annual rental and any other rental and compensation in full for adverse effect, market value of land granted, entry fee, capital damage, loss of use, severance, nuisance, noise, inconvenience done or caused to the Leased Lands, and weed control to the extent provided in Section 3.5.

2.2 Basic Annual Rental:
For each subsequent year after the first year of the Term, and thereafter during the Term of this Lease and subject to Section 2.3, a basic annual rental payable annually in advance of _____ 00/100 ($_____) Dollars for the Leased Lands, on the first day of each year throughout the Term, which sum includes rental and compensation in full for adverse effect, loss of use, severance, nuisance, noise and inconvenience, and weed control to the extent provided in Section 3.5, for the Leased Lands.

2.3 **Revision of Basic Annual Rental:**
The amount of basic annual rent payable under Section 2.2 in respect of the Leased Land will be revised either upwards or downwards on the first day of each of the 6th, 11th and 16th years of the Term, on the first day of the First Renewal Term and on the first day of the 6th, 11th and 16th years of the First Renewal Term (each called a "Review Date"). On each Review Date the basic annual rent shall be changed by multiplying the basic annual rent for the immediately preceding year by a fraction, the numerator of which will be the OCPI three months prior to the Review Date in question and the denominator of which will be the OCPI in effect three months prior the immediately previous Review Date (or in the case of the first Review Date, three months prior to the Effective Date) and then rounding-up the result to the next whole dollar value.

"**OCPI**" means the Consumer Price Index for Ontario, for all items, published by Statistics Canada (base year 1992 = 100), or by any successor or other governmental agency including a provincial agency, for the Province of Ontario, or if not published for Ontario, then for Canada (or any index published in substitution for the Consumer Price Index or any other replacement index reasonably designated by SEPI if it is no longer published). In the case of any required substitution, SEPI shall be entitled to make all necessary conversions reasonably required for comparison purposes. Similarly, if the base year for the OCPI is changed, SEPI will make the necessary conversions.

2.4 **Consideration for Temporary Workspace:**
For the grant of the right of temporary use of the Temporary Workspace, the sum of _____00/100 ($_____) to be paid as consideration for each separate grant of the Temporary Workspace.

2.5 **Percentage Rental**
A percentage rental based on a share of the gross revenue received from generation of the metered price of electrical energy as follows:

Years 1 through 10 [redacted]

The percentage annual rental shall be equal to the Lessor's proportionate share of the percentage of the aggregate payments for gross revenues (before calculation of taxes and deduction of expenses) received by the Lessee from a party (the "**Power Purchaser**") for the net purchase price of electrical energy for transmission into an electric utility distribution or transmission system, calculated for each calendar year, for electrical energy generated from all of the wind turbine generators operated by the Lessee on the Leased Lands. Such percentage rental shall be payable annually and in arrears, within ninety (90) days following the last day of each such calendar year.

For the purposes of the foregoing, the "**Lessor's proportionate share**" means the proportion that the number of commissioned wind turbine generators located on the Leased Lands bears to the total number of wind turbine generators commissioned at any particular time in connection with the sale of power to that Power Purchaser from the wind power project comprised in part of the Leased Lands, and "**commissioned**" means that the pertinent wind turbine generator has been initially certified under applicable law to produce electrical power and is connected to the power transmission system of the Power Purchaser. Such payment shall be retroactively made on a per diem basis for any less than whole calendar year after the Exercise Date, using as its ratio the number of days during which the wind turbine was commissioned in that calendar year divided by 365 days, provided that the Lessor's proportionate share of payments shall be calculated monthly during the initial period while the wind turbine generators are being constructed and commissioned (but paid annually), and calculated and paid annually thereafter.

ARTICLE III

LESSOR'S COVENANT

THE LESSOR HEREBY COVENANTS AND AGREES TO AND WITH THE LESSEE

3.1 Taxes Paid by Lessor

The Lessor will promptly pay and satisfy all taxes, rates and assessments that may be assessed or levied against the Leased Lands during the continuance of this Lease except where such are to be paid by the Lessee. The Lessee shall pay the Proportionate Share of any increase which actually occurs in any such taxes, rates and assessments due to Lessee's use of the Leased Lands for the purposes and uses permitted herein. For the purposes hereof "Proportionate Share" shall mean a fraction the numerator of which is the area of the Leased Lands and the denominator of which shall be the area of the Lands.

3.2 Quiet Enjoyment

The Lessor has good title to the Lands as hereinbefore set forth, has good right and full power to grant and lease the Lands and the rights and privileges in manner aforesaid, and the Lessee, upon observing and performing the covenants and conditions on the Lessee's part herein contained, shall and may peaceably possess and enjoy the Leased Lands and Temporary Workspace and the rights and privileges hereby granted during the said Term and any extension thereof without any interruption or disturbance from or by the Lessor or any other person claiming by, through or under the Lessor. Lessor further warrants that there are no deeds or agreements to secure debt, mortgages, liens or judgments or which otherwise encumber the Lands except as registered on title to the Lands effective as of the Effective Date hereof (all of which, if any, have been or will be subordinated and postponed to this Lease and from which the Lessee has received or will receive a non-disturbance agreement), and there are no other encumbrances on the title to the Lands that would prevent Lessee using the Lands for the uses intended by Lessee as set forth herein throughout the entire Term and all renewals thereof.

3.3 Covenant Regarding Obstructions

The Lessor hereby grants (on behalf of itself and its successors and permitted assigns) a covenant in favor of the Lessor, not to construct or erect, or cause to be constructed or erected, during the Term of this Lease and all renewals thereof, on any of the Lands which were owned or controlled by the Lessor as of the Effective Date, in any direction surrounding any Leased Lands, any above-ground structure of any height located within two hundred (200) meters of the Leased Lands; and (without Lessee's prior written consent, which Lessee may withhold for any reason) any above ground structure having a height greater than twenty (20) meters located outside of the aforementioned two hundred (200) meter boundary but within eight hundred (800) meters of the Leased Lands. This covenant is for the benefit of all or any portion of the Leased Lands (being the dominant tenement) and shall run with and burden every portion of the Lands (as the servient tenement) for the duration of this Lease. The parties agree that damages will be an insufficient remedy for breach of this covenant by the Lessor, and that the Lessee may seek an equitable remedy of specific performance or an injunction or both in respect of such covenant, in addition to any other remedies available to it in equity or at law.

3.4 Site Assessments and Restoration

The Lessee shall have the further right of non-exclusive access to the Lands to conduct soil and water samples on the Lands together with such wind tests as are necessary to ascertain the suitability of the Lands for the erection of wind turbines and connecting corridors thereto for underground electrical cables and underground telecommunication cables, and to condition, maintain, reclaim and restore the surface of the Leased Lands during the Term of the Lease.

3.5 Weed Control

During the Term of this Lease the Lessor shall take all necessary precautions to keep down and destroy all noxious weeds on the Leased Lands except with respect to that portion of the Leased Lands located inside Lessee's fenced perimeter, if required, surrounding any anemometer, pad transformer or wind turbine tower, payment for which is part of the first year consideration and annual rental as set out in Sections 2.1 and 2.2 above. The Lessee shall remain responsible for weed control to the same standard, with respect to the excluded portion of the Leased Lands.

3.6 Renewal of Lease Term

If the Lessee is not in material default in respect of any of the covenants and conditions contained in this Lease at the date of expiration of the Term, then this Lease shall be renewed automatically and the Term extended for a further period of twenty-one (21) years less one (1) day (hereinafter called the "First Renewal Term").

The basic annual rental payable as of the first day of the First Renewal Term for the Leased Lands (the "Renewal Date") will be calculated by multiplying the basic annual rental which was paid on the final anniversary of the Effective Date of the previous Term by the percentage increase or decrease in the OCPI (as that term is defined in Section 2.3 hereof) as hereinafter provided. Such increase or decrease in the OCPI will be determined by comparing (a) the OCPI that was in effect on the date sixty three (63) months prior to the Renewal Date; and (b) the OCPI that was in effect on the date three (3) months prior to the Renewal Date, to determine the change in the OCPI over the intervening five (5) year period. That sum will be rounded up to the next nearest whole dollar value, and the rounded-up sum shall become the basic annual rental payable for the next succeeding five (5) year period of the First Renewal Term. Thereafter, the basic annual rental shall be subject to revision on each successive Review Date throughout the First Renewal Term and any renewal thereafter in the same manner as the basic annual rental is revised in the initial Term pursuant to Section 2.2.

For ease of managing its records and for the purposes of tendering basic rental payments, the Lessee may continue to describe the Renewal Date for the First Renewal Term of the Lease as being the same as the Effective Date, and may continue to tender its basic annual rental payments on the anniversary of the Effective Date, notwithstanding that the previous original Term of the Lease terminated one (1) day prior to the twenty-first (21^{st}) anniversary of the Effective Date and notwithstanding that the anniversary of the Renewal Date for the First Renewal Term will commence one (1) day prior to the anniversary date of the Effective Date.

Such First Renewal Term and every renewal thereof shall be subject to all the provisions hereof including this provision for renewal.

ARTICLE IV

LESSEE COVENANTS

THE LESSEE HEREBY COVENANTS AND AGREES TO AND WITH THE LESSOR

4.1 Rental

The Lessee shall pay the rental hereinbefore reserved in each and every year during the continuance of this Lease.

4.2 Permanent Access Roads

The Lessee shall, if reasonably required by either party, ensure that any permanent access road on the Leased Lands is constructed to a low profile unless topography of the land dictates otherwise.

4.3 Culverts

The Lessee shall construct and maintain such culverts and other structures on the Leased Lands as are reasonably required to ensure the unimpeded flow of water through natural drainage courses.

4.4 Fencing

During the continuance of this Lease, the Lessee shall erect and put upon or around the boundaries of the wind turbine foundations on the Leased Lands, a good substantial fence if reasonably required by the Lessor or the Lessee, and replace all fences which the Lessee may have removed for its purposes, and repair all fences which it may have damaged, and if and when reasonably required by the Lessor, provide a proper gate at any point of entry upon the Lands used by the Lessee.

4.5 Taxes Payable by Lessee

The Lessee shall pay all taxes, rates and assessments that may be assessed or levied in respect of any and all machinery, equipment, structure and works placed by the Lessee, in, on, over or under the Leased Lands.

4.6 Compensation for Damages

The Lessee shall pay compensation for damage done by Lessee or its servants or agents to the balance of the Lands excluding the Leased Lands which without restricting the generality thereof shall include damage to growing crops, machinery and other equipment, fences, buildings or other improvements of the Lessor upon the Lands other than the Leased Lands.

4.7 Indemnity

The Lessee shall indemnify and save harmless the Lessor from and against all actions, suits, claims and demands by any person in respect of any loss, injury, damage or obligation arising out of or connected with the use, occupancy or operations of the Lessee on the Lands, Leased Lands and Temporary Workspace, other than through willful damage or gross negligence by the Lessor.

4.8 Reclamation

The Lessee shall, prior to the surrender of the whole or any portion of the Leased Lands and Temporary Workspace, promptly restore the surface of the surrendered Leased Lands and Temporary Workspace as nearly as possible to its original condition in accordance with the laws and regulations of the Province of Ontario. Within a reasonable time following expiry of the Term of this Lease or earlier termination, Lessee shall at its expense discharge any notice of this Lease registered by the Lessee against title to the Leased Lands.

4.9 Topsoil

The Lessee agrees to strip, conserve and preserve the subsoil and topsoil from those portions of the Leased Lands to be excavated by the Lessee, having regard to good soil conservation practices and as soon as reasonably possible having regard to the nature of the Lessee's operations, shall restore the subsoil and topsoil in their original order onto the Leased Lands.

4.10 Electrical Cables and Telecommunication Cables

The Lessee shall, where practical or required by law, bury all electrical cables and telecommunication cables under the permanent access road (if any) comprising part of the Leased Lands. Where the Lessee does not acquire a permanent access road as part of the Leased Lands, or where the Lessee's permanent access road and buried cable are not in common, or where it is impractical in the Lessee's opinion to include the right-of-way for the buried cable in the Leased Lands, the Lessor shall promptly grant to the Lessee a right of entry and rights-of- or easements for its buried cables. In the event that the Lessor and Lessee are unable to agree upon any additional compensation which may be appropriate for such further right of entry and rights-of-way or easements, the compensation shall be determined in accordance with the dispute resolution provisions set out in Section 6.2 hereof.

ARTICLE V

MUTUAL CONVENANTS

THE LESSOR AND THE LESSEE DO HEREBY MUTUALLY COVENANT AND AGREE EACH WITH THE OTHER AS FOLLOWS

5.1 Transmission Easements and Rights-of Way

The Lessor acknowledges, in conjunction with the use and enjoyment of the Leased Lands by the Lessee, that further grants of easements and rights-of way may be necessary to permit the installation and connection of power lines and related apparatus and communication facilities by the distributor, transmitter or the Power Purchaser to the facilities and equipment of the Lessee on the Leased Lands. The Lessor covenants and agrees that it will promptly grant to the distributor, transmitter or the Power Purchaser all appropriate and required easements and rights-of way so as to permit the installation of any and all such power lines and related apparatus and communication facilities by the distributor, transmitter or the Power Purchaser and to permit the required connections to be made to enable the Lessee to conduct its operations on the Leased Lands in furtherance of the Lessee's use and enjoyment of such Leased Lands.

5.2 Overholding

If the Lessee remains in possession of the Leased Lands after the termination or expiry of the Term or any renewal of this Lease, and continues to pay monthly rent equivalent to that payable for the month immediately prior to such expiry or termination, such tenancy of the Lessee shall be from month to month only and shall be subject to all the terms, conditions and provisions of this Lease.

5.3 Perpetuities

Notwithstanding any of the provisions of this Lease, the rights of the Lessee pursuant to this Lease to acquire any further rights of entry, rights-of-way and Temporary Workspace in or in respect of the Lands or to otherwise acquire any interest in the Lands, shall not extend beyond twenty-one (21) years as provided in Section 13(3) of the *Perpetuities Act* R.S.O. 1990 Chap. P.9.

5.4 Surrender

The Lessee shall have the right at any time to surrender this Lease upon no less than forty-five (45) days written notice to the Lessor, provided however that there shall be no refund to the Lessee of any rental which may have been paid in advance, and provided that the Lessee shall have complied with all provisions for abandonment and reclamation in accordance with applicable laws.

5.5 Reduction of Acreage

The Lessee may from time to time and at any time surrender any part or portion of the Leased Lands by giving the Lessor a revised plan of the portion or portions thereof retained. Upon the surrender of a portion of the Leased Lands the rental payable hereunder for the subsequent remaining years of the Term and any renewals of this Lease shall be calculated on the proportionate basis of the reduced area of the Leased Lands then remaining subject to this Lease.

5.6 Removal of Equipment

The Lessee may at all times during the continuance of this Lease remove or cause to be removed from the Leased Lands all facilities, structures, material and equipment of any kind which it may have placed on or in the Leased Lands or in any area to be surrendered.

5.7 Discharge of Encumbrances

The Lessee may at its option pay or discharge all or part of any balance owing under any agreement for sale or mortgage, or of any withholding or other tax, charge, lien or encumbrance of any kind or nature whatsoever which may now or hereafter exist on or against or in any way affect the Lands or the Leased Lands, in which event the Lessee shall be subrogated to the rights of the holder or holders thereof, and may in addition thereto, at its option, reimburse itself by applying on account of repayment of the amount so paid by it the rentals or other sums accrued or accruing to the Lessor under the terms of this Lease. Any sums so applied shall, for all purposes of this Lease, be deemed to have been paid to and received by the Lessor in payment of such rentals or other sums accrued or accruing to the Lessor under the terms of this Lease.

5.8 Assignment by Lessee and Lessor

(a) The intention of the parties with respect to the covenant contained in Section 3.3 is to ensure that all portions of the original Lands which were subject to this Lease as of the Effective Date remain subject to the covenant as if no sale or assignment of the Sold Lands (as hereinafter defined) had occurred. Accordingly, should the Lessor propose to sell, assign, transfer, convey or otherwise alienate or dispose of title to all or any portion of the Lands (the **"Sold Lands"**) which are burdened by the covenant in Section 3.3, the Lessor (as vendor or transferor) shall make it a condition of any such sale or transfer that the purchaser or transferee agrees with the Lessee in writing under seal to assume the burden of that covenant in full against the Sold Lands as servient tenement, such that benefit of such covenant accrues to all or any portion of the Leased Lands (whether located on the Sold Lands or the retained Lands), as dominant tenement as if the purchaser or transferee of the Sold Lands were an original party to this Lease with the Lessee. All assignment provisions of this Lease shall apply to any successor or permitted assign of the Lessor or of the above-referenced purchaser or transferee. Similarly, the covenant granted by the Lessor shall continue to burden the retained Lands and shall continue to accrue to the benefit of any portion of the Sold Lands to the extent same are comprised, or will be comprised at a future date, of the Leased Lands, as of the date of such sale or transfer.

(b) If the estate and interest of either party in this Lease or the Lands or both or any portion thereof is sold, assigned, transferred, conveyed or disposed of in any manner (which disposition is hereby expressly allowed, subject to compliance with the provisions of Section 3.3 the provisions of this Lease shall inure to the benefit of and be binding upon the parties hereto and each of them, their respective heirs, executors, administrators, successors and permitted assigns, and shall constitute a grant, interest and covenant in and running with the Lands.

(c) No sale, assignment, transfer, conveyance or disposition shall be effective or binding on the non-assigning party: (i) until that non-assigning party has received notice thereof, which notice shall include the name and address of the assignee; (ii) with respect to the devolution of all or part of the estate in the Lands to the heir, administrator or executor of a party, until written notice of such devolution and copies of pertinent documents evidencing such devolution is provided to the non-assigning party; and (iii) in all other circumstances except those described in (ii) above, until he assignee of the assigning party has entered into an agreement in writing with the non-assigning party whereby such assignee has agreed to be bound by all of the terms hereof.

ARTICLE VI

DEFAULT AND DISPUTE RESOLUTION

6.1 **Default**

Notwithstanding anything herein contained to the contrary, the Lessee shall not be in default in the performance of any of its covenants or obligations under this Lease, including the payment of compensation or rental, unless and until the Lessor has notified the Lessee of such default in writing and the Lessee has failed to commence action to remedy the same within forty-five (45) days of receipt of such notice and thereafter fails to diligently continue to complete such remedial action.

6.2 **Dispute Resolution**

(a) Any matter or issue arising under or by virtue of this Agreement which cannot be agreed upon by the Owner and SEPI shall be determined by arbitration pursuant to the provisions of the *Arbitration Act,* 1991 S.O. 1991, as amended from time to time.

(b) For any arbitration, three (3) disinterested arbitrators shall be appointed, one by the Owner, one by SEPI, and the third to be appointed by the two arbitrators previously appointed. The arbitrators appointed shall be competent and have expertise with respect to the matter in dispute, and shall render their decision in writing withio ten (10) days of the conclusion of the submissions. The responsibility for the arbitration costs shall be determined by the appointed arbitrators, whose decision shall be final and binding on the parties hereto.

(c) The arbitrators or adjudicator shall be required to consider the sums described in Schedule "C" of this Agreement if issues of compensation arise, by considering the equivalent market value of the Leased Lands excluding the value of all chattels, equipment, structures, buildings, and improvements, located on or under the Leased Lands which have been installed by SEPI or are owned by SEPI.

The decision of the Arbitrators shall be final and binding on the parties hereto.

ARTICLE VII

MISCELLANEOUS

7.1 **Notices:**

All notices, communications, payments and deliveries (collectively the "**Notices**") required or permitted hereunder shall be in writing, unless otherwise expressed herein. All such Notices and all payments to be tendered hereunder may be given personally or by registered letter addressed to the party to whom the Notice is to be given. When delivered personally, such Notice shall be deemed received on the day of delivery, and when mailed, such Notice shall be deemed to be given to, and received by, the addressee four (4) days after the mailing thereof, postage prepaid, provided however that if a Notice is mailed and a disruption of postal services occurs before the date of deemed receipt of such Notice, such Notice shall not be deemed to be received until the expiration of four (4) days following the resumption of postal service.

The respective addresses for service of Notices shall be as follows:

Lessor: _____

_____

_____

Phone # _____

GST # _____

Lessee: Suncor Energy Products Inc.
PO Box 2844
150 6th Avenue S.W.
Calgary, Alberta T2P 3E3

Attention: Manager, Contracts – Renewable Energy

Any party may change its address for service by Notice to the other party. At any time there shall be only one address for service of Notices for each party.

7.2 Amendment and Waivers:
No amendment or waiver of any provision of this Agreement shall be binding on any party unless consented to in writing by such party. No waiver of any provision of this Agreement shall constitute a waiver of any other provision, nor shall any waiver constitute a continuing waiver unless otherwise expressly provided.

7.3 Severability
If and to the extent that any Court of competent jurisdiction determines that any of the terms or provisions of the within Lease are void or unenforceable, such determination shall not affect the validity of the other provisions of this Lease which shall remain in full force and effect.

7.4 Headings:
The division of this Lease into Articles and Sections and the insertion of headings are for convenience of reference only and shall not affect the construction or interpretation of this Lease.

7.5 Gender:
In this Lease, words importing the singular number only shall include the plural and vice versa, words importing gender shall include all genders and words importing persons shall include individuals, corporations, partnerships, associations, trusts, unincorporated organizations, governmental bodies and other legal and business entities.

7.6 Counterparts:
This Lease may be executed in counterparts, each of which will constitute an original and all of which taken together will constitute one and the same instrument.

7.7 Inurement:
This Lease and everything herein contained shall inure to the benefit of and be binding upon the Owner, his/her heirs, executors, administrators, successors and assigns and upon SEPI, its successors and assigns.

7.8 Further Acts:
The parties shall each do and perform such acts and things and execute and deliver all such instruments, documents or writings and give all such further assurances as may be necessary to give full effect to the provisions and the intent of this Lease, including but not limited to registration of notice of this Lease on title to the Lands.

7.9 Planning Act
This Lease is subject to the provisions of *The Planning Act*, R.S.O. 1990 c.P.13, as amended. If any consent is required it shall be obtained by the Lessee with the consent of the Lessor and until such consent is obtained any term hereof, including any options to renew, shall be read as not exceeding twenty-one (21) years less one (1) day and in the event such consent is not obtained, the Term hereof, including any options to renew, shall not exceed twenty-one (21) years less one (1) day.

7.10 **Governing Law**
This Lease shall for all purposes be construed according to the laws of the Province of Ontario and the laws of Canada as applicable therein. Any references herein to specific legislation shall be deemed a reference to amending or successor legislation thereto once same is enacted and in force.

7.11 **Personal Information Consent:**
By providing personal information to the Lessee, the Lessor consents to the Lessee's collection, use, retention and disclosure of that information for any and all purposes and uses as permitted and contemplated under this Agreement and as needed to comply with any legal requirements.

7.12 **Time of Essence:**
Time shall be of the essence of this Lease.

IN WITNESS WHEREOF the Lessor has executed this Indenture under his/her/their hand(s) and the Lessee has executed this Indenture under the hand of its proper officer, duly authorized in that behalf, all as of the day and year first above written.

SIGNED, SEALED AND DELIVERED
in the presence of)
)

_____ _____
Owner Lessor

_____ _____
Owner Lessor

SUNCOR ENERGY PRODUCTS INC.
Per: _____
Name:
Title:

CONSENT OF SPOUSE

I, _____ being the spouse of the above named

_____ (Lessor) do hereby give my consent to the transaction set out in this Agreement pursuant to Section 21 (Matrimonial Home) of the *Family Law Act*, R.S.O. 1990 Chap. F3.

_____
Spouse of the Lessor

SCHEDULE "A"

Plan of Survey or Sketch of Leased Lands

SCHEDULE "B"

Sketch of Temporary Workspace, including Temporary Access Roads

SCHEDULE "C"

The Lands

SCHEDULE "C"

First Year Consideration and Annual Rental for Leased Lands and Temporary Workspace under Ground Lease

Leased Lands under Ground Lease:

A) For Wind Turbines:

First Year Consideration
Basic Rental: [redacted]

Annual Rental
Basic annual rental: [redacted].

Percentage Rental
A percentage rental based on a share of the gross revenue received from generation of the metered price of electrical energy as follows:

Years 1 through 10 [redacted]

The percentage annual rental shall be equal to the Owner's proportionate share of the percentage of the aggregate payments for gross revenues (before calculation of taxes and deduction of expenses) received by SEPI from a party (the "**Power Purchaser**") for the gross sale of electrical energy for transmission into an electric utility distribution or transmission system, calculated for each calendar year, for electrical energy generated from all of the wind turbine generators operated by SEPI on the Leased Lands. Such percentage rental shall be payable annually and in arrears, within ninety (90) days following the last day of each such calendar year.

For the purposes of the foregoing, the "**Owner's proportionate share**" means the proportion that the number of commissioned wind turbine generators located on the Leased Lands bears to the total number of wind turbine generators commissioned at any particular time in connection with the sale of power to that Power Purchaser from the wind power project comprised in part of the Leased Lands, and "**commissioned**" means that the pertinent wind turbine generator has been initially certified under applicable law to produce electrical power and is connected to the power transmission system of the Power Purchaser. Such payment shall be retroactively made on a per diem basis for any less than whole calendar year after the Exercise Date, using as its ratio the number of days during which the wind turbine was commissioned in that calendar year divided by 365 days, provided that the Owner's proportionate share of payments shall be calculated monthly during the initial period while the wind turbine generators are being constructed and commissioned (but paid annually), and calculated and paid annually thereafter.

B) For Permanent Access Road (Width of 15 meters):

First Year Consideration

[redacted]/acre, calculated proportionately for fractional acres.

Annual Rental

Basic annual rental: [redacted]/acre, calculated proportionately for fractional acres.

C) **For Anemometers:**

Annual Rental
Basic annual rental [redacted] per acre per annum

Temporary Workspace under Ground Lease:

For Wind Turbines:
[redacted] per acre, calculated proportionately for fractional acres.

D) **For Cable Rights-of-Way (separate lease required when cable is unable to be placed in road allowances)(minimum of 3 meters width):**

One time payment of [redacted]

Amendments to Option Agreement (Add Only If Required)

1/ The Optionee (Lessee) shall, where it appears drainage problems will be encountered as a result of the road construction and/or turbine placement, mitigate these impacts to the extent reasonably possible. The Optionee (Lessee) will repair and restore all field drainage systems and municipal drains impacted by construction as near as reasonably possible to their original performance and will be responsible for the remedy, in consultation with the Optionor (Lessor), of any drainage problem created by the existence of the road(s) and/or turbine(s).

2/ The Optionee hereby grants to SEPI the Option as contemplated in section 4.5 of the Option Agreement to acquire easements as required and in its sole discretion by SEPI during the term of the Option Agreement. The granting of this Option Agreement will be exclusively for easements in the form of the "Easement Agreement" annexed hereto as Schedule "G" and in no way shall be Schedule "B" "Ontario Ground Lease" be exercised in any form for the installation of wind turbine(s), access road(s) or anemometer(s).

SCHEDULE "D"

Sample Calculations of Annual Rental Adjustments Pursuant to subsection 3.4(d) of the Option Agreement:

Formula: *(the basic annual rental) x (the number of days from and including the Exercise Date up to but not including the Commencement Date of the Ground Lease)/365) = rental monies due to Owner.*

Assume: the basic annual rental for the Ground Lease under Schedule "B" is [redacted]

a) If the Commencement Date of the Ground Lease occurs 200 days after the Exercise Date:

[redacted]
which amount is owed by SEPI to The Owner.

b) If the Commencement Date of the Ground Lease occurs 500 days after the Exercise Date:

[redacted]
which amount is owed by SEPI to The Owner.

SCHEDULE "E"

Form of Exercise Notice

[method of delivery]

[date]

[addressed to Owner]

Re: Exercise of Option under Option for Ontario Ground Leases (Wind Power Projects) dated *[date of agreement]* ; ("Option Agreement"); Owner: *[name of Owner]* ; T R W M; Section *[describe all of optioned lands].*

For and in consideration of $1.00 (receipt and sufficiency of which is acknowledged by the Owner) XXX, as SEPI under the Option Agreement, hereby exercises an option to acquire a ground lease (the "Ground Lease") for certain lands (the "Leased Lands") for a *[wind turbine site/anemometer site/permanent access road]* from you as Owner, as follows:

1. The legal description of the lands within which the Ground Lease is to be acquired is as follows:

   _____

2. A plan of survey of the Ground Lease is attached, to be initialed by you as Owner to indicate your approval of the location of the Leased Lands.

3. If a Temporary Workspace is required, a sketch of the anticipated area is attached, to be initialed by you as Owner to indicate your approval of the location of the Temporary Workspace.

Please acknowledge your receipt of this letter by signing both copies of it in the manner indicated and returning one copy to the writer. .Please also initial the survey land and the sketch (if required) attached to this letter to indicate your consent to the location of the Leased Lands and the Temporary Workspace to be granted by the Ground Lease.

Yours truly,

[name of SEPI]

Per: _____

Name:
Title:

Receipt of this letter is acknowledged this ____ day of _____, 20__ by

_____ _____
Owner Witness

_____ _____
Owner Witness

SCHEDULE "F"

Lands

Exhibit G, Tab 1, Schedule 1
Community and Stakeholder Consultation

COMMUNITY AND STAKEHOLDER CONSULTATION

Suncor has carried out its public, community, aboriginal, agency, and other stakeholder consultations, in the context of the Renewable Energy Approval ("**REA**") process.

Suncor has conducted a comprehensive stakeholder consultation program that began in the winter of 2011 under O. Reg. 359/09 and has identified the key issues of interest to the local community and incorporated them into the Project design where possible. This includes a reduction in the total number of proposed turbine locations from 80 to 55 (up to 46 constructed turbines plus 9 alternative locations). The consultation program involved a total of eight public meetings, as well as opportunities for stakeholders, agencies and aboriginal communities to provide comments and concerns including a review of Draft Renewable Energy Approval Reports (released to the public in January 2013). Consultation efforts undertaken by Suncor will continue with Project stakeholders during all phases of the Project including providing Project updates on the Project website and the implementation of a communication plan to continually address stakeholder concerns. With an anticipated presence in the community over the long term, Suncor will continue to develop local relationships and channels of communication, which they anticipate will benefit the local area.

Suncor utilized various communication tools for both disseminating Project information to, and collecting information from, interested parties, including but not limited to, the public, Aboriginal communities, agencies, provincial and federal elected officials and local municipalities and the County.

The communication tools used for the Project included:

- Project notices published in local newspapers (Official REA notices and "reader friendly" advertisements);
- Direct mailings to assessed landowners in the Project Boundary (in excess of 550 m from the Project Location) and to interested stakeholders who had requested to be added to the contact list;
- Issued a renewable energy "In Your Community" newsletter distributed in winter of 2012, another newsletter was issued in the summer of 2013;
- Eight (8) Public Meetings;
- Public Meeting feedback forms (responses to comments were summarized and posted on the website – see below);
- On-site meetings with landowners;

- Landowner appreciation dinners (two);
- Presentations to local Council members and municipal planners;
- A Project website (http://www.suncor.com/cedarpointwind);
- A Project e-mail address (CedarPoint@suncor.com);
- A dedicated stakeholder telephone line (1-866-344-0178); Mailing addresses and phone numbers for both Suncor and Stantec key contacts (Stantec was Suncor's consultant for the REA matters);
- Meetings with local community members, Aboriginal communities, municipal staff and meetings with other wind developers in the community; and,
- Engaging in public policy and public outreach and education initiatives (including program funding through Suncor's Energy Foundation, site tours and presentations at universities).

Contact information for Project representatives was provided on all Project communications provided to the public. In addition to the public meetings described below, Suncor staff also met with several landowners and residents in person throughout the development of the Project.

Suncor's consultation activities include (a) public consultations, (b) municipal consultations, (c) agency consultations, and (d) Aboriginal consultations.

Notice of the first public meetings was published in local newspapers in March 2012. The related public meetings were held on April 18 and 19, 2012 in Lambton Shores and Plympton-Wyoming. Once it became clear that one turbine would be erected in Warwick Township, a separate Notice was issued on July 12, 2012, and a public meeting was held there on August 23, 2012. Subsequent Notices advised the public of the release of a Draft Project Description Report and its availability for viewing prior to the public meetings. A second round of public meetings was held on August 21 and 22 in Plympton-Wyoming and Lambton Shores. On August 17, 2012, Suncor published a Notice of Draft Site Plan in the three municipalities. The site plan was posted on the project website and available at the three municipal offices. The Draft Site Plan contained two potential transmission line routes. A revised site plan was released in January 2013, prior to final public meetings held on April 2-4, 2013. The Revised Site Plan showed a primary and secondary route for the overhead transmission line.

Suncor also consulted with the Town of Plympton-Wyoming, Municipality of Lambton Shores, Warwick Township, and Lambton County, throughout the development of the Project.

A Municipal Consultation Form ("MCF") (required as part of the REA process), along with the required corresponding reports, were provided at the following milestones to assist in initiating discussions with all parties:

Date	Provided To	Reports Attached	Project Milestone
March 15, 2012	Plympton-Wyoming, Lambton Shores, Lambton County	Draft Project Description Report	At least 30-days prior to the first public meetings
July 11, 2012	Warwick Township	Draft Project Description Report	At least 30-days prior to the first public meeting in Warwick Township
July 11, 2012	Plympton-Wyoming, Lambton Shores, Lambton County	Updated Draft Project Description Report (to reflect the addition of Warwick Township)	At least 30-days prior to the second round of meetings in Lambton Shores and Plympton-Wyoming
September 10, 2012	All	Draft REA Report package	At least 90-days prior to the final public meetings

Suncor is interested in developing long-term relationships within communities in which they operate. To this end, regular contact was made with the municipal and county staff through emails, telephone calls, and face-to-face meetings. A record of communications can be found at Appendix E of the Cedar Point Wind Power Project Consultation Report ("**Consultation Report**"), which was filed in support of the REA application to the Ministry of the Environment.

With respect to agency consultations, Suncor has consulted with a wide range of governmental authorities having relevant or potentially relevant jurisdiction over permits and approvals potentially required for the planned generation and proposed transmission facilities. This includes consultations related to the heritage, archaeological and natural heritage studies prepared as part of the REA process, the scope of which included the proposed transmission facility locations. No significant feedback specifically related to the proposed transmission facilities was received through agency consultations.

With respect to Aboriginal consultations, Suncor has undertaken a thorough program of consultation with Aboriginal communities. After obtaining the Aboriginal Communities List for the Project from MOE on December 8, 2011, Suncor contacted each of the seven noted First Nations Communities, and has had face-to-face meetings with virtually all of them. Depending on the expressed interest of each aboriginal community, Suncor is continuing to engage and build relationships, and has an openness to participate in events, symposia, joint meetings, and

open houses with other Aboriginal communities. Suncor has conducted site tours for First Nations to link Suncor's operating projects in Ontario, such as the Kent Breeze Wind Power Project, supported and participated in First Nations open houses and First Nations symposia on wind energy. It also invited Walpole Island, Kettle and Stoney Point, and Aamj-wneeng First Nations to participate with Suncor in the 2013 Inspire Awards.

The First Nations consultations are described in detail in Suncor's Consultation Report, to the Ministry of the Environment (part of the REA submissions), at pages 4.1 to 4.3 and Appendix F. A description of the overall Consultation Process is contained in pages 2.1 to 2.11 of that Report. Suncor notes that, as explained in the Board's *Filing Requirements for Transmission and Distribution Applications*, the Board does not consider issues relating to the Crown's duty to consult with Aboriginal peoples in Section 92 applications.

Exhibit H, Tab 1, Schedule 1
Overview of Impact Assessments

OVERVIEW OF IMPACT ASSESSMENTS

Suncor received a System Impact Assessment ("**SIA**") (Addendum Report) (the "**Assessment**") on December 12, 2012 for the Cedar Point Project. The Report was issued in the form of an Addendum to the SIA issued to NextEra for the connection of its Shared Transmission Facilities on June 4, 2012. These reports conclude that the proposed connection of Cedar Point is expected to have no material adverse impacts on the reliability of the integrated power system. The IESO therefore recommended that a Notification of Conditional Approval for Connection be issued. The Notification was issued to Suncor concurrently with SIA Addendum Report.

Suncor received a final Customer Impact Assessment ("**CIA**") Report "Wind Energy Power Project, Adelaide/Bornish/Jericho Wind Energy Centres" on June 8, 2012 from Hydro One in respect of the Proposed Transmission Facilities. This report concludes that electricity from the Cedar Point generation facilities can be conveyed to the IESO-controlled grid through the proposed Transmission Facilities and the Shared Transmission Facilities without adverse impacts on area customers. The CIA Report was issued in the form of an Addendum to the previously issued Customer Impact Assessment for NextEra Shared Transmission Facilities, for which has recently been approved by the Board.

The Board noted in its decision on the Bornish Application, while discussing the SIA and the CIA performance for that project that, for both the SIA and the CIA, subsequent addenda included the impacts of the 100 MW Suncor Cedar Point Project in the combined projects.

Exhibit H, Tab 2, Schedule 1
System Impact Assessment

SYSTEM IMPACT ASSESSMENT

REPORT

Power to Ontario.
On Demand.

System Impact Assessment Report

CONNECTION ASSESSMENT & APPROVAL PROCESS

Final Report

CAA ID: **2011-445**
Project: **Cedar Point II Wind Power Project**
Applicant: **Suncor Energy Products Inc.**

Market Facilitation Department
Independent Electricity System Operator

Date: June 4th, 2012

Document ID	IESO_REP_0811
Document Name	System Impact Assessment Report
Issue	Final Report
Reason for Issue	Final Report
Effective Date	June 4th, 2012

System Impact Assessment Report

Acknowledgement

The IESO wishes to acknowledge the assistance of Hydro One in completing this assessment.

Disclaimers

IESO

This report has been prepared solely for the purpose of assessing whether the connection applicant's proposed connection with the IESO-controlled grid would have an adverse impact on the reliability of the integrated power system and whether the IESO should issue a notice of conditional approval or disapproval of the proposed connection under Chapter 4, section 6 of the Market Rules.

Conditional approval of the proposed connection is based on information provided to the IESO by the connection applicant and Hydro One at the time the assessment was carried out. The IESO assumes no responsibility for the accuracy or completeness of such information, including the results of studies carried out by Hydro One at the request of the IESO. Furthermore, the conditional approval is subject to further consideration due to changes to this information, or to additional information that may become available after the conditional approval has been granted.

If the connection applicant has engaged a consultant to perform connection assessment studies, the connection applicant acknowledges that the IESO will be relying on such studies in conducting its assessment and that the IESO assumes no responsibility for the accuracy or completeness of such studies including, without limitation, any changes to IESO base case models made by the consultant. The IESO reserves the right to repeat any or all connection studies performed by the consultant if necessary to meet IESO requirements.

Conditional approval of the proposed connection means that there are no significant reliability issues or concerns that would prevent connection of the proposed project to the IESO-controlled grid. However, the conditional approval does not ensure that a project will meet all connection requirements. In addition, further issues or concerns may be identified by the transmitter(s) during the detailed design phase that may require changes to equipment characteristics and/or configuration to ensure compliance with physical or equipment limitations, or with the Transmission System Code, before connection can be made.

This report has not been prepared for any other purpose and should not be used or relied upon by any person for another purpose. This report has been prepared solely for use by the connection applicant and the IESO in accordance with Chapter 4, section 6 of the Market Rules. The IESO assumes no responsibility to any third party for any use, which it makes of this report. Any liability which the IESO may have to the connection applicant in respect of this report is governed by Chapter 1, section 13 of the Market Rules. In the event that the IESO provides a draft of this report to the connection applicant, the connection applicant must be aware that the IESO may revise drafts of this report at any time in its sole discretion without notice to the connection applicant. Although the IESO will use its best efforts to advise you of any such changes, it is the responsibility of the connection applicant to ensure that the most recent version of this report is being used.

Hydro One

The results reported in this report are based on the information available to Hydro One, at the time of the study, suitable for a System Impact Assessment of this connection proposal.

The short circuit and thermal loading levels have been computed based on the information available at the time of the study. These levels may be higher or lower if the connection information changes as a result of, but not limited to, subsequent design modifications or when more accurate test measurement data is available.

This study does not assess the short circuit or thermal loading impact of the proposed facilities on load and generation customers.

In this report, short circuit adequacy is assessed only for Hydro One circuit breakers. The short circuit results are only for the purpose of assessing the capabilities of existing Hydro One circuit breakers and identifying upgrades required to incorporate the proposed facilities. These results should not be used in the design and engineering of any new or existing facilities. The necessary data will be provided by Hydro One and discussed with any connection applicant upon request.

The ampacity ratings of Hydro One facilities are established based on assumptions used in Hydro One for power system planning studies. The actual ampacity ratings during operations may be determined in real-time and are based on actual system conditions, including ambient temperature, wind speed and facility loading, and may be higher or lower than those stated in this study.

The additional facilities or upgrades which are required to incorporate the proposed facilities have been identified to the extent permitted by a System Impact Assessment under the current IESO Connection Assessment and Approval process. Additional facility studies may be necessary to confirm constructability and the time required for construction. Further studies at more advanced stages of the project development may identify additional facilities that need to be provided or that require upgrading.

Table of Contents

Executive Summary

Project Description

Suncor Energy Products Inc. (the "connection applicant") is proposing to construct a 100 MW wind energy project named Cedar Point II Wind Power Project (the "project") in Forest, Ontario. The project will connect to Hydro One's 500 kV circuit B562L via a 121 kV network to which three other projects, Bornish, Adelaide and Jericho Wind Energy Centres will also be connected. As agreed with the connection applicants for all four projects, this System Impact Assessment (SIA) study was performed as a cluster with requirements being developed for the combination of the Cedar Point II, Bornish, Adelaide and Jericho wind projects (the "projects").

The Cedar Point II Wind Power Project has been awarded a Power Purchase Agreement under the Feed-In Tariff (FIT) program with the Ontario Power Authority. The project in-service date is July 5th, 2014.

Findings

1. The proposed connection arrangement and equipment for the projects are acceptable to the IESO.
2. The asymmetrical fault current at Bruce A 230 kV switchyard before and after the incorporation of the project will exceed the interrupting capability of the existing breakers. Hydro One has planned to replace the Bruce 230 kV breakers to improve fault current interrupting capability in the long term. Before the circuit breakers are replaced, temporary operational mitigation measures have been developed by Hydro One in collaboration with the IESO.
3. Circuit S2S will be required to operate open-loop under certain conditions after the integration of the committed generation in the Bruce Area to prevent thermal overloading
4. The projects are connecting in the Bruce Area where transmission connected generation projects participate in the Bruce Special Protection Scheme (BSPS).
5. The reactive power capability of the wind turbine generators (WTGs) along with the impedance between the WTGs and the IESO controlled grid results in a reactive power deficiency at the connection point which has to be compensated with additional reactive power devices.
6. The functions of the proposed wind farm control system meet the requirements in the Market Rules except that the inertia emulation control function is unavailable. The IESO reserves the right to ask the connection applicant to install this function in the future should the function become available for the proposed type of WTG.
7. Some outage conditions and contingencies cause the voltage at the 500 kV Evergreen SS to exceed maximum permissible voltage levels of 550 kV. This will be managed by using equipment with a maximum continuous operating voltage of at least 570 kV. Alternate solutions to manage the high voltage concern may be acceptable upon the approval of the IESO.
8. The WTGs of the projects and the power system are expected to be transiently stable following recognized fault conditions.
9. The proposed WTGs are expected to remain connected to the grid for recognized system contingencies which do not remove the projects by configuration.

10. Protection adjustments identified by Hydro One in the Protection Impact Assessment (PIA) to accommodate the projects have no adverse impact on the reliability of IESO-controlled grid.
11. The relay margins on the affected circuits after the incorporation of the projects conform to the Market Rules' requirements.
12. In the event of high flows eastward towards Toronto, there is a low probability of congestion that may require the applicant to curtail its output.

IESO Requirements for Connection

Transmitter Requirements

The following requirements are applicable to the transmitter for the incorporation of the projects:

(1) Hydro One is required to review the relay settings of the 500 kV sectionalized circuits of B562L and any other circuits affected by the projects, as per solutions identified in the PIA.

Modifications to protection relays after this SIA is finalized must be submitted to IESO as soon as possible or at least six (6) months before any modifications are to be implemented. If those modifications result in adverse reliability impacts, the connection applicant and the transmitter must develop mitigation solutions.

(2) The transmitter shall modify the existing Bruce Special Protection Scheme (BSPS) to incorporate the new projects and the new switching station. The BSPS shall be expanded to recognize the disconnection of the circuits in the Bruce x Longwood corridor. A description of the modification to the BSPS has to be provided to the IESO in a timely manner to allow for the required approvals of the BSPS to be obtained. A Facility Description Document (FDD) describing the functionality of the expanded BSPS has to be provided to the IESO during the market entry/facility registration process.

(3) Equipment at Evergreen SS must sustain a continuous voltage up to 561 kV. Alternate solutions to manage the high voltage concern may be acceptable upon the approval of the IESO.

(4) Fault interrupting devices must be able to interrupt fault currents at the maximum continuous voltage of 561 kV.

Applicant Requirements

Specific Requirements: The following *specific* requirements are applicable for the incorporation of the projects. Specific requirements pertain to the level of reactive compensation needed, operation restrictions, special protection system, upgrading of equipment and any project specific items not covered in the *general* requirements These requirements are based on the projects' grid connection point being at the 500 kV Parkhill CTS..

(1) The projects are required to have the capability to inject or withdraw reactive power continuously (i.e. dynamically) at the connection point up to 33% of its rated active power at all levels of active power output.

Based on the equivalent collector impedance parameters provided by the connection applicant, a static capacitive compensation device of at least 120 Mvar@121 kV installed at the 121 kV Parkhill CTS bus would satisfy the reactive power requirement. The required capacitive compensation would need to be arranged into at least 4 approximately equal steps to allow for flexibility in adjustment of reactive power production.

The voltage profile along the projects' network greatly impacts their ability to provide full reactive support from the WTGs. The IESO recommends that projects' internal system

voltages be controlled via automatic ULTC such that voltages remain within acceptable ranges, ultimately facilitating the WTGs ability to provide full reactive support.

The connection applicant has the obligation to ensure that the wind farm has the capability to meet the Market Rules' requirements at the connection point and be able to confirm this capability during the commission tests.

(2) The wind farm voltage control system shall be designed as per the philosophy described in Section 6.5. The connection applicant is required to provide a finalized copy of the functional description of the wind farm control systems for the IESO's approval before the project is allowed to connect.

(3) The connection applicant shall ensure that the equipments within the project have the capability to operate when the voltage at Evergreen SS is as high as 561 kV.

(4) Special protection system facilities must be installed at the projects to accept a pair (A & B) of Generation Rejection (G/R) signals from the BSPS, and disconnect the project from the system with no intentional time delay when armed for G/R following a triggering contingency. These special protection system facilities must also comply with the NPCC Reliability Reference Directory #7 for Type 1 special protection systems. In particular, if the SPS is designed to have 'A' and 'B' protection at a single location for redundancy, they must be on different non-adjacent vertical mounting assemblies or enclosures. Two independent trip coils are required on the breakers selected for G/R. The applicant must provide two dedicated communication channels, separated physically and geographically diverse, between the project and the Bruce NGS.

To disconnect the project from the system for G/R, simultaneous tripping of the 500 kV and 121 kV breakers at Parkhill CTS shall be initiated with no accompanying breaker failure response. After being tripped by the BSPS, the closing of the breakers is not permitted until approval is obtained from the IESO. Alternative solutions to disconnect the project from the system for G/R may be acceptable upon the approval of the IESO.

General Requirements: The connection applicant shall satisfy all applicable requirements and standards specified in the Market Rules and the Transmission System Code. The following requirements summarize some of the general requirements that are applicable to the proposed projects, and presented in detail in section 2 of this report.

(1) The connection applicant shall ensure that the projects have the capability to operate continuously between 59.4Hz and 60.6Hz and for a limited period of time in the region above straight lines on a log-linear scale defined by the points (0.0s, 57.0Hz), (3.3s, 57.0Hz), and (300s, 59.0Hz).

The project shall respond to frequency increase by reducing the active power with an average droop based on maximum active power adjustable between 3% and 7% and set at 4%. Regulation deadband shall not be wider than ± 0.06%. The projects shall respond to system frequency decline by temporarily boosting its active power output for some time (i.e. 10 s) by recovering energy from the rotating blades, if this technology is available.

(2) The connection applicant shall ensure that the projects have the capability to supply continuously all levels of active power output for 5% deviations in terminal voltage.

The project shall inject or withdraw reactive power continuously (i.e. dynamically) at the connection point up to 33% of its rated active power at all levels of active power output except where a lesser continually available capability is permitted by the IESO.

The project shall have the capability to regulate automatically voltage within ±0.5% of any set point within ±5% of rated voltage at a point whose impedance (based on rated apparent power and rated voltage) is not more than 13% from the highest voltage terminal. If the

AVR target voltage is a function of reactive output, the slope ΔV/ΔQmax shall be adjustable to 0.5%. The response of the projects for voltage changes shall be similar or better than that of a generation facility with a synchronous generation unit and an excitation system that meets the requirements of Appendix 4.2 of the Market Rules.

(3) The project shall have the capability to ride through routine switching events and design criteria contingencies assuming standard fault detection, auxiliary relaying, communication, and rated breaker interrupting times unless disconnected by configuration.

(4) The connection applicant shall ensure that the 500 kV equipment is capable of continuously operating between 490 kV and 561 kV. Protective relaying must be set to ensure that transmission equipment remains in-service for voltages between 94% of the minimum continuous value and 105% of the maximum continuous value specified in Appendix 4.1 of the Market Rules.

(5) The connection applicant shall ensure that the connection equipment is designed to be fully operational in all reasonably foreseeable ambient temperature conditions. The connection equipment must also be designed so that the adverse effects of its failure on the IESO-controlled grid are mitigated. This includes ensuring that all circuit breakers fail in the open position.

(6) The connection applicant shall install at the projects a disturbance recording device with clock synchronization that meets the technical specifications provided by the transmitter.

(7) The connection applicant shall ensure that the new equipment at the projects is designed to withstand the fault levels in the area. If any future system changes result in fault levels exceeding the equipment's capability, the connection applicant is required to replace the equipment with higher rated equipment capable of sustaining the increased fault level, up to maximum fault level specified in Appendix 2 of the Transmission System Code.

Fault interrupting devices must be able to interrupt fault currents at the maximum continuous voltage of 561 kV.

(8) Appendix 2 of the Transmission System Code states that the maximum rated interrupting time for the 500 kV breakers must 2 cycles or less. Thus, the connection applicant shall ensure that the installed breakers meet the required interrupting time specified in the Transmission System Code.

(9) The connection applicant shall ensure that the new protection systems at the projects are designed to satisfy all the requirements of the Transmission System Code and any additional requirements identified by the transmitter.

As currently assessed, the projects are not part of the Bulk Power System (BPS). However, being 500 kV connected facilities, the projects are designated as essential to the power system by the IESO and as such must meet the TSC requirements for essential elements.

The protection systems within the project must only trip the appropriate equipment required to isolate the fault.

The auto-reclosure of the high voltage breakers at Parkhill CTS must be blocked. Upon its opening for a contingency, the high voltage breaker must be closed only after the IESO approval is granted.

Any modifications made to protection relays after this SIA is finalized must be submitted to the IESO as soon as possible or at least six (6) months before any modifications are to be implemented on the existing protection systems.

(10) The connection applicant shall ensure that the telemetry requirements are satisfied as per the applicable Market Rules requirements. The finalization of telemetry quantities and telemetry testing will be conducted during the IESO Facility Registration/Market Entry process.

(11) If revenue metering equipment is being installed as part of the projects, the connection applicant should be aware that revenue metering installations must comply with Chapter 6 of the IESO Market Rules. For more details the connection applicant is encouraged to seek advice from their Metering Service Provider (MSP) or from the IESO metering group.

(12) The project must be compliant with applicable reliability standards set by the North American Electric Reliability Corporation (NERC) and the North East Power Coordinating Council (NPCC) that are in effect in Ontario as mapped in the following link: http://www.ieso.ca/imoweb/ircp/orcp.asp.

(13) The connection applicant will be required to be a restoration participant. Details regarding restoration participant requirements will be finalized at the Facility Registration/Market Entry Stage.

(14) The connection applicant must complete the IESO Facility Registration/Market Entry process in a timely manner before IESO final approval for connection is granted.

Models and data, including any controls that would be operational, must be provided to the IESO at least seven months before energization to the IESO-controlled grid. This includes both PSS/E and DSA software compatible mathematical models. The models and data may be shared with other reliability entities in North America as needed to fulfill the IESO's obligations under the Market Rules, NPCC and NERC rules.

The connection applicant must also provide evidence to the IESO confirming that the equipment installed meets the Market Rules requirements and matches or exceeds the performance predicted in this assessment. This evidence shall be either type tests done in a controlled environment or commissioning tests done on-site. The evidence must be supplied to the IESO within 30 days after completion of commissioning tests. If the submitted models and data differ materially from the ones used in this assessment, then further analysis of the projects will need to be done by the IESO.

(15) The Market Rules governing the connection of renewable generation facilities in Ontario are currently being reviewed through the SE-91 stakeholder initiative and, therefore, new connection requirements (in addition to those outlined in the SIA), may be imposed in the future. The connection applicant is encouraged to follow developments and updates through the following link: http://www.ieso.ca/imoweb/consult/consult_se91.asp.

Notification of Conditional Approval

The proposed connection of the Cedar Point II Wind Power Project, operating up to 100 MW, subject to the requirements specified in this report, is expected to have no material adverse impact on the reliability of the integrated power system.

It is recommended that a *Notification of Conditional Approval for Connection* be issued for the Cedar Point II Wind Power Project subject to the implementation of the requirements outlined in this report.

– End of Section –

1. Project Description

Suncor Energy Products Inc. is proposing to construct a 100 MW wind energy project named Cedar Point II Wind Power Project in Forest, Ontario. The project has been awarded a Power Purchase Agreement under the FIT program with the Ontario Power Authority. The project in-service date is July 5th, 2014.

The project will consist of 45 units of Siemens 2.3 MW wind turbines, output limited to 2.221 MW each. These wind turbines will be arranged into 4 groups of 12, 11 or 10 turbines each. The collector feeder for each group of turbines will be connected to a 34.5 kV bus via a circuit breaker, which in turn will be connected to a 34.5/120 kV step-up transformer. A 120 kV circuit breaker and a 120 kV motorized disconnect switch will be installed between the high-voltage side of the step-up transformer and an 11.9 km, 120 kV tap line. At the other end of the tap line, an additional 120 kV circuit breaker and a 120 kV motorized disconnect switch will connect the tap line into a newly proposed 121/500 kV network built by Nextera Energy Canada. This 121/500 kV network will be used to inject power from three other newly proposed wind facilities (Jericho Wind Energy Centre – CAA 2011_441, Bornish Wind Energy Centre – CAA 2011_443 and Adelaide Wind Energy Centre – CAA 2011_446).

Power from all four wind farms will be transmitted to a 500/121 kV substation called Parkhill CTS through an 11.4 km line called BTS1P. Additional capacitor banks will be installed at the 121 kV bus at Parkhill CTS to provide reactive power compensation. The voltage level will subsequently be stepped up to 500 kV using a transformer. Parkhill CTS will be connected to circuit B562L, which will be sectionalized by the new Evergreen SS 500 kV ring bus at the connection point of the project. Evergreen SS will be approximately 36.5 km from Longwood TS. These shared equipment parameters that were originally assessed with the Jericho, Bornish and Adelaide System Impact Assessments have been revised by Nextera Energy Canada and their impact reassessed in this System Impact Assessment.

The single line diagram and the connection point of the project are illustrated in Figure 1 and Figure 2, Appendix A, respectively.

Sectionalizing circuits B562L and B563L at Evergreen SS and Ashfield SS (for connection of the K2 wind project) respectively resulted in four new 500 kV circuits. Figure 2 shows the names of these circuits: B562E, E562L, B563A, and A563L. The nomenclature assumed for the new circuits is for the purpose of this report and the names may differ at the time of connection.

This System Impact Assessment and its requirements are based on the projects' grid connection point being at the 500 kV Parkhill CTS. The reactive power compensation requirements specified in the System Impact Assessments completed for Jericho, Bornish and Adelaide Wind Energy Centres have also been updated.

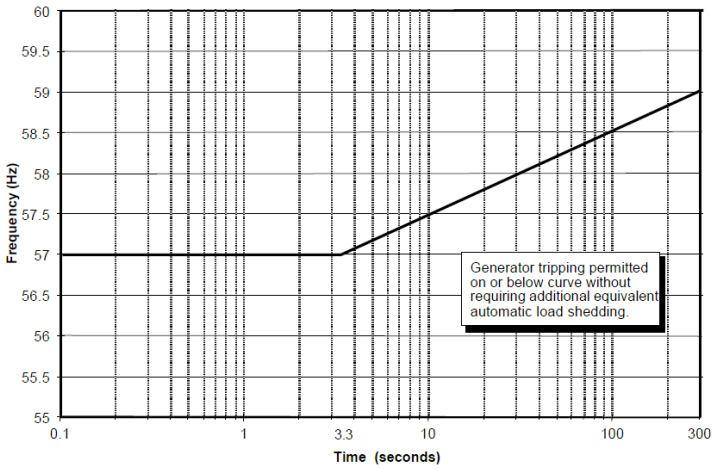
– End of Section –

2. General Requirements

The connection applicant shall satisfy all applicable requirements and standards specified in the Market Rules and the Transmission System Code. The following sections highlight some of the general requirements that are applicable to the proposed project.

2.1 Frequency/Speed Control

As per Appendix 4.2 of the Market Rules, the connection applicant shall ensure that the project has the capability to operate continuously between 59.4 Hz and 60.6 Hz and for a limited period of time in the region above straight lines on a log-linear scale defined by the points (0.0 s, 57.0 Hz), (3.3 s, 57.0 Hz), and (300 s, 59.0 Hz), as shown in the following figure.



The project shall respond to frequency increase by reducing the active power with an average droop based on maximum active power adjustable between 3% and 7% and set at 4%. Regulation deadband shall not be wider than ± 0.06%. The project shall respond to system frequency decline by temporarily boosting its active power output for some time (i.e. 10 s) by recovering energy from the rotating blades. This usually refers to "inertia emulation control" function within the wind farm control system. It is not required for wind facilities to provide a sustained response to system frequency decline. The connection applicant will need to indicate to the IESO whether the function of inertia emulation control is commercially available for the proposed type of wind turbine generator at the time when the wind farm comes into service. If this function is available, the connection applicant is required to implement it before the project can be placed in-service. If this function is commercially unavailable, the IESO reserves the right to ask the connection applicant to install this function in the future, once it is commercially available for the proposed type of wind turbine generator.

2.2 Reactive Power/Voltage Regulation

The project is directly connected to the IESO-controlled grid, and thus, the connection applicant shall ensure that the project has the capability to:

- supply continuously all levels of active power output for 5% deviations in terminal voltage. Rated active power is the smaller output at either rated ambient conditions (e.g. temperature,

head, wind speed, solar radiation) or 90% of rated apparent power. To satisfy steady-state reactive power requirements, active power reductions to rated active power are permitted;

- inject or withdraw reactive power continuously (i.e. dynamically) at the connection point up to 33% of its rated active power at all levels of active power output except where a lesser continually available capability is permitted by the IESO. If necessary, shunt capacitors must be installed to offset the reactive power losses within the project in excess of the maximum allowable losses. If generators do not have dynamic reactive power capabilities, dynamic reactive compensation devices must be installed to make up the deficient reactive power;
- regulate automatically voltage within ±0.5% of any set point within ±5% of rated voltage at a point whose impedance (based on rated apparent power and rated voltage) is not more than 13% from the highest voltage terminal. If the AVR target voltage is a function of reactive output, the slope $\Delta V/\Delta Q_{max}$ shall be adjustable to 0.5%. The response of the project for voltage changes shall be similar to or better than the response of a generation facility with a synchronous generation unit and an excitation system that meets the requirements of Appendix 4.2 of the Market Rules.

2.3 Voltage Ride Through Capability

The project shall have the capability to ride through routine switching events and design criteria contingencies assuming standard fault detection, auxiliary relaying, communication, and rated breaker interrupting times unless disconnected by configuration.

2.4 Voltage

Appendix 4.1 of the Market Rules states that under normal operating conditions, the voltages in the 500 kV system are maintained within the range of 490 kV and 550 kV. Thus, the IESO requires that the 500 kV equipment in Ontario must have a maximum continuous voltage rating of at least 550 kV.

Protective relaying must be set to ensure that transmission equipment remains in-service for voltages between 94% of the minimum continuous value and 105% of the maximum continuous value specified in Appendix 4.1of the Market Rules.

2.5 Connection Equipment Design

The connection applicant shall ensure that the connection equipment is designed to be fully operational in all reasonably foreseeable ambient temperature conditions. The connection equipment must also be designed so that the adverse effects of its failure on the IESO-controlled grid are mitigated. This includes ensuring that all circuit breakers fail in the open position.

2.6 Disturbance Recording

The connection applicant is required to install at the project a disturbance recording device with clock synchronization that meets the technical specifications provided by the transmitter. The device will be used to monitor and record the response of the project to disturbances on the 500 kV system in order to verify the dynamic response of generators. The quantities to be recorded, the sampling rate and the trigger settings will be provided by the transmitter.

2.7 Fault Level

The Transmission System Code requires the new equipment to be designed to withstand the fault levels in the area where the equipment is installed. Thus, the connection applicant shall ensure that the new equipment at the project is designed to sustain the fault levels in the area. If any future system changes results in an increased fault level higher than the equipment's capability, the connection applicant is required to replace the equipment with higher rated equipment capable of sustaining the increased fault level, up to maximum fault level specified in the Transmission System Code. Appendix 2 of the Transmission System Code establishes the maximum fault levels for the transmission system. For the 500 kV system, the maximum 3 phase and single line to ground symmetrical fault levels are 80 kA (usually limited to 63 kA)..

Fault interrupting devices must be able to interrupt fault currents at their maximum continuous voltage.

2.8 Breaker Interrupting Time

Appendix 2 of the Transmission System Code states that the maximum rated interrupting time for the 500 kV breakers must be 2 cycles or less. Thus, the connection applicant shall ensure that the installed breakers meet the required interrupting time specified in the Transmission System Code.

2.9 Protection System

The connection applicant shall ensure that the protection systems are designed to satisfy all the requirements of the Transmission System Code as specified in Schedules E, F and G of Appendix 1 and any additional requirements identified by the transmitter. New protection systems must be coordinated with the existing protection systems.

Facilities that are essential to the power system must be protected by two redundant protection systems according to section 8.2.1a of the TSC. These redundant protections systems must satisfy all requirements of the TSC, and in particular, they must not use common components, common battery banks or common secondary CT or PT windings. As currently assessed by the IESO, this project is not on the current Bulk Power System list, however it is considered essential to the power system due to its 500 kV connection and as such must meet the TSC requirements for essential elements.

The protection systems within the project must only trip the appropriate equipment required to isolate the fault. After the project begins commercial operation, if an improper trip of the 500 kV circuits emanating from Evergreen SS occurs due to events within the project, the project may be required to be disconnected from the IESO-controlled grid until the problem is resolved.

The auto-reclosure of the high voltage breakers at Parkhill CTS must be blocked. Upon its opening for a contingency, the high voltage breaker must be closed only after the IESO approval is granted.

Any modifications made to protection relays after this SIA is finalized must be submitted to the IESO as soon as possible or at least six (6) months before any modifications are to be implemented on the existing protection systems. If those modifications result in adverse impacts, the connection applicant and the transmitter must develop mitigation solutions

2.10 Telemetry

According to Section 7.3 of Chapter 4 of the Market Rules, the connection applicant shall provide to the IESO the applicable telemetry data listed in Appendix 4.15 of the Market Rules on a

continual basis. As per Section 7.1.6 of Chapter 4 of the Market Rules, the connection applicant shall also provide data to the IESO in accordance with Section 5 of Market Manual 1.2, for the purposes of deriving forecasts of the amount of energy that the project is capable of producing. The whole telemetry list will be finalized during the IESO Facility Registration/Market Entry process.

The data shall be provided with equipment that meets the requirements set forth in Appendix 2.2, Chapter 2 of the Market Rules and Section 5.3 of Market Manual 1.2, in accordance with the performance standards set forth in Appendix 4.19 subject to Section 7.6A of Chapter 4 of the Market Rules.

As part of the IESO Facility Registration/Market Entry process, the connection applicant must complete end to end testing of all necessary telemetry points with the IESO to ensure that standards are met and that sign conventions are understood. All found anomalies must be corrected before IESO final approval to connect any phase of the project is granted.

2.11 Revenue Metering

If revenue metering equipment is being installed as part of this project, the connection applicant should be aware that revenue metering installations must comply with Chapter 6 of the IESO Market Rules. For more details the connection applicant is encouraged to seek advice from their Metering Service Provider (MSP) or from the IESO metering group.

2.12 Reliability Standards

Prior to connecting to the IESO controlled grid, the project must be compliant with the applicable reliability standards established by the North American Electric Reliability Corporation (NERC) and reliability criteria established by the Northeast Power Coordinating Council (NPCC) that are in effect in Ontario. A mapping of applicable standards, based on the proponent's/connection applicant's market role/OEB license can be found here: http://www.ieso.ca/imoweb/ircp/orcp.asp

This mapping is updated periodically after new or revised standards become effective in Ontario.

The current versions of these NERC standards and NPCC criteria can be found at the following websites:
http://www.nerc.com/page.php?cid=2|20
http://www.npcc.org/documents/regStandards/Directories.aspx

The IESO monitors and assesses market participant compliance with a selection of applicable reliability standards each year as part of the Ontario Reliability Compliance Program. To find out more about this program, write to orcp@ieso.ca or visit the following webpage:
http://www.ieso.ca/imoweb/ircp/orcp.asp

Also, to obtain a better understanding of the applicable reliability compliance obligations and engage in the standards development process, we recommend that the proponent/ connection applicant join the IESO's Reliability Standards Standing Committee (RSSC) or at least subscribe to their mailing list by contacting rssc@ieso.ca. The RSSC webpage is located at:
http://www.ieso.ca/imoweb/consult/consult_rssc.asp.

2.13 Restoration Participant

Based on the SIA application, the connection applicant meets the restoration participant criteria. Please refer to the Market Manual 7.8 to determine its applicability to the project. Details

regarding restoration participant requirements will be finalized at the Facility Registration/Market Entry Stage.

2.14 Facility Registration/Market Entry

The connection applicant must complete the IESO Facility Registration/Market Entry process in a timely manner before IESO final approval for connection is granted.

Models and data, including any controls that would be operational, must be provided to the IESO. This includes both PSS/E and DSA software compatible mathematical models representing the new equipment for further IESO, NPCC and NERC analytical studies. The models and data may be shared with other reliability entities in North America as needed to fulfill the IESO's obligations under the Market Rules, NPCC and NERC rules. The connection applicant may need to contact the software manufacturers directly, in order to have the models included in their packages. This information should be submitted at least seven months before energization to the IESO-controlled grid, to allow the IESO to incorporate this project into IESO work systems and to perform any additional reliability studies.

As part of the IESO Facility Registration/Market Entry process, the connection applicant must provide evidence to the IESO confirming that the equipment installed meets the Market Rules requirements and matches or exceeds the performance predicted in this assessment. This evidence shall be either type tests done in a controlled environment or commissioning tests done on-site. In either case, the testing must be done not only in accordance with widely recognized standards, but also to the satisfaction of the IESO. Until this evidence is provided and found acceptable to the IESO, the Facility Registration/Market Entry process will not be considered complete and the connection applicant must accept any restrictions the IESO may impose upon this project's participation in the IESO-administered markets or connection to the IESO-controlled grid. The evidence must be supplied to the IESO within 30 days after completion of commissioning tests. Failure to provide evidence may result in disconnection from the IESO-controlled grid.

If the submitted models and data differ materially from the ones used in this assessment, then further analysis of the project will need to be done by the IESO.

2.15 Other Connection Requirements

The Market Rules governing the connection of renewable generation facilities in Ontario are currently being reviewed through the SE-91 stakeholder initiative and, therefore, new connection requirements (in addition to those outlined in the SIA), may be imposed in the future. The connection applicant is encouraged to follow developments and updates through the following link: http://www.ieso.ca/imoweb/consult/consult_se91.asp

-End of Section-

3. Data Verification

3.1 Connection Arrangement

The connection arrangement of the project as shown in Figure 1, Appendix A, will not reduce the level of reliability of the integrated power system and is, therefore, acceptable to the IESO.

3.2 Siemens SWT 2.3 - 113

The Siemens 2.3 MW WTG is a variable speed, full conversion wind turbine generator system. Its specifications are show in Table 1.

Table 1: Specifications of Siemens 2.3 MW WTG

Type	Rated Voltage	Rated MVA	Rated MW	Transformer			Q_{max} (Mvar)	Q_{min} (Mvar)
				MVA	R	X		
Siemens SWT-2.3-113	690 V	2.55	2.221	2.6	0	0.06	1.495	-1.610

The active power rating of the proposed wind turbines will be limited to 2.221 MW to not exceed the 100 MW facility rating. The provided Qmax and Qmin values are for full active power output at rated terminal voltage.

Voltage Ride-Though Capability

The Siemens 2.3 MW WTG provides voltage ride through capability. During a voltage drop/raise, the minimum time for a WTG to remain online is shown in Table 2. The proposed turbines will use this option.

Table 2: WTG Voltage Ride-Through Specifications

Voltage Range (% of base voltage)	Minimum time for WTGs to Remain Online (s)
V<15	0.85
15<V<40	1.6
40<V<70	2.6
70<V<85	11
85 < V < 90	200
110 < V < 120	1.0
V>120	0

The low voltage ride-through (LVRT) capability of the proposed WTGs was verified by performing the studies outlined in Section 6.10.

Frequency Ride-Through Capability

The Siemens SWT 2.3-113 wind turbine can remain online continuously for the frequency range of 57.0 Hz to 62.0 Hz.

The Market Rules state that the generation project directly connecting to the IESO-controlled grid shall operate continuously between 59.4Hz and 60.6Hz and for a limited period of time in the region above straight lines on a log-linear scale defined by the points (0.0s, 57.0Hz), (3.3s, 57.0Hz), and (300s, 59.0Hz).

The frequency ride-through capability of the proposed WTGs meets the Market Rules' requirements.

3.3 Step-Up Transformers

Table 3: Facility Step-Up Transformer Data

Unit	Transformation	Rating (MVA) (ONAN/ONAF/OFAF)	Positive Sequence Impedance (pu) S_B = 66 MVA	Configuration		Tap
				HV-Side	LV-Side	
Cedar Point T1	120/34.5kV	66/88/110	0.0015+ j0.08	Yg	Yg	ULTC@ HV 132-108 kV, 17 steps

3.4 Collector System

Table 4: Equivalent Impedance of Collector System

Circuit	Unit#	MW	Positive-Sequence Impedance (pu, S_B=100MVA, V_B=118.05 kV)			Zero-Sequence Impedance* (pu, S_B=100MVA, V_B=118.05 kV)		
			R	X	B	R	X	B
C1	12	26.65	0.09292	0.3188406	0.034759	-	-	-
C2	10	22.21	0.15282	0.126444	0.01997	-	-	-
C3	12	26.65	0.01815	0.018736	0.011302	-	-	-
C4	11	24.43	0.05066	0.151145	0.017729	-	-	-

(*) Zero-sequence impedance has not been provided. Typical data was assumed during the SIA. The connection applicant needs to provide these data during the IESO Market Entry process.

3.5 Connection Equipment

3.5.1 HV Switches

Table 5: Specifications of HV Switches

Identifier	Voltage Rating	Continuous Current Rating	Short Circuit Symmetrical Rating
All	145 kV	1200 A	40 kA

3.5.2 HV Circuit Breakers

Table 6: Specifications of HV Circuit Breakers

Identifier	Voltage Rating	Interrupting time	Continuous Current Rating	Short Circuit Symmetrical Rating
All	145 kV	50 ms	1200 A	40 kA

3.5.3 Tap Line

Table 7: Impedance of Facility Tap Line

Circuit	Length (km)	Positive-Sequence Impedance (pu, S_B=100MVA, V_B=118.05 kV)			Zero-Sequence Impedance (pu, S_B=100MVA, V_B=118.05 kV)		
		R	X	B	R	X	B
CP1J	11.9	0.00624	0.0363	0.0064	0.0279	0.1060	0.0033

3.6 Updated Information for Shared Nextera Equipment

The following information updates the parameters for the main step up transformer and transmission lines that will be shared between the project and the previously assessed Bornish, Jericho and Adelaide Wind Energy Centres.

Table 8: Main Step-Up Transformer Data

Unit	Transformation	Rating (MVA) (ONAN/ONAF/OFAF)	Positive Sequence Impedance (pu) S_B= 256 MVA	Configuration		Tap
				HV-Side	LV-Side	
Parkhill T3	525/121	256/341/426	0.0022+ j0.10	Yg	Δ	ULTC@ LV 133.1-108.9 kV, 33 steps

Table 9: Impedance of Intermediate Transmission Lines

Circuit	Length (km)	Positive-Sequence Impedance (pu, S_B=100MVA, V_B=118.05 kV)			Zero-Sequence Impedance (pu, S_B=100MVA, V_B=118.05 kV)		
		R	X	B	R	X	B
J1BTS	14.5	0.00248	0.0316	0.0110	0.0393	0.0967	0.0061
BTS1P	11.4	0.00194	0.0249	0.0086	0.0309	0.076	0.0048

3.7 Wind Farm Control System

The proposed wind farm will be equipped with the Siemens Remote Control and Monitoring System. This control system is designed to interface with each WTG in the wind farm for regulating system voltage, and real and actual power for the entire wind farm.

The proposed wind farm will also be equipped with a separate Programmable Logic Control (PLC) to help coordinate and control fixed reactor and capacitor banks within the wind farm.

Voltage Control

- Voltage, VAR and Power Factor Control

The voltage control of the wind farm is managed by an outer and inner control loop. The HV system voltage is controlled by the outer loop managed by the Siemens Remote Control and Monitoring system. A feedback of the HV system voltage is received by the Siemens Remote Control and Monitoring system and voltage references are sent to each wind turbine controllers at the individual wind turbines. By way of the wind turbine controllers, the terminal voltages are controlled via the inner loop control.

The Siemens SWT 2.3 - 113 does not have power factor or reactive power regulation.

- Fixed Reactor and Cap Bank Control and Coordination

Reactors or capacitors installed within the wind farm will be controlled by an independent PLC. Reactive devices will be switched with the objective to minimize wind farm reactive output while ensuring that the terminal voltages of each turbine are within operational limits.

The voltage control functions enable the proposed wind farm to operate in voltage control mode and control voltage at a point whose impedance (based on rated apparent power and voltage of the project) is not more than 13% from the connection point. Thus, it is acceptable to the IESO.

The function of voltage control meets the requirements of the Market Rules.

Frequency Control

The Siemens Remote Control and Monitoring system has a function of frequency droop control which controls the wind farm power output based upon the grid frequency. This function is similar to governor droop control for a conventional rotating generator. The function of frequency control meets the requirements of the Market Rules.

Inertia Emulation Capability

The Siemens SWT 2.3 MW wind turbines are currently unable to provide any form of Inertia Emulation capability. The IESO reserves the right to ask the connection applicant to install this function in the future, should it become commercially available for the proposed wind turbine.

-End of Section-

4. Short Circuit Assessment

Fault level studies were completed by the transmitter to examine the effects of the project on fault levels at existing facilities in the surrounding area. Studies were performed to analyze the fault levels with and without the project and other recently committed generation projects in the system.

The short circuit study was carried out with the following primary system assumptions:

(1) Generation Facilities In-Service

East

Lennox	G1-G4	Chenaux	G1-G8
Kingston Cogen	G1-G2	Mountain Chute	G1-G2
Wolf Island	300 MW	Stewartville	G1-G5
Arnprior	G1-G2	Brockville	G1
Barrett Chute	G1-G4	Havelock	G1
Chats Falls	G2-G9	Saunders	G1-G16
Cardinal Power	G1, G2		

Toronto

Pickering units	G1, G4-G8	Sithe Goreway	G11-13, G15
Darlington	G1-G4	TransAlta Douglas	G1-G3
Portlands GS	G1-G3	GTAA	G1-G3
Algonquin Power	G1, G2	Brock west	G1
Whitby Cogen	G1		

Niagara

Thorold GS	GTG1, STG2	Beck 2	G11-G26
Beck 1	G3-G10	Beck 2 PGS	G1-G6
Decew	G1, G2, ND1		

South West

Nanticoke	G1, G2, G5-G8	Kingsbridge WGS	39.6 MW
Halton Hills GS	G1-G3	Amaranth WGS	199.5 MW

Bruce

Bruce A	G1-G4	Ripley WGS	76 MW
Bruce B	G5-G8	Underwood WGS	198 MW
Bruce A Standby	SG1		

West

Lambton units	G3-G4	Imperial Oil	G1
Brighton Beach	G1, G1A, G1B	Kruger Port Alma WGS	101.2 MW
Greenfield Energy Centre	G1-G4	Gosfield Wind Project	50.6 MW
St. Clair Energy Centre	CTG3, STG3, CTG4, STG4	Kruger Energy Chatham WF	101 MW
East Windsor Cogen	G1-G2	Raleigh Wind Energy Centre	78 MW
TransAlta Sarnia	G861, G871, G881, G891	Talbot Wind Farm	98.9 MW
Ford Windsor CTS	STG5	Dow Chemicals	G1, G2, G5
TransAlta Windsor	G1, G2	Port Burwell WGS	99 MW
West Windsor Power	G1, G2	Fort Chicago London Cogen	23 MVA
		Great Northern Tri-Gen Cogen	15 MVA

(2) Previously Committed Generation Facilities

- Bruce G1, G2
- Big Eddy GS and Half Mile Rapids GS
- Port Dover and Nanticoke
- Grand Renewable Energy

- White Pines Wind Farm
- Amherst Island
- York Energy Centre
- Conestogo Wind Energy Centre 1
- Dufferin Wind Farm
- Summerhaven Wind Farm
- Greenfield South
- Comber East C24Z
- Comber West C23Z
- Pointe-Aux-Roches Wind
- South Kent Wind Farm

(3) Recently Committed Generation Facilities

- Bluewater Wind Energy Centre
- Jericho Wind Energy Centre
- Bornish Wind Energy Centre
- Goshen Wind Energy Centre
- Cedar Point Wind Power Project Phase II
- Adelaide Wind Energy Centre
- Grand Bend Wind Farms
- Grand Valley Wind Farms (Phase 3)
- Erieau Wind
- East Lake St. Clair Wind
- Adelaide Wind Power Project
- Gunn's Hill Wind Farm
- Silvercreek Solar Park
- K2 wind
- Armow
- 300 MW wind at Orangeville
- 100 MW wind at S2S

(4) Existing and Committed Embedded Generation

- Essa area: 264 MW
- Ottawa area: 90 MW
- East area: 580 MW
- Toronto area: 168 MW
- Niagara area: 52 MW
- Southwest area: 348 MW
- Bruce area: 26 MW
- West area: 585 MW

(5) Transmission System Upgrades

- Leaside - Bridgman reinforcement: Leaside TS to Birch JCT: new 115 kV circuit (CAA2006-238);
- St. Catherines 115 kV circuit upgrade: circuits D9HS, D10S and Q11S (CAA2007-257);
- Tilbury West DS second connection point for DESN arrangement using K2Z and K6Z (CAA2008-332);
- Second 500kV Bruce-Milton double-circuit line (CAA2006-250);
- Woodstock Area transmission reinforcement (CAA2006-253);
  - Karn TS in service and connected to M31W & M32W at Ingersol TS
  - W7W/W12W terminated at LFarge CTS
  - Woodstock TS connected to Karn TS
- Lower Mattagami expansion - H22D line extension from Harmon to Kipling (CAA2006-239);
- Rodney (Duart) TS DESN connected to W44LC and W45LS 230 kV circuits (CAA2007-260)

(6) System Operation Conditions

- Lambton TS 230 kV operated *open*
- Claireville TS 230 kV operated *open*
- Leaside TS 230 kV operated *open*
- Leaside TS 115 kV operated *open*
- Middleport TS 230 kV bus operated
- Hearn SS 115 kV bus operated *open*
- Cherrywood TS north & south 230kV buses operated ***open***
- Richview TS 230 kV bus operated ***open***
- All tie-lines in service & phase shifters on neutral taps
- Maximum voltages on the buses

Table 10 summarizes the projected fault levels at facilities near the project with and without the project and other recently committed generation projects.

Table 10: Fault Levels at Facilities near the Project

Station	Before the projects		After the projects and other committed projects		Lowest Rated Circuit Breaker (kA)
	3-Phase	L-G	3-Phase	L-G	
*Symmetrical Fault (kA)**					
Bruce A 500 kV	37.13	41.72	38.09	42.66	63
Bruce A 230 kV	42.82	54.20	44.36	55.86	60***
Bruce B 500 kV	36.92	41.55	37.85	42.53	80
Longwood 500 kV	20.04	20.95	20.77	21.99	63
Longwood 230 kV	37.36	44.74	38.35	46.04	63
Evergreen 500 kV	-	-	15.71	14.03	63
Parkhill TS 121 kV	-	-	14.50	6.81	40
Bornish TS 121 kV	-	-	10.84	9.19	40
Cedar Point II 121 kV	-	-	5.58	4.47	40
Jericho WEC 121 kV	-	-	8.00	8.39	40
*Asymmetrical Fault (kA)**					
Bruce A 500 kV	54.40	63.15	55.76	64.45	74.9
Bruce A 230 kV	57.47	**78.24****	59.39	**80.43****	72.6***
Bruce B 500 kV	54.27	63.52	55.57	64.89	89.5
Longwood 500 kV	24.36	26.68	25.27	27.97	68.9
Longwood 230 kV	45.70	57.93	47.03	59.68	78
Evergreen 500 kV	-	-	19.01	18.03	63****
Parkhill TS 121 kV	-	-	18.62	6.91	40****
Bornish TS 121 kV	-	-	12.92	9.84	40****
Cedar Point II 121 kV	-	-	6.13	4.74	64
Jericho WEC 121 kV	-	-	9.37	10.49	40****

* Based on a pre-fault voltage level of 550 kV for 500 kV buses, 250 kV for 230 kV buses, and 127 kV for 115 kV buses.

**The asymmetrical fault level is based on a breaker contact parting time of 44 ms.

***Three lower rated Bruce A 230 kV breakers (D1L81, K1L82 and L23T25) are scheduled to be replaced by December 2012 (see CAA ID#2010-EX511). The listed lowest rated circuit breaker value for Bruce A 230 kV assumes these breakers being replaced.

****The symmetrical rating was used as the asymmetrical rating has not been provided.

Table 10 shows the interrupting capability of the 500 kV and 121 kV circuit breakers within the newly built network are adequate for the anticipated fault levels.

The results also show that the line-to-ground asymmetrical fault current at Bruce A 230 kV before and after the incorporation of the projects and other committed projects will exceed the interrupting capability of the existing breakers. This issue has been investigated in the 2nd SIA addendum for the project of Bruce G1 and G2 restart (CAA ID 2004-163), where the IESO has identified a requirement to replace all the Bruce 230 kV breakers with higher fault current interrupting capability and assessed potential mitigation measures for this issue until these circuit breakers are replaced. Hydro One has planned to replace the Bruce 230 kV breakers.

With the exception of Bruce A 230 kV, the interrupting capability of the lowest rated circuit breakers near the project will not be exceeded after the incorporation of the project.

-End of Section-

5. Protection Impact Assessment

A Protection Impact Assessment (PIA) was completed by Hydro One, included in Appendix B of this report, to examine the impact of the project on existing transmission system protections. The summary of the PIA report is presented below.

Protection Changes

The changes to the existing transmission protection systems required to incorporate the project, which were included in the system impact studies, are summarized in Table 11.

In addition, with either the Evergreen-by-Longwood or Bruce-by-Evergreen circuit out of service, low infeed from the wind farm can result in delayed fault clearing. With low infeed, a fault near Evergreen SS would not be seen by the Evergreen SS protections nor by the remote stations' Zone 1 due to the fault location being within Zone 2 reach; resulting in a fault clearing time of up to 400 ms. Hydro One will implement a relay logic design to address the weak infeed scenario which will be elaborated in the planning document in preparation of the detailed design.

Table 11: Proposed Protection Changes to Circuit B562L

Station	Zone	Existing Reach (km)	Revised Reach (km)	Comments
Bruce A TS	1	149	120	Set at 80% of the line segment impedance to Evergreen SS.
	2	233	188	Set at 125% of the maximum apparent impedance seen for a fault at Evergreen SS.
Longwood TS	1	149	29	Set at 80% of the line segment impedance to Evergreen SS.
	2	233	46	Set at 125% of the maximum apparent impedance seen for a fault at Evergreen SS.
Evergreen SS to Longwood TS	1	-	29	Set at 80% of the line segment impedance to Longwood TS.
	2	-	46	Set at 125% of the maximum apparent impedance seen for a fault at Longwood TS.
Evergreen SS to Bruce A TS	1	-	120	Set at 80% of the line segment impedance to Bruce A TS.
	2	-	188	Set at 125% of the maximum apparent impedance seen for a fault at Bruce A TS.

Telecommunication Requirements

New digital and PLC (main and alternate) facilities will be installed at the Evergreen SS in order to establish necessary connections for teleprotection. The links will be established to both Bruce A TS and Longwood TS. Signal exchange is also required between Evergreen SS and the project's step-up station (Parkhill CTS). All communication links are to be redundant and fully separated with geographic diversity

The PIA concluded that it is feasible to connect the projects at the proposed location as long as the PIA proposed changes to the transmission configuration, protection hardware, protection settings, and telecommunications are made.

-End of Section-

6. System Impact Studies

The technical studies focused on identifying the impact of the projects on the reliability of the IESO-controlled grid. They include a thermal loading assessment of transmission lines, system voltage performance assessment, transient stability assessment of the proposed and major surrounding generation units, ride-through capability of the project and relay margin evaluation for transmission circuits. This chapter also investigates the performance of the proposed control systems and the reactive power capability of the project in comparison to the Market Rules' requirements.

6.1 Study Assumptions

In this assessment, the 2014 summer base cases were used with the following assumptions:

(1) **Transmission Facilities**: All existing and committed major transmission facilities with 2014 in-service dates or earlier were assumed in service. The committed facilities primarily include:

- Second 500kV Bruce-Milton double-circuit line (CAA2006-250);
- Nanticoke and Detweiler SVCs;
- Buchanan TS: one 250 Mvar shunt capacitor;

(2) **Generation Facilities:** All existing and committed major generation facilities with 2013 in-service dates or earlier were assumed in service. The primary committed generation facilities are outlined in the assumptions for short circuit study, Section 4.

(3) **Basecases:** Three basecases in terms of load level were used in this SIA studies: peak load, shoulder load, and light load. The projects were incorporated into each case. The generation dispatch philosophies for the three cases are as follows:

Peak Load Basecase

- All committed and existing generation in the Southwest and Bruce areas were maximized, including 8 units at Bruce;
- Gas generation, in conjunction with maximum wind generation, in the West area was dispatched to achieve a NBLIP transfer of approximately 2000MW;
- Generation in the North areas was dispatched to achieve a Flow South transfer of approximately 1250MW;
- Generation in the Greater Toronto Area included two Pickering units, four Darlington units and four Sithe Goreway units;

Shoulder Load Basecase

- All committed and existing generation in the Bruce area was maximized;
- Renewable and minimum level gas generation in the West was dispatched to achieve an NBLIP transfer of approximately 986MW;
- Generation in the North areas was dispatched to achieve a Flow North transfer of approximately 500MW;
- Generation in the Greater Toronto Area included two Pickering units and four Darlington units;
- Generation in the Southwest area was then dispatched to balance the load;

Light Load Basecase

- All dispatchable gas units out of service;
- Minimum hydraulic generation;

- Nuclear generation limited to three Pickering units, two Darlington units and five Bruce units;
- Existing Southwest, West and Bruce area wind generation in service;
- Incorporation of the projects into the system;

The system demand and the primary interface flows after the incorporation of the projects are listed in Table 12.

Table 12: System Demand and Primary Interface Flows for Basecases (MW)

Basecase	System Demand	NBLIP	FABC	FETT	QFW	FS	FIO
Peak Load	26880	2023	6412	6913	1146	1250	1585
Shoulder Load	20716	986	6412	6707	1055	-488	1309
Light Load	11621	643	3845	906	34	-1048	746

6.2 Special Protection System (SPS)

The BSPS is a collection of special protection systems installed at the Bruce B switching station (SS) and other stations which perform pre-defined control actions, including generation rejection, load rejection and reactor switching. These control actions are initiated in response to recognized contingencies by monitoring the electrical connection between nodes in southern Ontario. The primary purpose of the BSPS is to allow increased pre-contingency transfers on the existing transmission facilities emanating from the Bruce nuclear generation station (NGS).

The BSPS is classified as a "Type 1 Special Protection System", and conforms to criteria and guidelines specified in NPCC Directory #7 for special protection system.

The IESO has identified a requirement that wind generation stations connecting near the Bruce NGS must connect to and participate in the BSPS, as detailed in the SIA report and addendum for Hydro One BSPS modifications (CAA ID 2005-EX222). The incorporation of wind generation rejection (G/R) to the BSPS is considered a new BSPS control action. This new control action will provide the IESO with increased operating flexibility during transmission outage conditions.

Special protection system facilities must be installed at the projects to accept a single pair (A & B) of G/R signals from the BSPS, and disconnect from Evergreen SS with no intentional time delay, when armed by the IESO following a triggering contingency. These special protection system facilities must also comply with the NPCC Directory #7 for special protection systems. In particular, if the SPS is designed to have 'A' and 'B' protection at a single location for redundancy, they must be on different non-adjacent vertical mounting assemblies or enclosures. Also, two independent trip coils are required on breakers that are part of the SPS. The applicant must provide two dedicated communication channels, separated physically and geographically diverse, between the projects and the Bruce NGS.

To disconnect the project from the system for G/R, simultaneous tripping of the 500 kV and 121 kV breakers at Parkhill CTS shall be initiated with no accompanying breaker failure response. After being tripped by the BSPS, the closing of the breakers is not permitted until approval is obtained from the IESO.

Alternative solutions to disconnect the project from the system for G/R may be acceptable upon the approval of the IESO.

The BSPS shall also be expanded to recognize the disconnection of the circuits in the Bruce-to-Longwood corridor. A Facility Description Document (FDD) describing the functionality of the expanded BSPS has to be provided to the IESO by Hydro One in a timely manner to allow for the required approvals of the BSPS to be obtained.

6.3 Reactive Power Compensation

The Market Rules require generators to inject or withdraw reactive power continuously (i.e. dynamically) at a connection point equal to up to 33% of the generator's rated active power at all levels of active power output; except where a lesser continually available capability is permitted by the IESO. A generating unit with a power factor range of 0.90 lagging and 0.95 leading at rated active power connected via impedance between the generator and the connection point not greater than 13% based on rated apparent power provides the required range of dynamic reactive capability at the connection point.

Dynamic reactive compensation (e.g. D-VAR or SVC) is required for a generating facility which cannot provide a reactive power range of 0.90 lagging power factor and 0.95 leading power factor at rated active power. For a wind farm with an impedance between the generator and the connection point in excess of 13% based on rated apparent power, provided the WTGs have the capability to provide a reactive power range of 0.90 lagging power factor and 0.95 leading power factor at rated active power, the IESO accepts that the wind farm compensate for excessive reactive losses in the collector system of the project with static shunts (e.g. capacitors and reactors).

The SIA proposed a solution for the project to meet the Market Rules requirements on reactive power capability. However, the applicant can deploy any other solutions which result in its compliance with the Market Rules. The applicant shall be able to confirm this capability during the commission tests.

Dynamic Reactive Power Capability

The Siemens SWT 2.3 MW WTGs can deliver IESO required dynamic reactive power at rated power and at rated terminal voltage. Thus, there is no need to install additional dynamic reactive power device.

Static Reactive Power Capability

In addition to the dynamic reactive power requirement identified above, the projects have to compensate for the reactive power losses within the projects' network to ensure that it has the capability to inject or withdraw reactive power up to 33% of its rated active power at the connection point. As mentioned above, the IESO accepts this compensation to be made with switchable shunt admittances.

Load flow studies were performed to calculate the static reactive compensation, based on the equivalent parameters provided by the connection applicant for the projects.

The reactive power capability in lagging power factor of the projects was assessed under the following assumptions:

- typical voltage of 545 kV at the connection point;
- maximum active power output from the equivalent WTG;
- maximum reactive power output (lagging power factor) from the equivalent WTG, unless limited by the maximum acceptable WTG terminal voltage;
- maximum WTG voltage of 1.05 pu;
- main and intermediate level step-up transformer ULTCs are available to adjust the LV voltage as close as possible to 1 pu voltage, while ensuring the intermediate transmission and collector bus voltages within the Nextera system do not exceed 1.05 pu. No voltage limitations for the Cedar Point facility have been specified.

The reactive power capability in leading power factor of the projects was assessed under the following assumptions:

- typical voltage of 545 kV at the connection point;
- minimum (zero) active power output from the equivalent WTG;
- reactive power consumption (leading power factor) as required to meet the Market Rules requirement from the equivalent WTG.
- minimum acceptable WTG voltage is 0.9 pu, as per WTG voltage capability;
- main and intermediate level step-up transformer ULTCs are available to adjust the LV voltage as close as possible to 1 pu voltage, while ensuring the intermediate transmission and collector bus voltages within the Nextera system do not fall below 0.95 pu. No voltage limitations for the Cedar Point facility have been specified.

The IESO's reactive power calculation used the equivalent electrical model for the WTG and collector feeders as provided by the connection applicant. It is important that the project have proper internal design to ensure that the WTGs are not limited in their capability to produce active and reactive power due to terminal voltage limits or other project internal limitations. For example, it is expected that the transformation ratio of the WTG step up transformers will be set in such a way that it will offset the voltage profile along the collector, and all the WTG would be able to contribute to the reactive power production of the project in an equal amount.

Based on the equivalent parameters for the wind farm provided by the connection applicant, a static capacitive reactive power compensation rated 120 Mvar at 121 kV is required to be installed at the Parkhill 121 kV bus to meet the reactive power injection requirement at the connection point. No reactor is required to meet the reactive power withdrawal requirement. A detailed summary of the results with reactive power compensation is provided in Table 13.

Table 13: Reactive Power Capability at the PCC

Operation	Intermediate Bus Voltage (kV)	Collector Bus Voltage (kV)	Max/Min Generator Terminal Voltage (pu)	PCC Reactive Power (Mvar)	PCC Voltage (kV)
Lagging PF	125.8	34.4	1.043	+134.0	545 kV
Leading PF	121	34.5	0.90	-203.3	545 kV

The required capacitive compensation will need to be arranged into at least 4 approximately equal steps to allow for flexibility in adjustment of reactive power production. It shall also be implemented as a part of wind farm control system that automatically controls the switching of capacitor banks to regulate the overall WTGs' reactive output to around zero.

Static Reactive Power Switching

The IESO requires the voltage change on a single capacitor switching to be no more than 4 % at the any point in the IESO Controlled Grid. A switching study was carried out to investigate the effect of the new shunt capacitor banks on the voltage changes. It was assumed that the largest capacitor step size is 30 Mvar. To reflect a reasonably restrictive system condition, the voltage change study was studied under light load conditions and assumed one Bruce to Longwood circuit out of service.

Table 14: Voltage Changes Due to Static Reactive Compensation Switching

Capacitor at 121 kV bus	Parkhill 121 kV voltage	Evergreen SS voltage
Pre-switching	120.2 kV	542.0 kV
Post-switching	122.2 kV	544.1 kV
ΔV	1.7%	0.4%

Table 14 shows that switching a single capacitor of 30 Mvar results in less than 4 % voltage change at the connection point, therefore meeting the Market Rules' requirement.

6.4 Overvoltage Management at Evergreen SS

Due to the long length of Bruce-by Evergreen 500 kV circuit, voltages at Evergreen SS may exceed maximum continuous levels of 550 kV specified by Appendix 4.1 of the Market Rules under certain operating scenarios.

The voltage analysis was carried out under the following assumptions:

- Voltage of 550 kV at Bruce A TS
- Evergreen-by-Longwood circuit out of service
- Cedar Point II, Jericho, Bornish and Adelaide WTGs off line with their proposed collector systems disconnected
- Parkhill CTS and Bornish TS remaining connected to Evergreen SS

Table 15: Voltage Analysis Results at Evergreen SS

Bus	Voltage with Evergreen-by-Longwood circuit out of service
Evergreen SS 500kV	561 kV

Table 15 shows the simulation results which indicate that the voltage at Evergreen SS could be as high as 561 kV. To manage the high voltage concern at Evergreen SS, Hydro One and the connection applicant have proposed to install higher rated equipments that a maximum continuous voltage of at least 570 kV can be sustained. This solution is acceptable to the IESO.

Thus, 500kV equipment at Evergreen SS and the project must be able to sustain a maximum continuous voltage of 561 kV as per the study results. The connection applicant shall also ensure that the equipments within the project have the capability to operate when the voltage at Evergreen SS is as high as 561 kV. Fault interrupting device at Evergreen SS and the project must be able to interrupt fault currents at voltages as high as 561 kV.

Alternate solutions to manage high voltage concern may also be acceptable upon the approval of the IESO.

6.5 Wind Farm Voltage Control System

As per the Market Rules requirements, the wind farms shall operate in voltage control mode by using all voltage control methods available within the projects. The automatic voltage regulation philosophy for the projects is summarized as follows:

(1) All WTGs control the voltage at a point whose impedance (based on rated apparent power and voltage of the projects) is not more than 13% from the connection point. Appropriate control slope is adopted for reactive power sharing among the WTGs as well as with adjacent generators. The reference voltage will be specified by the IESO during operation.

(2) Capacitor banks are automatically switched in/out to regulate the overall WTGs' reactive generation to around zero output. The dead band for capacitor switching will be set to about ±60% size of the smallest capacitor to avoid control hunting.

(3) The main transformer ULTC is adjusted, manually or automatically, to regulate the collector bus voltage such that it is within normal range and close to about 1 pu. The IESO may require automatic control for this ULTC if manual adjustment is too slow.

In this control system, the voltage control by WTGs and the overall WTGs' reactive control by capacitor banks need to be coordinated by using different time constants.

In the event that the wind farm voltage control becomes unavailable, the IESO requires that each WTG operate in reactive power control and maintain its reactive power output to the value prior to the loss of signal from the wind farm voltage control. Depending on system conditions, further action such as curtailing the output of the project may be required for reliability purposes

6.6 Thermal Analysis

The *Ontario Resource and Transmission Assessment Criteria* requires that all line and equipment loads be within their continuous ratings with all elements in service, and within their long-term emergency ratings with any element out of service. Immediately following contingencies, lines may be loaded up to their short-term emergency ratings where control actions such as re-dispatch, switching, etc. are available to reduce the loading to the long-term emergency ratings.

In the thermal analysis, the continuous ratings for conductors were calculated at the lowest of the sag temperature or 93°C operating temperature, with a 35°C ambient temperature and 4 km/h wind speed. The long term emergency ratings (LTE) for conductors were calculated at the lowest of the sag temperature or 127°C operating temperature, with a 35°C ambient temperature and 4 km/h wind speed. The short-term emergency ratings (STE) for conductors were calculated at the sag temperature, with a 35°C ambient temperature, 4 km/h wind speed and 100% continuous pre-load.

System Overview

The return of Bruce G1 and G2 combined with the addition of new Bruce and Southwest Ontario generation results in a higher flow eastward from Bruce. This naturally increases the flow along the 115 kV path of circuit S2S from Owen Sound TS to Stayner TS when circuit S2S is operated closed-loop. Table 16 shows the pre-contingency thermal results with S2S operated closed-loop under the defined shoulder load condition. It indicates the overloading of both circuit S2S from Meaford TS to Stayner TS and Stayner T1. To prevent the thermal overloading, circuit S2S will be required to operate open-loop under certain conditions after the integration of the committed generation projects in the area of Bruce and Southwest Ontario. Hydro One has investigated this mitigating action and is in agreement with it.

Table 16: Pre-Contingency Thermal Results w/ S2S Closed-Loop Under Shoulder Load Conditions

Circuit	Pre-Contingency Flow	Summer Continuous Rating	Loading (%)
S2S (Meaford-Stayner)	650 A	590 A	**110**
Stayner T1	136 MVA	125 MVA	**109**

Due to the fact that the opening of circuit S2S results in increased flows on the parallel 230 kV and 500 kV circuits emanating from Bruce, circuit S2S was assumed open-loop at Owen Sound for the rest of the SIA studies in this report.

The impact of the projects on the overall system, in conjunction with other committed projects, was examined to identify if any system congestion issues exist in Central and Southwest Ontario due to 230 kV circuit or 500 kV auto-transformer thermal constraints. The studies concluded that under exceptionally high power transfers towards Toronto, generating stations in Bruce and Southwest Ontario may be required to curtail their outputs to relieve congestion. However, the

flow into Toronto at the levels examined is not expected to materialize for the next several years. Future planning assessments for the west Greater Toronto Area (GTA) are currently being undertaken by the agencies.

With the addition of new committed generation projects in Bruce and Southwest Ontario, flows east into Toronto were maximized to reach 6913 MW under the defined peak load basecase, representing a high stress case for the west of GTA equipment. Under this high flow scenario, the additional new generation projects contributed to overloading some limiting elements in the central area. Table 17 and Table 18 show the thermal results of limiting circuits and transformers in Central area under peak load conditions after the integration of new committed generation projects. It shows both pre-contingency and post-contingency overloading of the limiting elements. Additional simulation results based on the defined shoulder load basecase show post-contingency overloading on circuits E8V/E9V for the loss of the companion circuit. If flows were to reach these high levels, the generating plants in the Bruce and Southwest Ontario may be required to curtail their outputs.

Table 17: Thermal Results of Limiting Circuits in the Central Area Under Peak-Load Conditions

Circuit	Contingency	Pre-Cont. Flow (A)	Continuous Rating (A)*	Pre-Cont. Loading (%)	Post-Cont. Flow (A)	LTE Rating (A) **	Post-Cont. Loading (%)
R14T (Trafalgar-Erindale)	R17T	1059	1110	95	1577	1460	108
R17T (Trafalgar-Erindale)	R14T	1063	1110	96	1576	1460	108
R19TH (Erindale-Hanlan)	R14T+R17T	792	840	94	1131	1090	107

Table 18: Thermal Results of Limiting Transformers in the Central Area Under Peak-Load Conditions

Transformer	Pre-Cont. Flow (MVA)	Summer Continuous Rating (MVA)	Pre-Cont. Loading (%)	LTE Rating (MVA)	Loss of Trafalgar T15	
					Post-Cont. Flow(MVA)	Post-Cont. Loading (%)
Trafalgar T14	858.84	750	114.51	1004	1078.02	107.37
Trafalgar T15	830.20	750	110.69	1132	0.00	0.00
Claireville T13	782.34	750	104.31	988	846.71	85.70
Claireville T14	796.55	750	106.21	995	861.85	86.62
Claireville T15	789.09	750	105.21	995	853.96	85.83

Local 500 kV Area Overview

The effects of the project on the thermal loadings of the 500kV transmission system in the Bruce area were examined. The peak-load basecase was used for thermal analysis due to the high flows out of the Bruce Area. Preliminary simulation results show the incorporation of the projects primarily increase flow on the 500 kV circuits emanating from Bruce TS and Longwood TS. This reduces the loading on 500 kV auto-transformers at Bruce A TS and Longwood TS and marginally increases the flow on 230 kV corridors from Bruce/Longwood to the GTA area. Therefore, only the 500 kV circuits were examined to assess the primary thermal impact of the projects.

Table 19: Circuit Ratings

Circuit	From	To	Continuous Rating (A)	LTE Rating (A)
B560V	Bruce A TS	Claireville TS	2820	3620
B561M	Bruce B TS	Milton TS	2820	3620
B501M	Bruce B TS	Milton TS	2820	3660
B502M	Bruce A TS	Milton TS	2820	3660
B562E	Bruce A TS	Evergreen SS	2820	3660
E562L	Evergreen SS	Longwood TS	2820	3660
B563A	Bruce B TS	Ashfield SS	2820	3660
A563L	Ashfield SS	Longwood TS	2820	3660
N582L	Nanticoke TS	Longwood TS	2820	3660

Pre-contingency thermal loadings of 500 kV circuits are shown in Table 20. It shows that there is no pre-contingency equipment overloading.

Table 20: Pre-Contingency Thermal Assessment Results – Circuits

Circuit	Circuit Loading Pre-Contingency (A)	Summer Continuous Rating (A)	Percent of Continuous Rating (%)
B560V	1514	2820	53.69
B561M	1533	2820	54.36
B501M	1527	2820	54.15
B502M	1513	2820	53.65
B562E	134	2820	4.75
E562L	453	2820	16.06
B563A	60	2820	2.13
A563L	279	2820	9.89
N582L	1348	2820	47.80

The following contingencies were simulated for the circuit thermal analysis:

(1) **Simultaneous loss of 500 kV circuits B560V and B561M:** 500 kV circuits B560V and B561M are main arteries out of the Bruce Area. The loss of these circuits results in higher transfers on the remaining circuits emanating from Bruce area.

(2) **Simultaneous loss of 500 kV circuits E562L and A563L:** This loss results in the projects and K2 generating radially onto the Bruce 500 kV system, resulting in a higher flow emanating from Bruce TS.

Post-contingency circuit loading results are summarized in Table 21. The results show that there is no post-contingency thermal concern on the 500 kV circuits and that the project does not introduce any thermal constraints.

Table 21: Post-Contingency Thermal Assessment Results – Circuits

Circuit	Circuit Loading Pre-Contingency (A)	Summer Continuous Rating (A)	Percent of Continuous Rating (%)	Long Term Emergency Rating (A)	Loss of B560V+B561M		Loss of E562L+A563L	
					Circuit Loading Post (A)	% of LTE	Circuit Loading Post (A)	% of LTE
B560V	1514	2820	53.69	3620	0	0.00	1659	45.83
B561M	1533	2820	54.36	3620	0	0.00	1693	46.77
B501M	1527	2820	54.15	3660	2528	69.07	1685	46.04
B502M	1513	2820	53.65	3660	2510	68.58	1672	45.68
B562E	134	2820	4.75	3660	479	13.09	385	10.52
E562L	453	2820	16.06	3660	829	22.65	0	0.00
B563A	60	2820	2.13	3660	393	10.74	280	7.65
A563L	279	2820	9.89	3660	675	18.44	0	0.00
N582L	1348	2820	47.80	3660	1859	50.79	938	25.63

6.7 Voltage Analysis

The *Ontario Resource and Transmission Assessment Criteria (ORTAC)* states that with all facilities in service pre-contingency, the following criteria shall be satisfied:

- The pre-contingency voltages on 500 kV buses must not exceed 550 kV or be less than 490 kV and voltages on 230 kV buses cannot exceed 250 kV be less than 220 kV;
- The post-contingency voltages on 500 kV buses must not exceed 550 kV or be less than 470 kV and voltages on 230 kV buses cannot exceed 250 kV be less than 207 kV;
- The voltage drop following a contingency must not exceed 10% pre-ULTC and 10% post-ULTC.

The voltage performance of the IESO-controlled grid was evaluated by examining if pre- and post-contingency voltages and post-contingency voltage changes remain within criteria at various facilities.

The following two contingencies were simulated:

(1) **Simultaneous loss of 500 kV circuits B560V and B561M:** 500 kV circuits B560V and B561M are main arteries of the FETT interface which feeds the load centre in the GTA. This contingency is the most severe contingency for the voltage profile. The contingency was simulated assuming automatic switching of the Bruce and Longwood reactors post-contingency. The defined peak load case was used.

(2) **Loss of the Parkhill 500/121 kV Transformer:** Using the defined light load case, the loss of the main 500/121 kV Parkhill transformer was assessed. The study was conducted assuming Cedar Point II Wind Project and Bornish, Adelaide, Jericho Wind Energy Centres were in-service and absorbing reactive power close to their maximum capability pre-contingency. As generating stations help control voltages pre-contingency, the simultaneous loss by configuration of these wind farms may result in significant voltage changes post-contingency.

The study results summarized in Table 22 and Table 23 indicate that voltages at Evergreen SS can rise above 550 kV for the loss of the entire 500/121 kV network. This concern can be mitigated by installing higher rated equipments as outlined in section 6.4.

Table 22: Voltage Analysis for Peak Load Case

Monitored Busses		Pre-Cont Voltage kV	Loss of B560V + B561M			
			Pre-ULTC		Post-ULTC	
Bus Name	Base kV		kV	%	kV	%
Longwood TS	500	545.6	540.3	-1	543.6	-0.4
Bruce A TS	500	548.3	547.5	-0.1	547.9	-0.1
Bruce B SS	500	549	549	0	549	0
Evergreen SS	500	546.8	542.2	-0.8	544.8	-0.4
Milton SS	500	528.9	501.8	-5.1	510.4	-3.5
Claireville TS	500	526.7	503.6	-4.4	512.7	-2.7
Bruce A TS	230	247.3	246.8	-0.2	247.4	0
Longwood TS	230	245	244.9	0	246.6	0.7

Table 23: Voltage Analysis for Light Load Case

Monitored Busses		Pre-Cont Voltage kV	Loss of the projects' network with maximum var withdrawal			
			Pre-ULTC		Post-ULTC	
Bus Name	Base kV		kV	%	kV	%
Longwood TS	500	543.4	549.6	1.1	549.6	1.1
Bruce A TS	500	547.6	547.7	0	547.7	0
Bruce B SS	500	548.5	548.5	0	548.5	0
Evergreen SS	500	542.7	551.3	1.6	551.3	1.6
Bruce A TS	230	247.4	247.6	0.1	247.6	0.1
Longwood TS	230	245.3	247.6	0.9	247.6	0.9

6.8 Steady State Voltage Stability

The *Ontario Resource and Transmission Assessment Criteria (ORTAC)* states that the maximum acceptable pre-contingency power transfer must be 10% lower than the voltage instability point of the pre-contingency P-V curve, and 5% lower than the voltage instability point of the post-contingency P-V curve.

The voltage performance of the IESO-controlled grid was evaluated by examining if the FABC transfer after the incorporation of the project meets the above requirement based on pre- and post-contingency and post-contingency P-V curves under peak load conditions. The contingency of simultaneous loss of B560V+561M was selected for studying the post-contingency steady-state voltage stability as it is the worst-case contingency in terms of system voltage stability. For this recognized contingency, two post-contingency scenarios, either tripping the reactors at Bruce and Longwood or no tripping of these reactors are investigated. Only the voltage responses at Claireville 500kV were recorded as it is the most critical point in the system in terms of system voltage stability performance.

Figure 3, Appendix A shows the steady-state voltage responses at Claireville 500kV as the FABC transfer increases under the pre-contingency scenario and two post-contingency scenarios. It indicates that the maximum FABC transfer under the pre-contingency scenario, post-contingency reactor tripping scenario, and post-contingency no reactor tripping scenario are 8748 MW, 7256 MW, and 6766 MW, respectively. The pre-contingency FABC transfer is 6412 MW. Thus, the pre-contingency FABC transfer is 10% lower than the voltage instability point of the pre-contingency P-V curve, and 5% lower than the voltage instability point of the post-contingency P-V curve, under either reactor tripping or no reactor tripping scenario. It can be concluded that the

steady-state voltage stability of the system after the incorporation of the project conforms to the Market Rules' requirement.

6.9 Transient Stability Performance

Transient stability simulations were performed to determine if the power system can be transiently stable for recognized fault conditions. In particular, rotor angles of generators at Bruce GS, Darlington GS, Pickering GS and Greenfield GS were monitored. Simulations were performed under both the peak and shoulder load conditions, however only results for the peak load condition are provided as the flows out of the Bruce Area were higher representing the more critical case for transient stability performance.

Transient stability analyses were performed considering recognized faults in Southwest Ontario. Four contingencies were simulated as shown in Table 24.

The simultaneous loss of B560V and B561M was simulated since it is the worst contingency in terms of the transient stability of Bruce generating units and GTA voltage stability.

The simultaneous loss of B563A and B562E was simulated since it results in having the projects and K2 wind farm radially connected to Longwood TS, to evaluate the transient stability performance of the West area.

The simultaneous loss of A563L and E562L was simulated since it results in having the projects and K2 wind farm radially connected to Bruce TS, to evaluate the transient stability performance of Bruce generating units.

Finally, an un-cleared 3-phase fault at the Parkhill 121 kV bus was simulated to ensure that the failure of the projects' internal protections does not adversely impact the stability of the IESO controlled grid.

Table 24: Simulated Contingencies for Transient Stability Analysis

Contingency	Location	Fault Type	Fault Clearing Time (ms)		B/L RSS* (ms)	Reclosure Time	Reclosure Location
			Local	Remote			
B560V+B561M	Bruce	LLG	66	91	124	10s for B560V 15s for B561M	Claireville Milton
B563A + B562E	Bruce	LLG	66	91	-	10s	Ashfield Evergreen
A563L + E562L	Longwood	LLG	75	100	-	10s	Longwood
LV side of main step-up transformer	Parkhill 121 kV	3 phase	Un-cleared		-	-	-

*B/L RSS denotes the Bruce and Longwood Reactor Switching Schemes

Figure 4 to Figure 7, Appendix A show the transient responses of rotor angles and bus voltages. The transient responses show that the generators remain synchronized to the power system and the oscillations are sufficiently damped following all simulated contingencies. It can be concluded that none of the simulated contingencies causes transient instability or un-damped oscillations.

It can be also concluded that the protection changes proposed in the PIA report do not have materially adverse impact on the transient stability of the IESO-controlled grid.

6.10 Voltage Ride-Through Capability

The IESO requires that the wind turbine generators and associated equipment within the projects be able to withstand transient voltages and remain connected to the IESO-controlled grid following a recognized contingency unless the generators are removed from service by configuration. This requirement is commonly referred to as the voltage ride-through (VRT) capability.

The Siemens SWT WTGs to be installed have VRT capability. The VRT capability of the wind turbines is shown in Table 2.

The VRT capability of the WTGs was assessed based on the terminal voltages of the WTGs under simulated contingencies in Table 25. These contingencies result in the lowest transient voltages at the projects.

Table 25: Simulated Contingencies for VRT Analysis

Contingency	Location	Fault Type	Fault Clearing Time (ms)	
			Local	Remote
E562L	Evergreen SS	3 phase	66	100
Bruce T27 w/ EL560 BKF	Bruce A 500 kV	3 phase	194 (500 kV) 98 (230 & 27.6 kV)	269 (Claireville)
Longwood T7 w/ KL582 BKF	Longwood 500 kV	3 phase	203 (500 kV) 90 (230 kV) 98 (27.6 kV)	278 (Nanticoke)

Note: 3 phase faults with breaker fail have been simulated in place of line to ground (LG) faults with breaker fail, as this represents a more conservative and more severe fault than recognized by the IESO. If voltage ride through is adequate for a three phase fault, then voltage ride through for a LG fault will also be adequate

Figure 8, Appendix A shows the terminal voltage response of the Siemens SWT WTGs. It shows that the terminal voltages of the WTGs dip, in the worst case, to approximately 0.3 pu and remain below 0.6 pu for about 300 ms, and recover thereafter. As compared with the VRT capability of the Siemens SWT model, the proposed WTGs are able to remain connected to the grid for recognized system contingencies that do not remove the project by configuration.

However, when the project is incorporated into the IESO-controlled grid, if actual operation shows that the WTGs trip for out of zone faults, the IESO will require the voltage ride-through capability be enhanced by the applicant to prevent such tripping.

The voltage ride-through capability must also be demonstrated during commissioning by either providing manufacturer test results or monitoring several variables under a set of IESO specified field tests and the results should be verifiable using the PSS/E model.

6.11 Relay Margin

The Market Manual 7.4 Appendix B.3.2 requires that, following fault clearance or the loss of an element without a fault, the margin on all instantaneous and timed distance relays that affect the integrity of the IESO-controlled grid, including generator loss of excitation and out-of-step relaying at major generating stations, must be at least 20 and 10 percent, respectively.

Relay margin analysis was performed to determine if circuits B562E or E562L will trip for out of zone faults due to the incorporation of the projects. The shoulder load basecase was used as it had the highest transfers on the Bruce-by-Longwood circuits. Simulations were performed with the projects in-service and out of service, however, only results for the in-service case are provided as varying the project status had minimal impact. The contingencies listed in Table 26 were simulated with the results shown in Figure 9 to Figure 20, Appendix A.

Table 26: Simulated Contingencies for Relay Margin Analysis

Contingency	Location	Fault Type	Fault Clearing Time (ms)		B/L RSS* (ms)	Reclosure Time	Reclosure Location
			Local	Remote			
B560V+B561M	Bruce	LLG	66	91	124	10s for B560V 15s for B561M	Claireville Milton
A563L	Longwood	3 phase	75	100	-	10s	Longwood
B563A	Bruce	3 phase	66	91	-	10s	Ashfield

*B/L RSS denotes the Bruce and Longwood Reactor Switching Schemes

The relay margin plots shown in Appendix A show that the impedance trajectories at both ends of circuits B562E and E562L do not penetrate the relay characteristics and have a margin of greater than 20%, thereby meeting the Market Manual requirement.

It can be also concluded that the protection adjustments proposed in the PIA report have no material adverse impact on the IESO-controlled grid with respect to relay margins.

-End of Section-

Appendix A: Figures

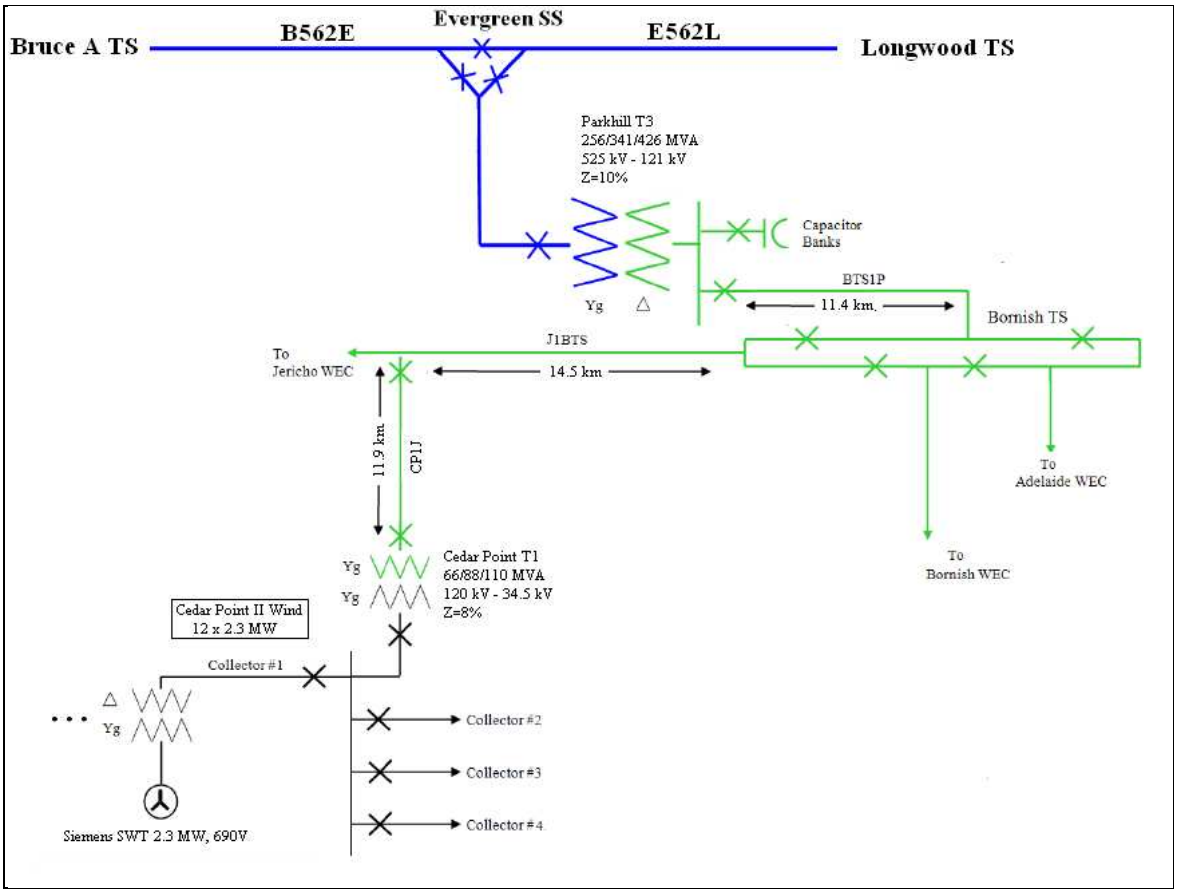


Figure 1: Cedar Point II Wind Power Project Single Line Diagram

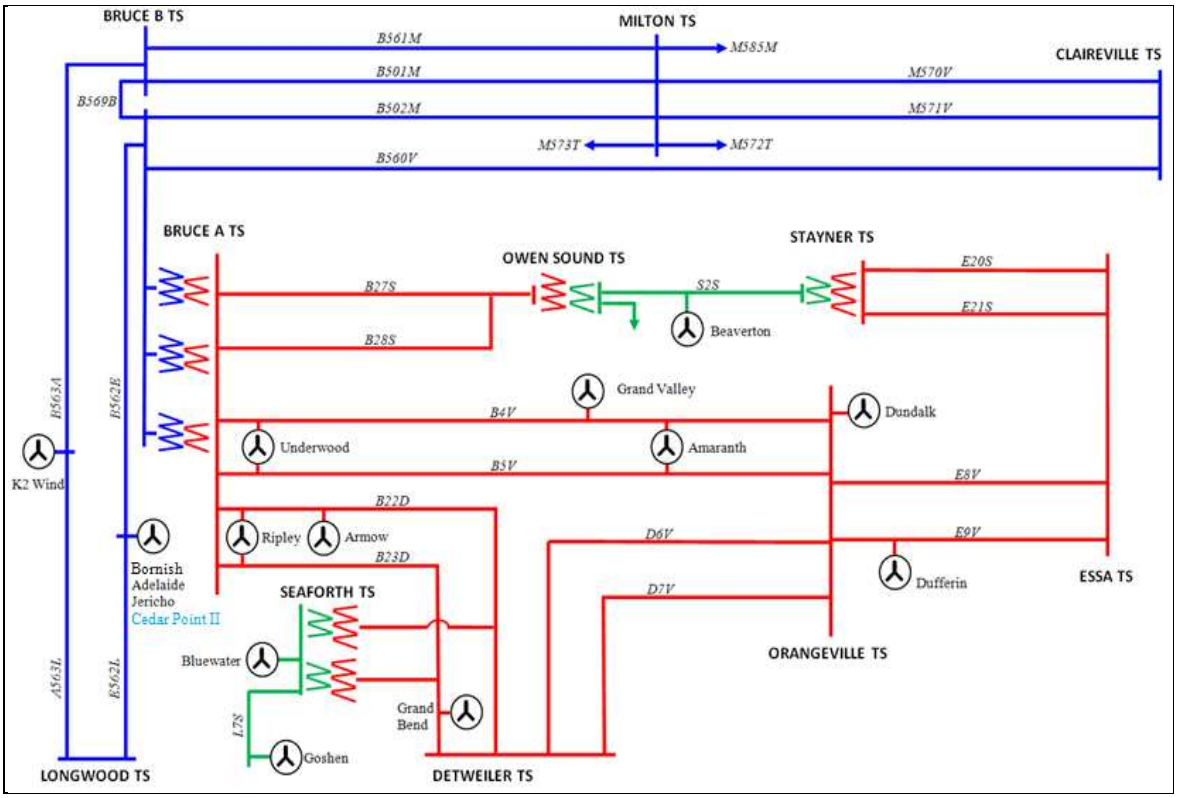


Figure 2: Location of Cedar Point II Wind Project

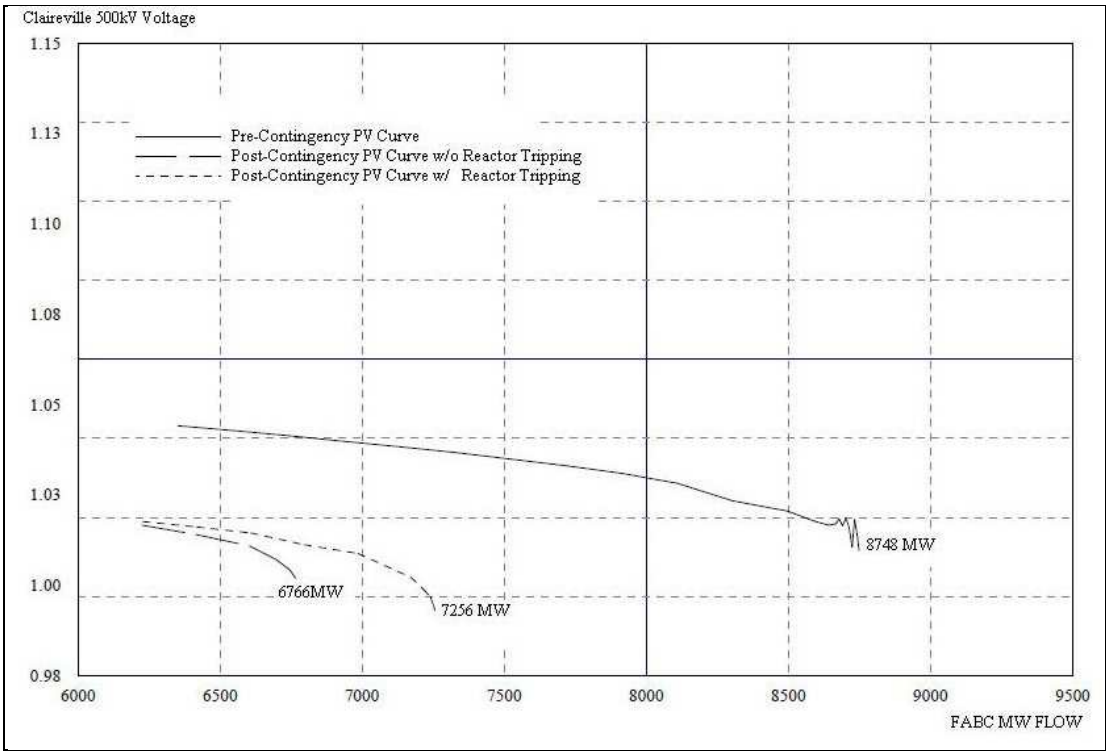


Figure 3: Voltage performance at Claireville 500kV vs. FABC transfer

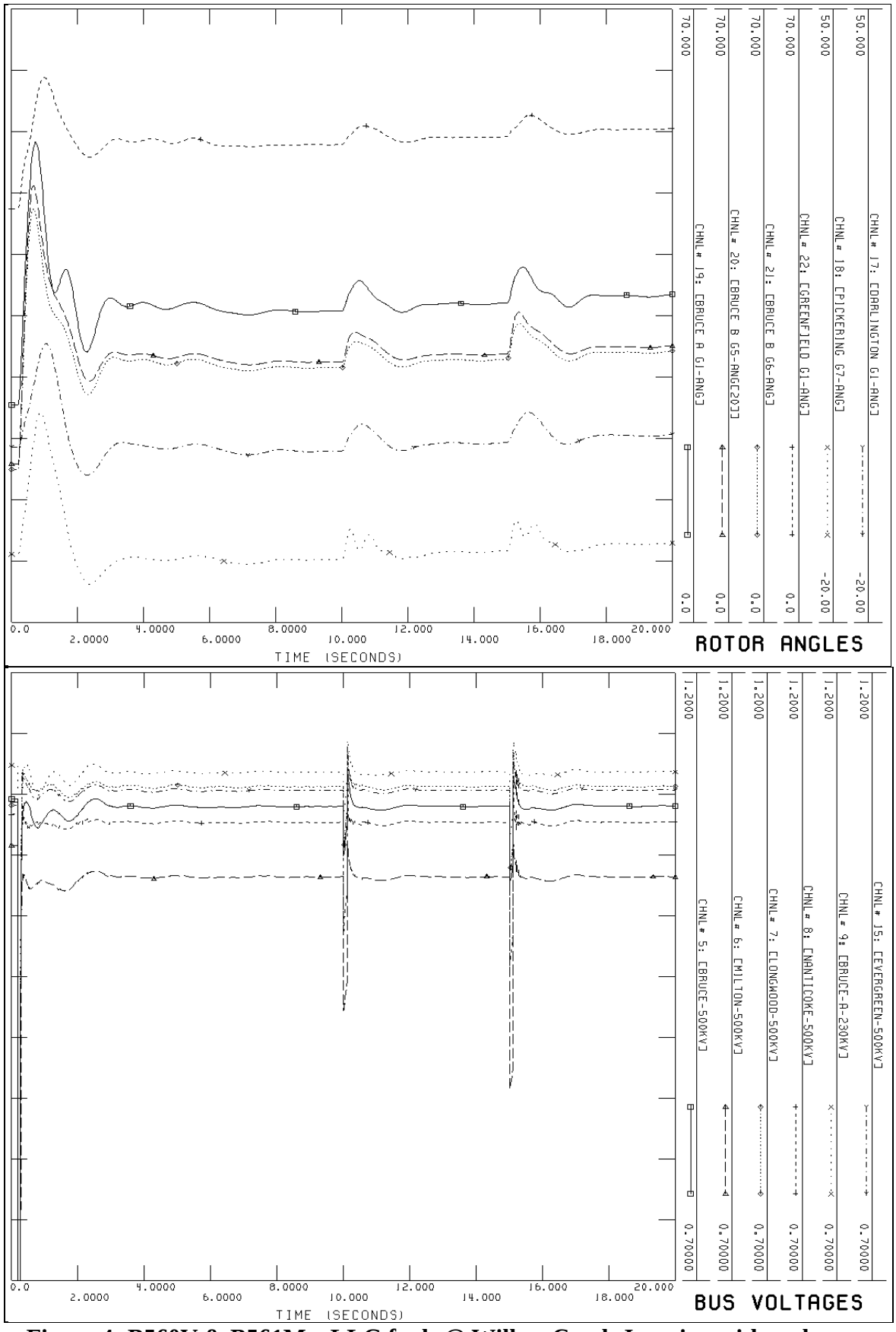


Figure 4: B560V & B561M – LLG fault @ Willow Creek Junction with reclosure

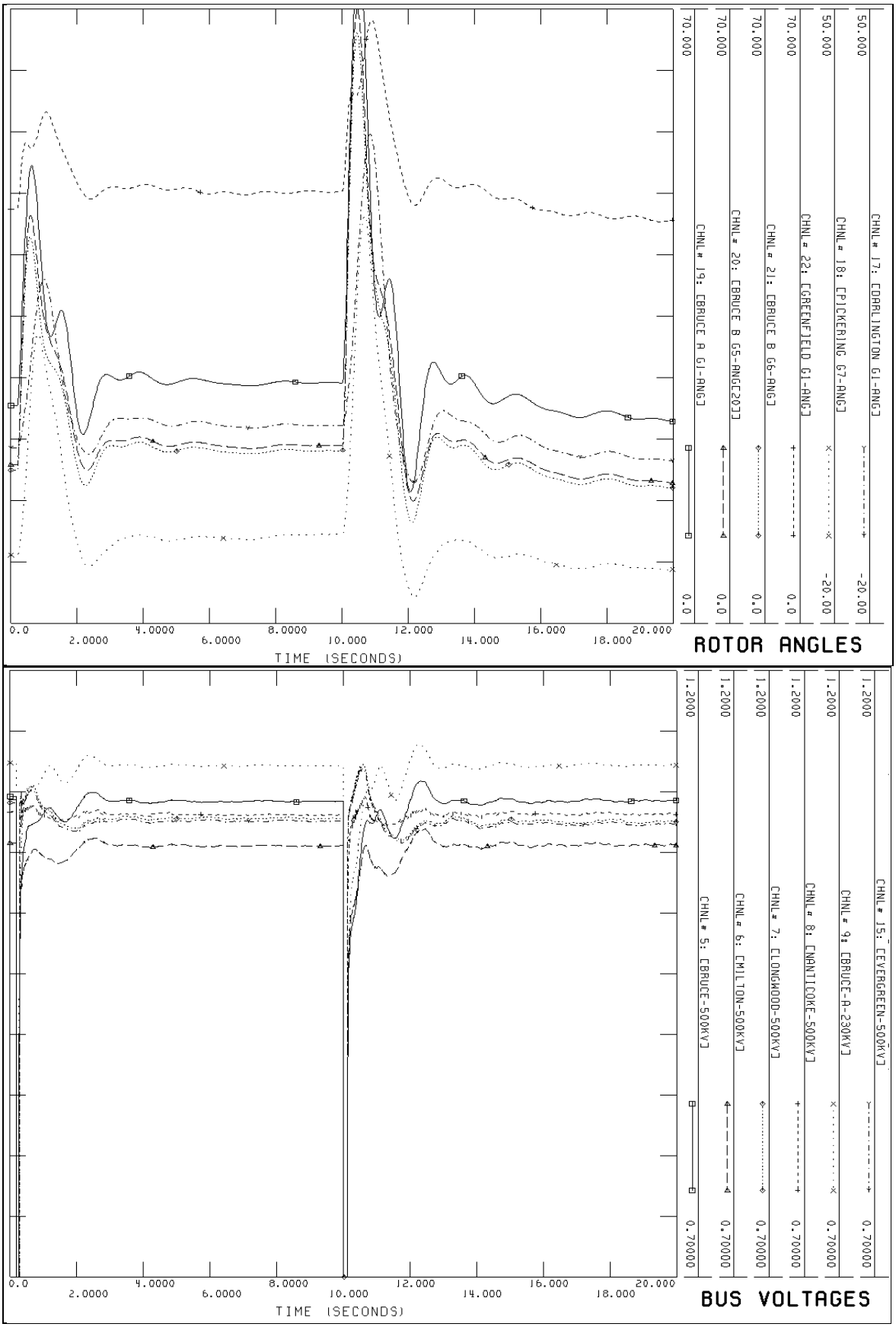
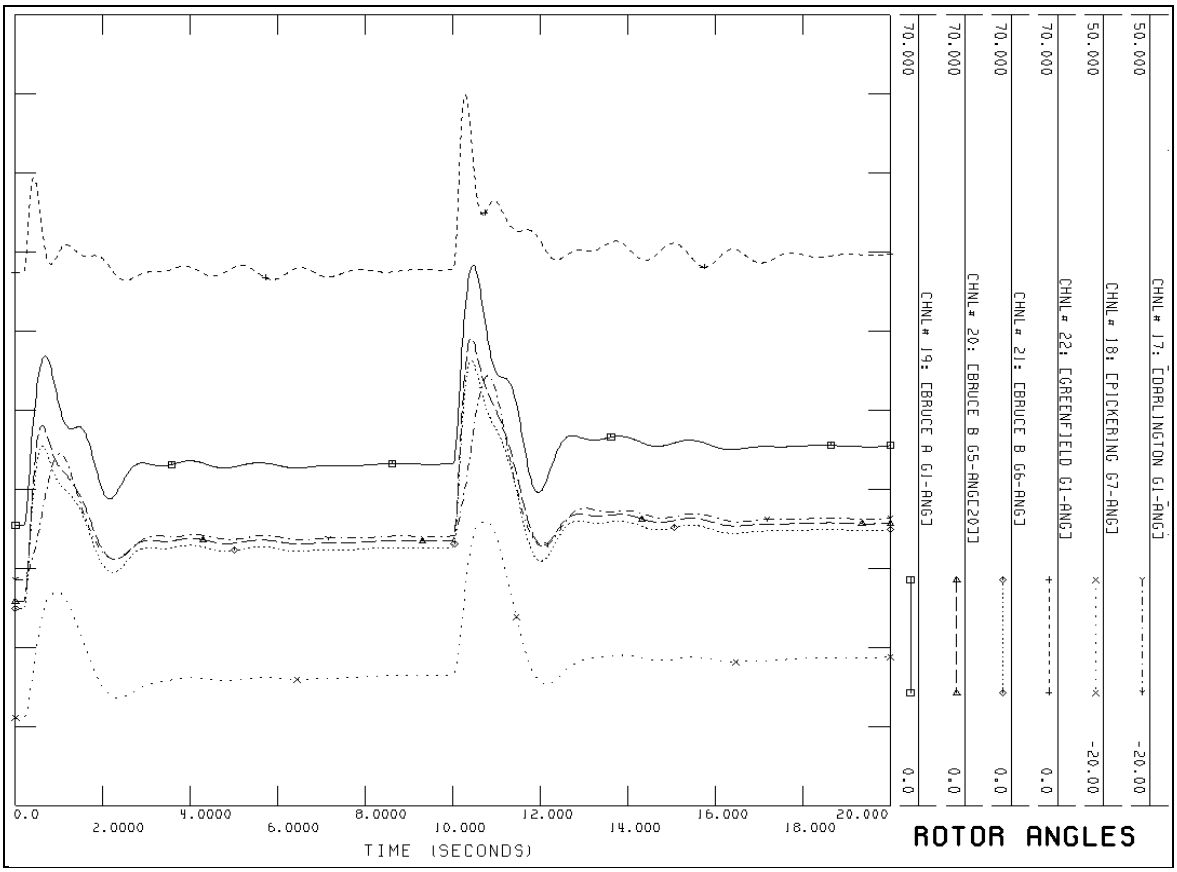


Figure 5: B562E & B563A – LLG fault @ Bruce with reclosure



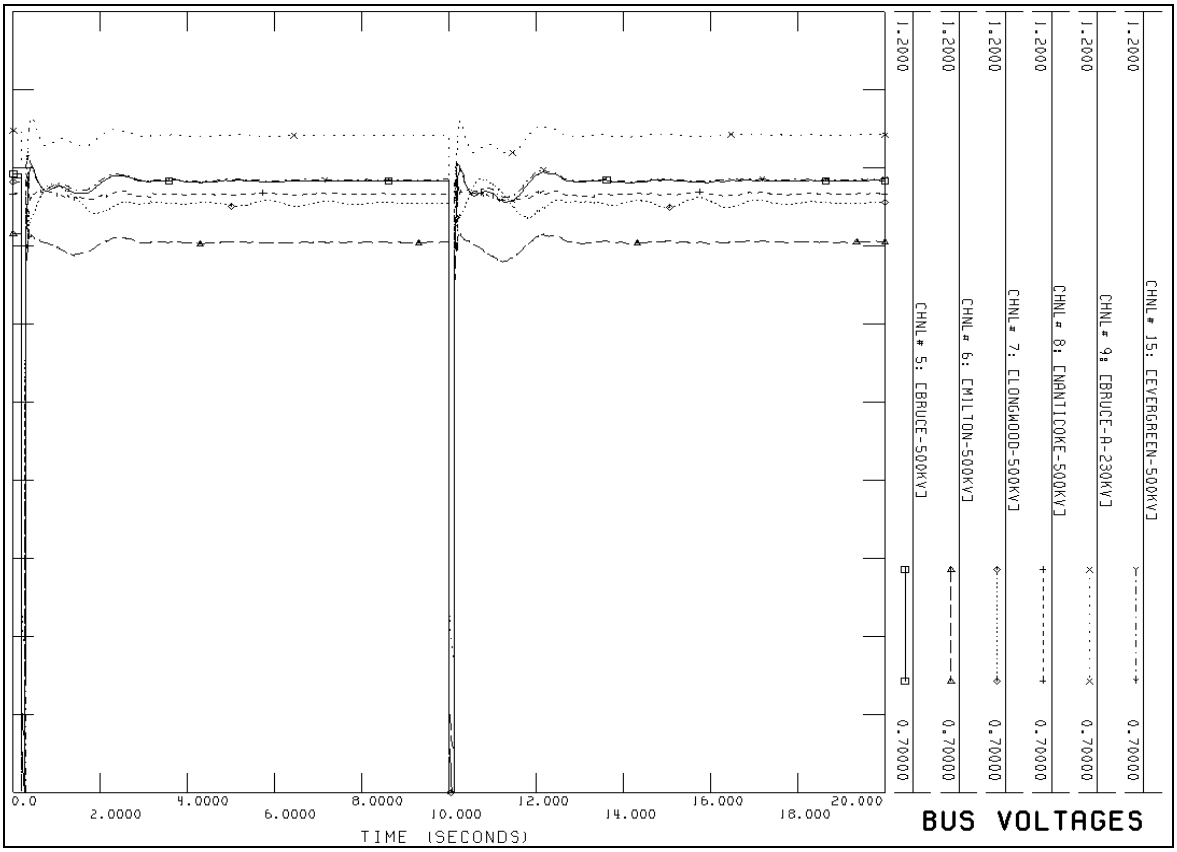


Figure 6: A563L & E562L – LLG fault @ Longwood with reclosure

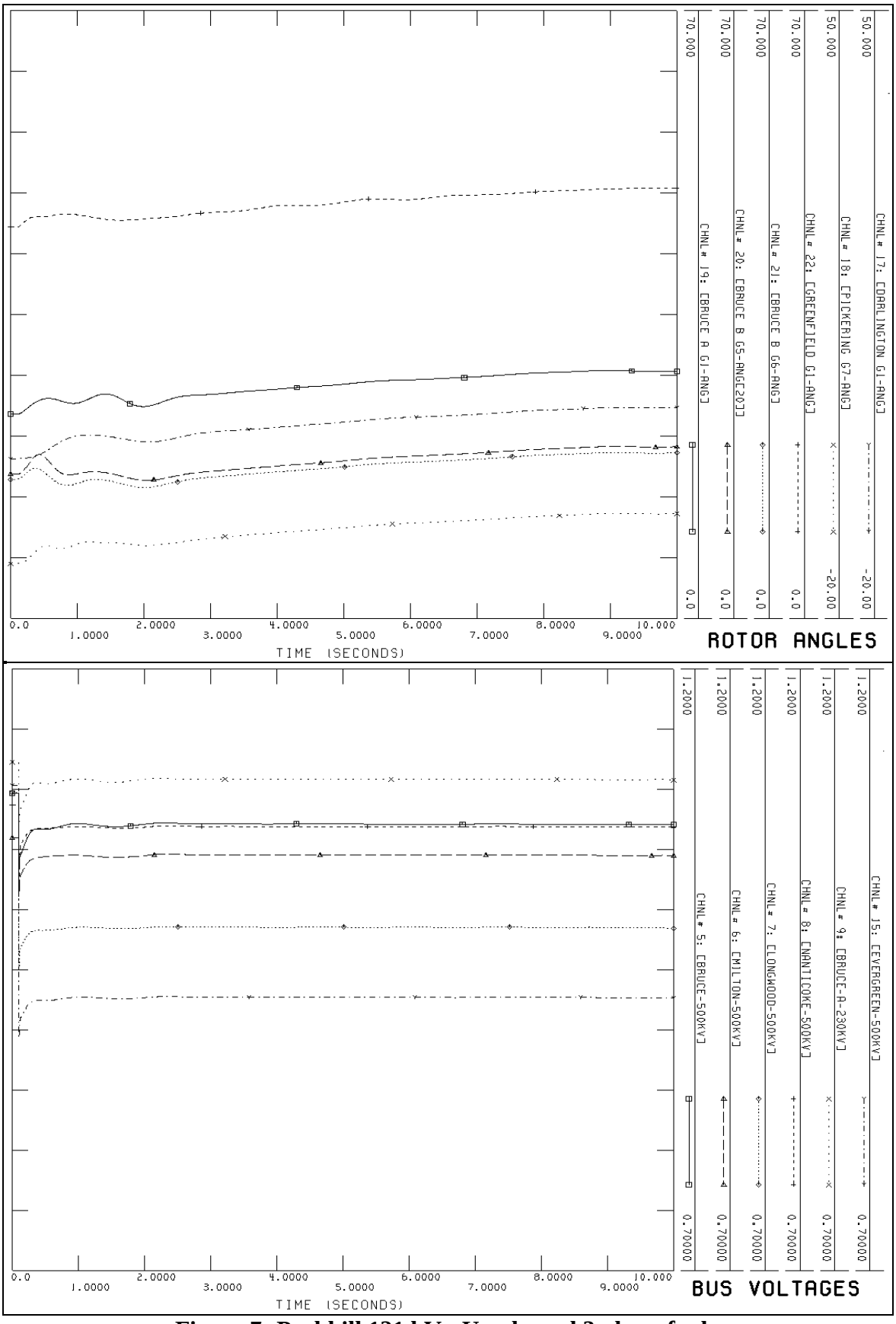


Figure 7: Parkhill 121 kV - Un-cleared 3 phase fault

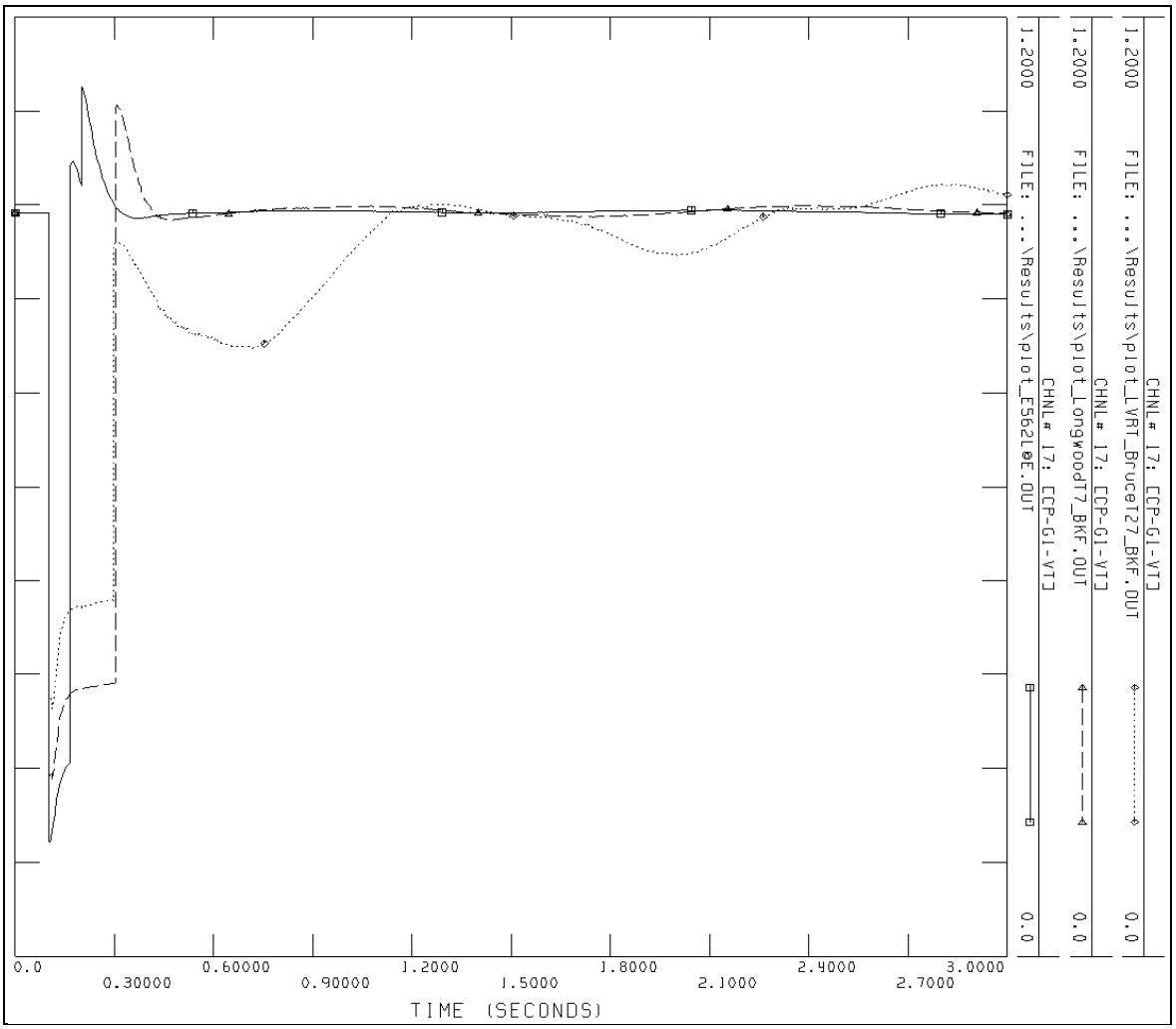


Figure 8: WTG terminal voltages of feeder C1 for studied contingencies

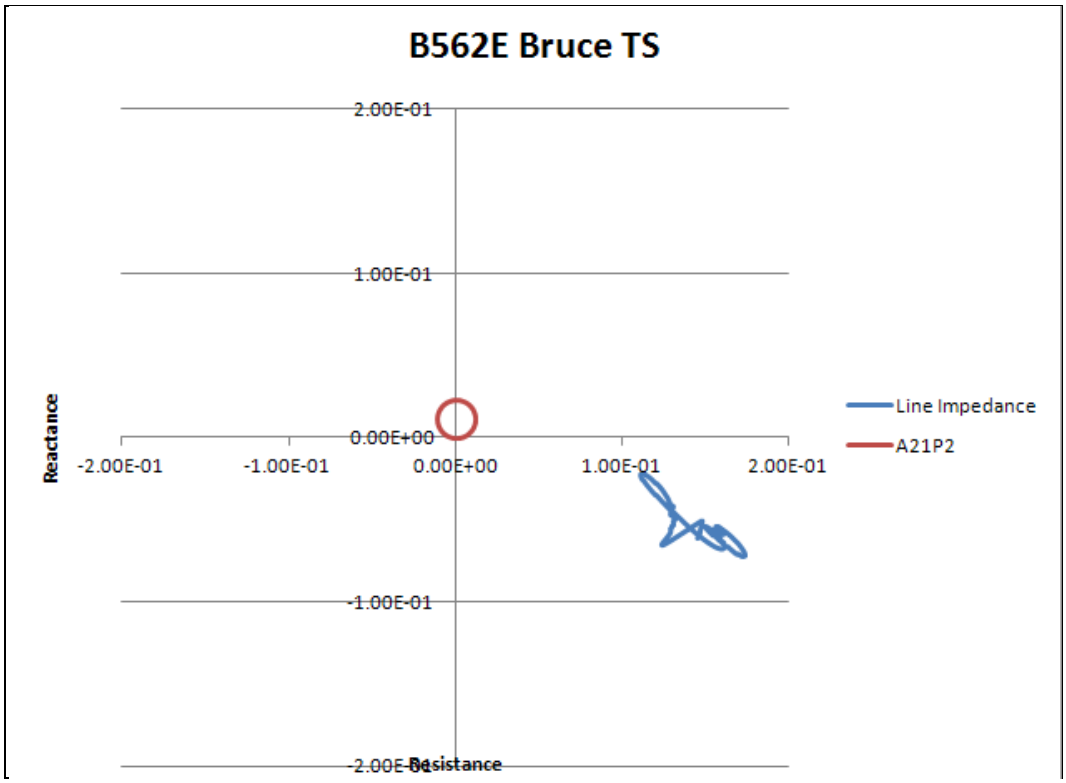


Figure 9: B562E @ Bruce trajectory for a LLG fault on B560V and B561M at Willow Creek Junction

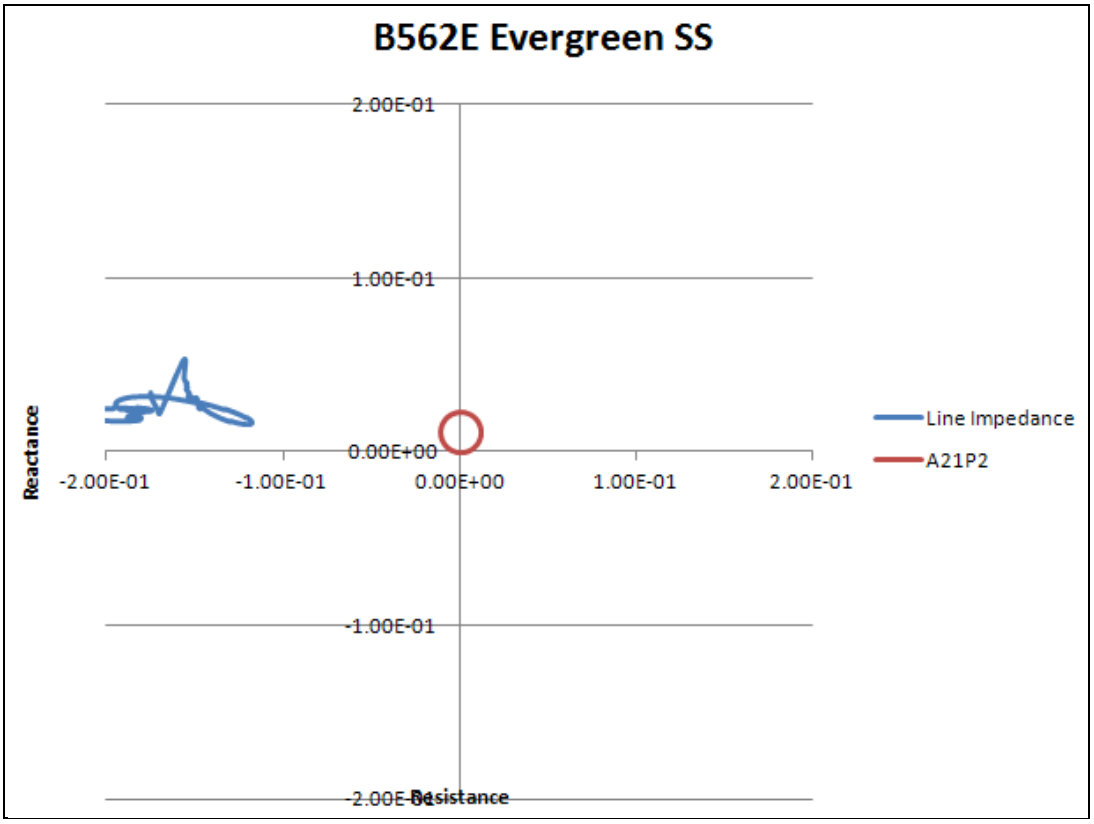


Figure 10: B562E @ Evergreen trajectory for a LLG fault on B560V and B561M at Willow Creek Junction

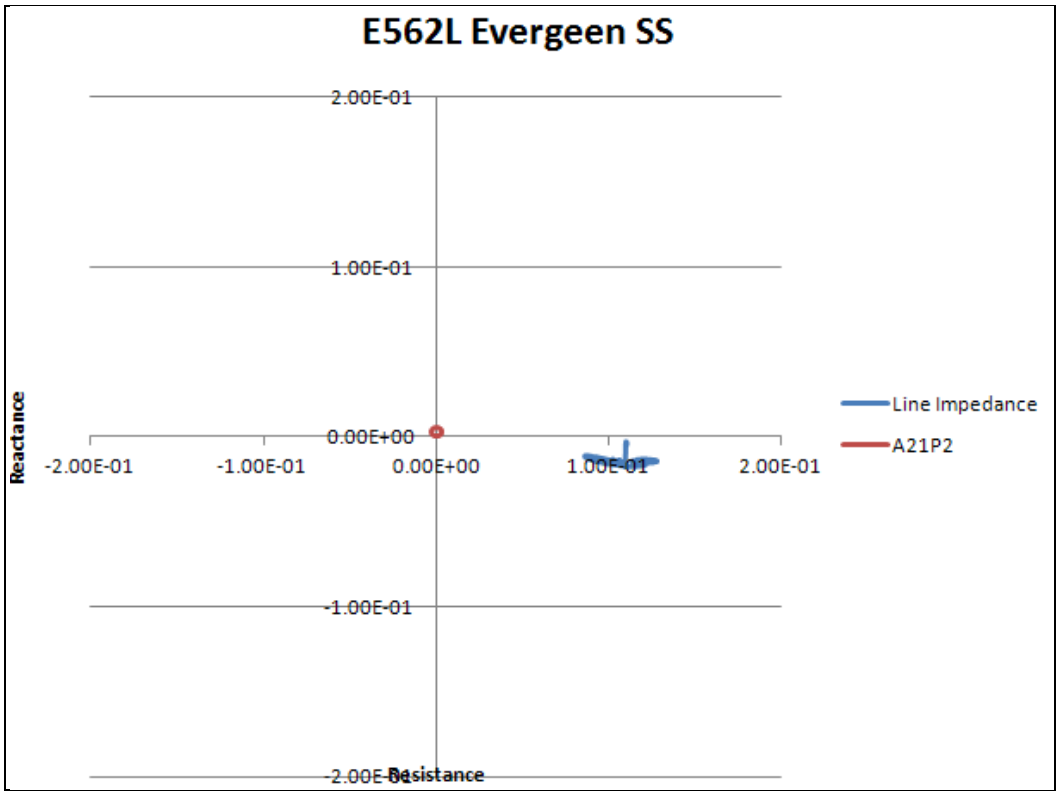


Figure 11: E562L @ Evergreen trajectory for a LLG fault on B560V and B561M at Willow Creek Junction

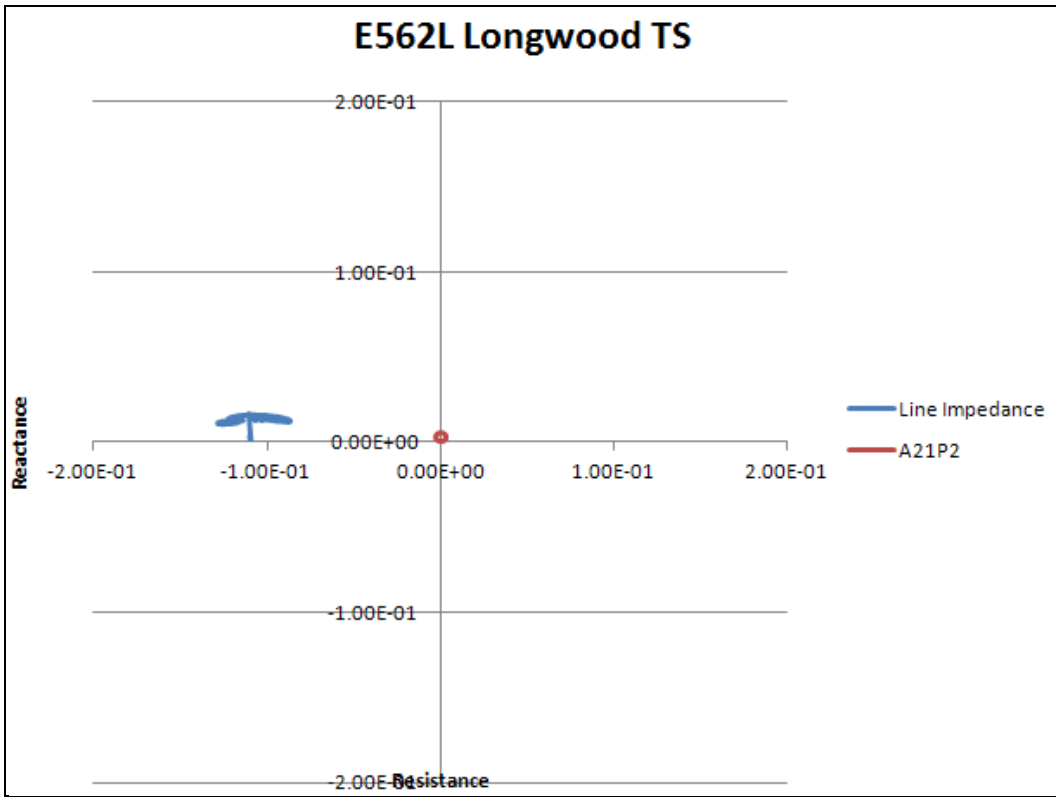


Figure 12: E562L @ Longwood trajectory for a LLG fault on B560V and B561M at Willow Creek Junction

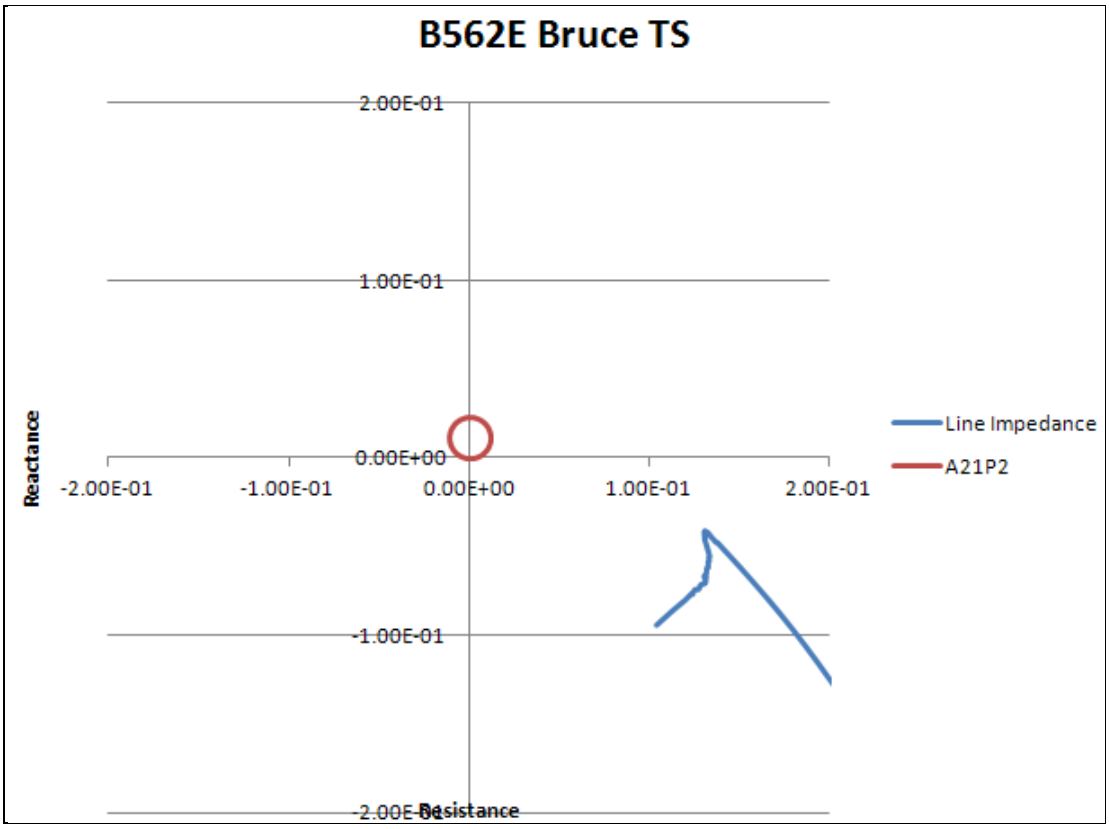


Figure 13: B562E @ Bruce trajectory for a 3 phase fault on B563A at Bruce

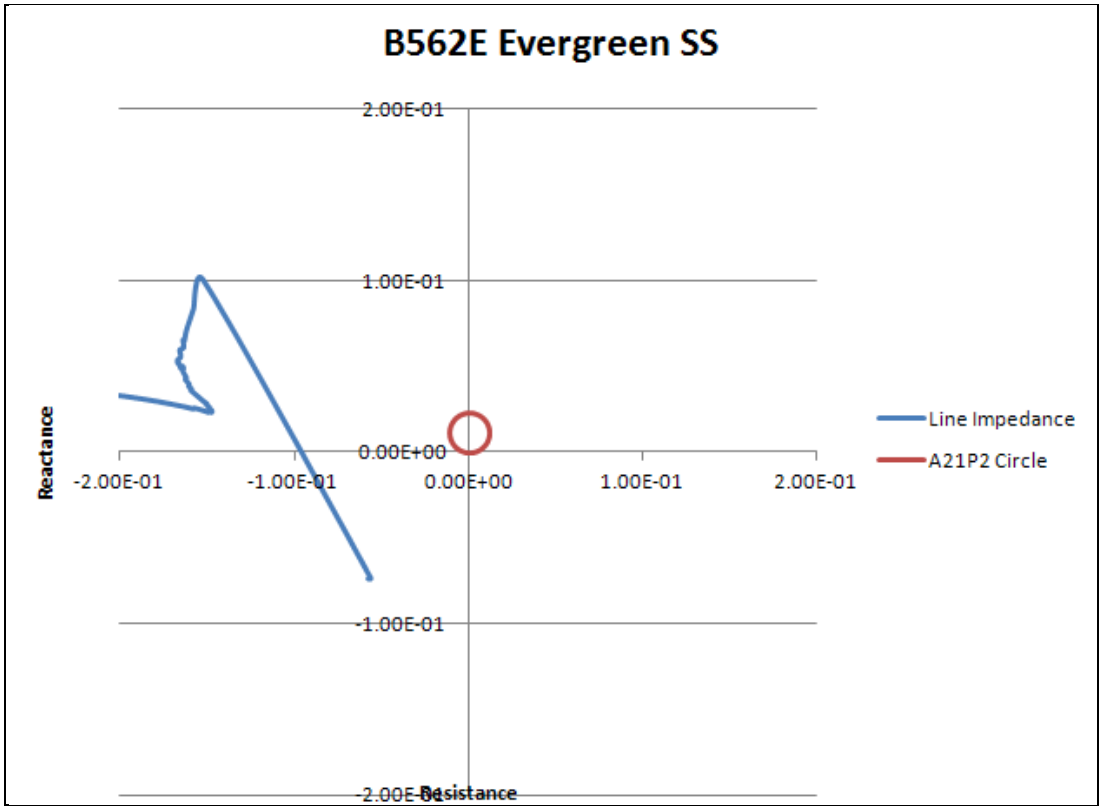


Figure 14: B562E @ Evergreen trajectory for a 3 phase fault on B563A at Bruce

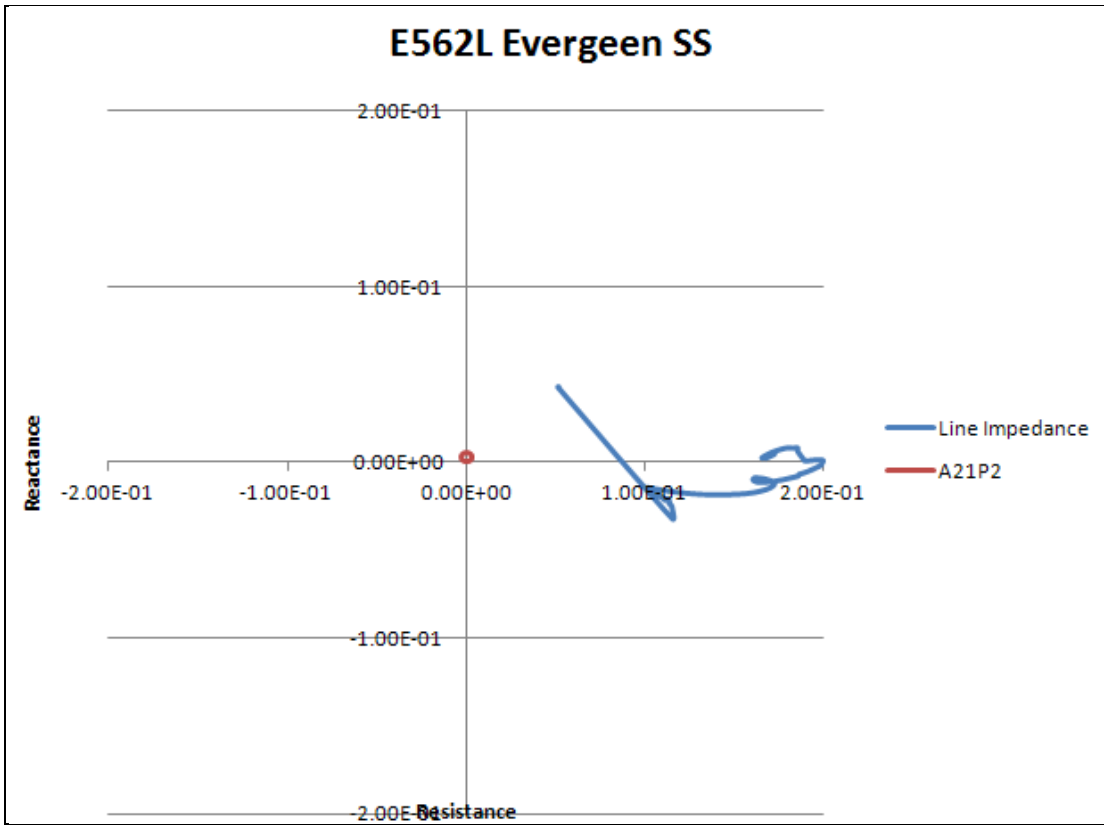


Figure 15: E562L @ Evergreen trajectory for a 3 phase fault on B563A at Bruce

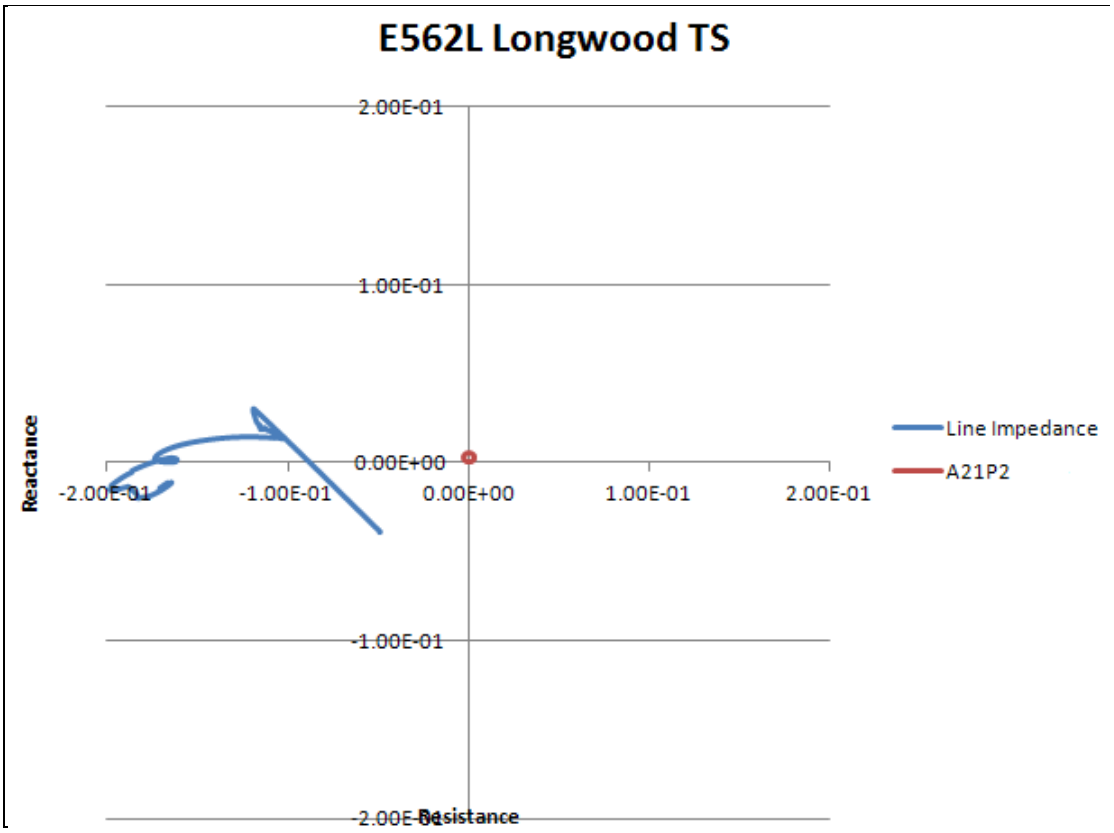


Figure 16: E562L @ Longwood trajectory for a 3 phase fault on B563A at Bruce

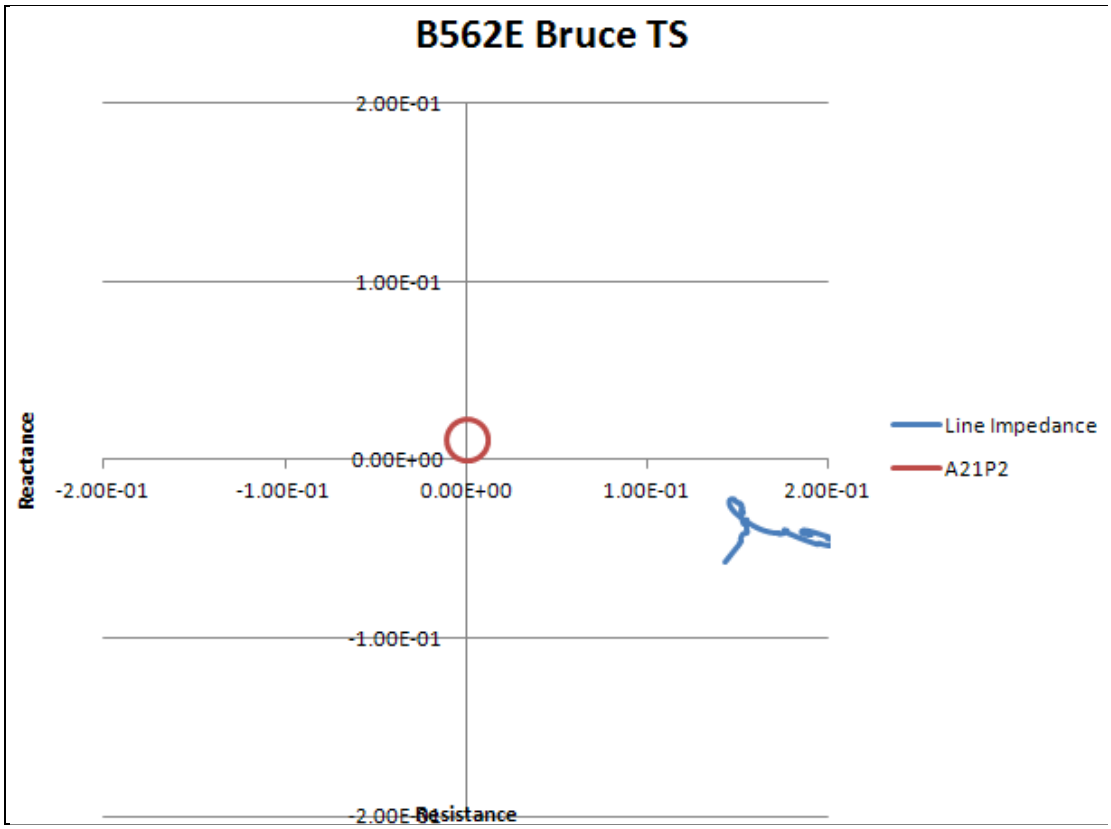


Figure 17: B562E @ Bruce trajectory for a 3 phase fault on A563L at Longwood

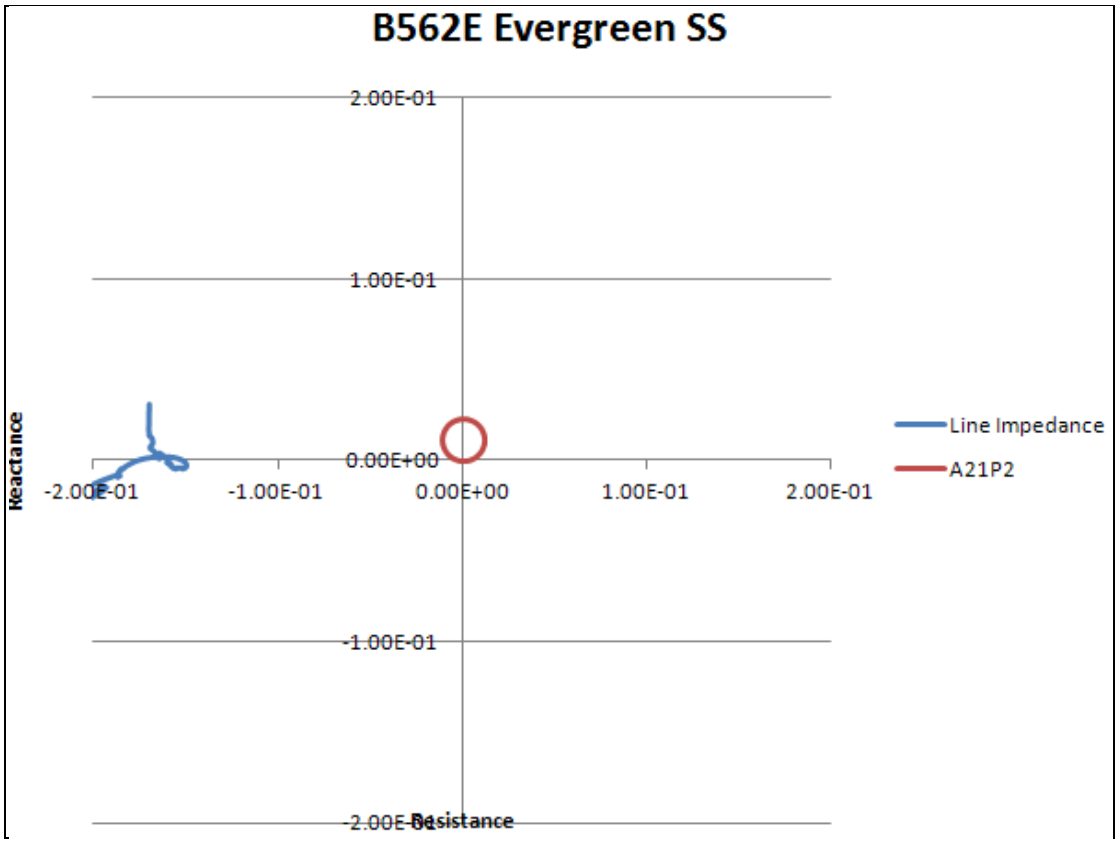


Figure 18: B562E @ Evergreen trajectory for a 3 phase fault on A563L at Longwood

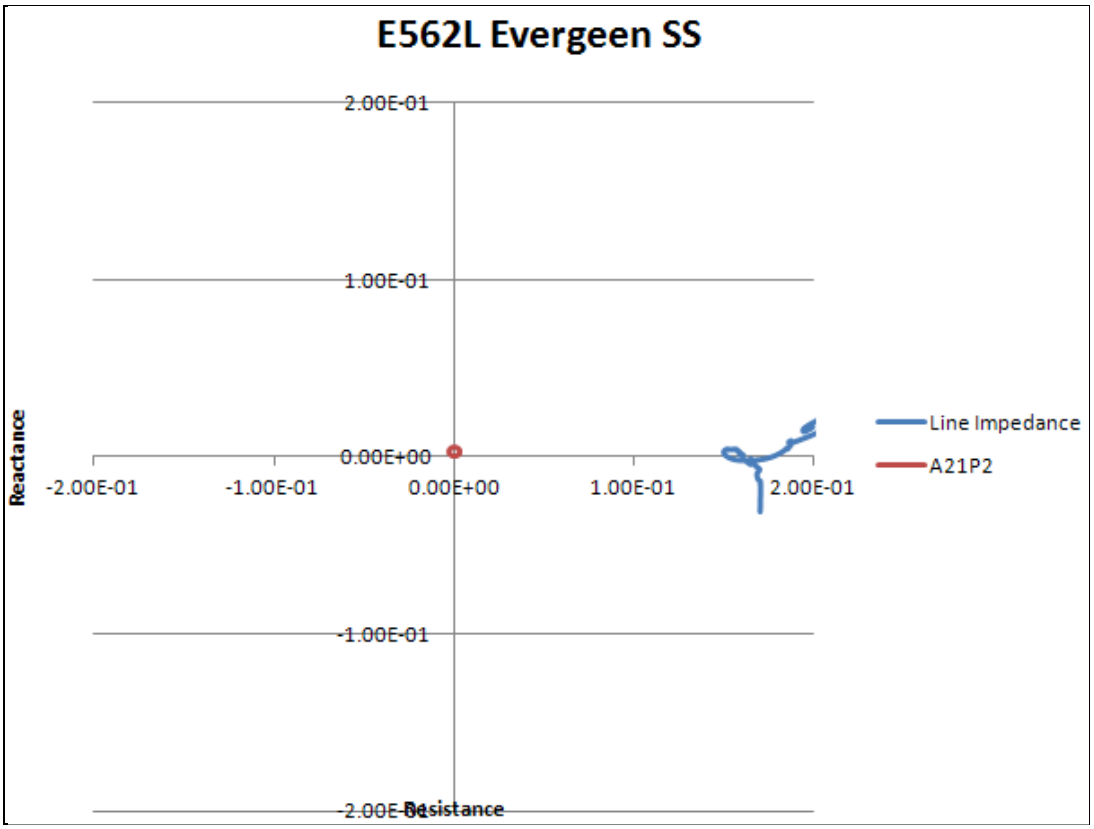


Figure 19: E562L @ Evergreen trajectory for a 3 phase fault on A563L at Longwood

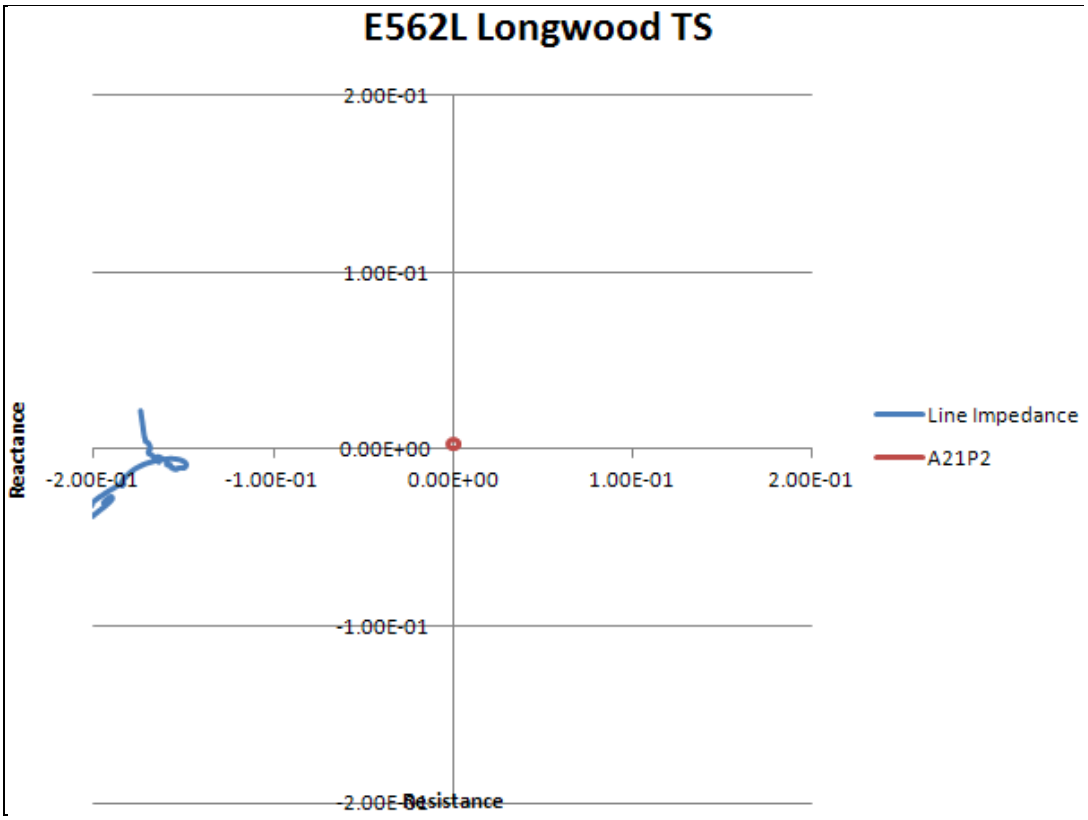


Figure 20: E562L @ Longwood trajectory for a 3 phase fault on A563L at Longwood

Appendix B: PIA Report

Hydro One Networks Inc.
483 Bay Street
Toronto, Ontario
M5G 2P5

PROTECTION IMPACT ASSESSMENT

NEXTERA/SUNCOR CEDAR POINT II WIND FARM PROJECTS

283.5 MW / 100 MW WIND GENERATORS GENERATION CONNECTION

Date: February 10, 2012
P&C Planning Group Project #: PCT-291-PIA

Prepared by

Hydro One Networks Inc.

Disclaimer

This Protection Impact Assessment has been prepared solely for the IESO for the purpose of assisting the IESO in preparing the System Impact Assessment for the proposed connection of the proposed generation facility to the IESO–controlled grid. This report has not been prepared for any other purpose and should not be used or relied upon by any person, including the connection applicant, for any other purpose.

This Protection Impact Assessment was prepared based on information provided to the IESO and Hydro One by the connection applicant in the application to request a connection assessment at the time the assessment was carried out. It is intended to highlight significant impacts, if any, to affected transmission protections early in the project development process. The results of this Protection Impact Assessment are also subject to change to accommodate the requirements of the IESO and other regulatory or legal requirements. In addition, further issues or concerns may be identified by Hydro One during the detailed design phase that may require changes to equipment characteristics and/or configuration to ensure compliance with the Transmission System Code legal requirements, and any applicable reliability standards, or to accommodate any changes to the IESO-controlled grid that may have occurred in the meantime.

Hydro One shall not be liable to any third party, including the connection applicant, which uses the results of the Protection Impact Assessment under any circumstances, whether any of the said liability, loss or damages arises in contract, tort or otherwise.

Revision History

Revision	Date	Change
R0	September 6, 2011	First draft
R1	October 27, 2011	Change in requirements for multiple setting groups and the name of the switching station to Evergreen SS.
R2	November 7, 2011	New approach for low WF infeed.
R3	February 10, 2012	Removed scenario that excluded Cedar Point II

EXECUTIVE SUMMARY

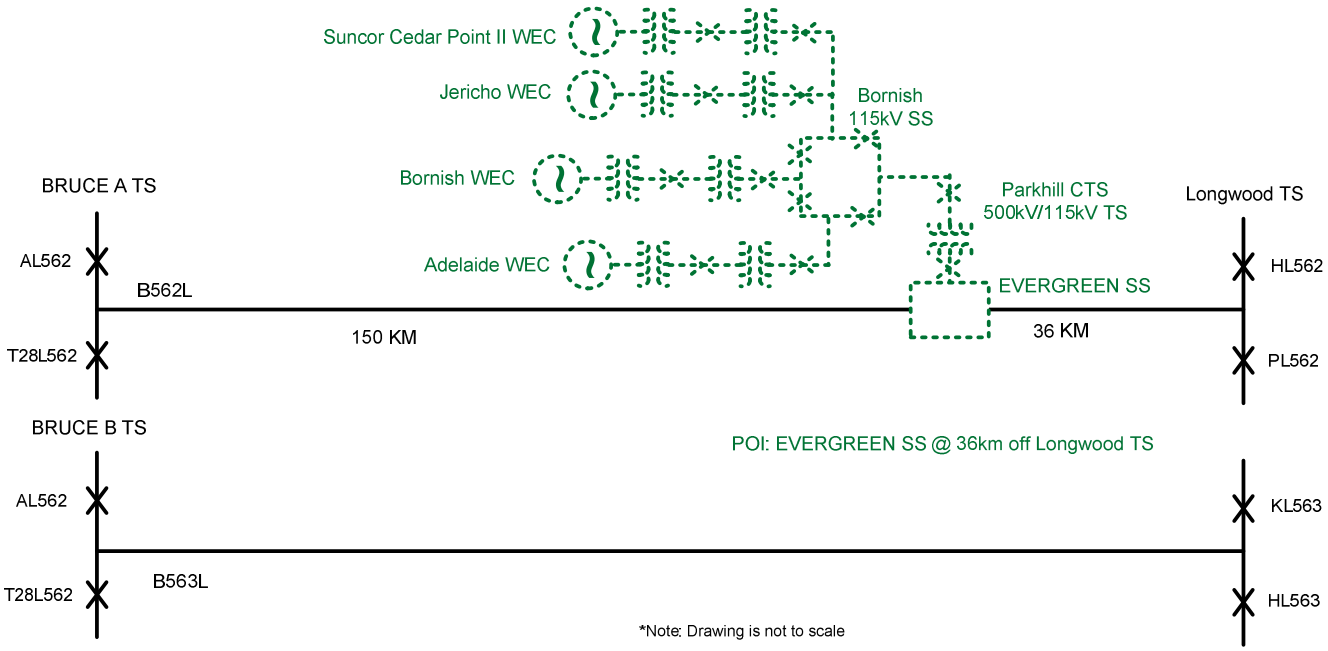


Figure 1: NextEra/SUNCOR WF Connection to HONI Transmission System

It is feasible for both NextEra and Suncor to connect their proposed generation projects (NextEra 283.5MW and Suncor 100 MW) at the location shown in Figure 1. A sectionalizing ring bus will be constructed on line B562L. Line segment between Bruce TS and Evergreen SS will be approximately 150km. Line segment between Evergreen SS and Longwood TS will be approximately 36.5 km. It is recommended to protect both the new 150km and the 36.5 km line segments by using a line distance scheme.

PROTECTION HARDWARE

The present relays at Bruce TS and Longwood TS shall be upgraded to standard line distance relays meeting NPCC D4 separation requirements. One of the relays ('B' group) at Bruce TS may be retained if feasible. This will trigger upgrading the 4 breaker (2 in each Bruce TS and Longwood TS) failure protections. New standard line protection relays will also have to be installed at Evergreen SS.

PROTECTION SETTINGS

Permissive Overreaching Schemes shall be implemented in both new line segments (previously part of B562L). New settings will be required for both Bruce TS and Longwood TS as the new three-breaker ring bus sectionalizes the line.

For the case where one of the line segments is open and the infeed from the wind farm is low, if a fault occurs close to Evergreen SS it will not be seen by Evergreen SS due to low infeed nor by the terminal station Zone 1 due to the fault location being within only Zone 2 reach, resulting in potentially long fault clearing time (up to 400ms). This scenario will require implementation of a relay logic design for the weak infeed solution which will be elaborated in the planning document in preparation of the detailed design.

New settings will also be required for relays at Evergreen SS. Essentially, the protection over B562L will have to be modified to protect two new line segments.

TELECOMMUNICATIONS

The telecommunication media between Bruce A TS and Longwood TS are digital Microwave (Main) and PLC (alternate) in both 'A' and 'B' groups. New digital MW and PLC (main and alternate) facilities shall be installed at Evergreen SS in order to establish necessary connections for teleprotection. The links shall be established to both Bruce A TS and Longwood TS.

In addition, the proponent is responsible for establishing the communication links ('A' & 'B' redundant and fully separated with geographic path diversity) to Evergreen SS. The proponent is also responsible for establishing the communication links to IESO and HONI control centers for SCADA.

CUSTOMERS RESPONSIBILITIES

The customers shall be responsible to reliably disconnect their equipment for a fault within their system in case of a single contingency in their equipment. New protection hardware shall be installed at Evergreen SS as described above. Teleprotection shall comply with the described above. Teleprotection signals such as transfer trip shall be transmitted to both terminal stations from Evergreen SS as well as Breaker Fail shall be initiated upon receiving TT signals from any of the terminal stations. Adequate signal exchange shall be established between Evergreen SS and customer's step-up station Parkhill CTS.

Exhibit H, Tab 3, Schedule 1
Customer Impact Assessment

CUSTOMER IMPACT ASSESSMENT

Hydro One Networks Inc.
483 Bay Street
Toronto, Ontario
M5G 2P5

- ADDENDUM -
CUSTOMER IMPACT ASSESSMENT

CEDAR POINT II WIND POWER PROJECT
ADELAIDE / BORNISH / JERICHO WIND ENERGY CENTRES

100 MW Wind Turbine Generation Connection
283.5 MW Wind Turbine Generation Connection

- FINAL -

Revision: 0

Date: June 8, 2012

Issued by: **Transmission System Development Division**
Hydro One Networks Inc.

Prepared by:

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Transmission System Development
Hydro One Networks Inc.

Approved by:

John Sabiston, P.Eng
Manager, Transmission Planning
Transmission System Development
Hydro One Networks Inc.

Disclaimer

This Customer Impact Assessment was prepared based on information available about the connection of the proposed Suncor Energy Products Inc. –Cedar Point II Wind Power Project. It is intended to highlight significant impacts, if any, to affected transmission customers early in the project development process and thus allow an opportunity for these parties to bring forward any concerns that they may have. Subsequent changes to the required modifications or the implementation plan may affect the impacts of the proposed connection identified in Customer Impact Assessment. The results of this Customer Impact Assessment are also subject to change to accommodate the requirements of the IESO and other regulatory or municipal authority requirements.

Hydro One shall not be liable to any third party which uses the results of the Customer Impact Assessment under any circumstances whatsoever for any indirect or consequential damages, loss of profit or revenues, business interruption losses, loss of contract or loss of goodwill, special damages, punitive or exemplary damages, whether any of the said liability, loss or damages arises in contract, tort or otherwise. Any liability that Hydro One may have to Suncor Energy Products Inc. in respect of the Customer Impact Assessment is governed by the Agreement between:

1. Suncor Energy Products Inc. and Hydro One dated February 14, 2012.

ADDENDUM: CUSTOMER IMPACT ASSESSMENT
CEDAR POINT II WIND POWER PROJECT &
ADELAIDE/BORNISH/JERICHO WIND ENERGY CENTRES
383.5 MW WIND TURBINE GENERATION CONNECTION

1.0 INTRODUCTION

Suncor Energy is to develop a 100 MW wind energy generation facility. The wind energy facility, known in this document as Cedar Point Wind Project (CPWP), will be constructed in the Township of Adelaide-Metcalfe in Middlesex County. CPWP will connect into the NEXTera ENERGY 283.5 MW wind energy generation facility, known in this document as NEXTera Wind Energy Centre (NWEC). NWEC consists of the three wind energy projects: Adelaide WEC (60 MW), Bornish WEC (73.5 MW) and Jericho WEC (150 MW). The total 383.5 MW of Suncor and NEXTera generation will connect to Hydro One's transmission system through one new step-up transformer via a new 500 kV switching station that will sectionalize Hydro One's 500 kV circuit, B652L, approximately 36.5 km from Longwood TS. The switching station will be located in Middlesex County, in the Municipality of North Middlesex. The switching station will be called Evergreen SS and will be Hydro One owned and operated. Evergreen SS interconnection station will be located just west and adjacent to Hydro One's B562/563L Right-Of-Way (ROW).

In accordance with section 6 of the Ontario Energy Board's Transmission System Code, Hydro One Networks Inc (Hydro One) is to carry out a Customer Impact Assessment (CIA) study to assess the impact of the proposed generator connection on existing customers in the affected area.

This study does not evaluate the overall impact of the Cedar Point Wind Project on the bulk electricity system. The impact of the new generator on the bulk electricity system is the subject of the System Impact Assessment (SIA) issued by the Independent Electricity System Operator (IESO).

The study does not evaluate the impact of the Cedar Point Wind Project on the network Protection and Control facilities. Protection and Control aspects are reviewed during the Protection Impact Assessment, which is part of the SIA. Protection and Control aspects are again reviewed, in detail, during the preparation of the connection cost estimate and will be reflected in the Connection and Cost Recovery Agreement.

1.2 Addendum: Proposed Connection: Cedar Point II Wind Power Project

1.2.1 The Wind Farm

The proposed 100 MW wind farm consists of 45 Siemens 2.3 MW Series Wind Turbine Generators (WTG). The maximum output of the WTG will be curtailed to a total generation output capability of 100 MW. Appendix A, Figures 1 & 2 shows an overview of the proposed connection arrangement.

Cedar Point II WPP consists of 4 groups of 10-12 x 2.3 MW Siemens wind turbine units totaling 100 MW. Each group of wind turbines is placed on a 34.5 kV feeder and is protected by a circuit breaker before connecting to a 34.5 kV bus at a substation located in the Municipality of Adelaide-Metcalfe. This substation will be called Cedar Point Customer Generation Station (CGS). At Cedar Point CGS, the power will be transformed to 121 kV via one 120/34.5 kV, 66/88/110 MVA transformer.

An 11.9 km, 121 kV customer-owned transmission line named CP1J will connect Cedar Point CGS to Cedar Point Customer Switching Station (CSS) which will be located next to NEXTera's Jericho CGS. At this point, Suncor's Cedar Point II WPP will join with the Jericho WEC. The combined wind farm outputs will then be transported 14.5 km on a 121 kV customer transmission line named J1BTS to NEXTera's Bornish CSS.

At Bornish CSS four wind generating facilities converge: Suncor's Cedar Point II WPP (100 MW) and NEXTera's Adelaide WEC (60 MW), Bornish WEC (73.5 MW) and Jericho WEC (150 MW). Bornish CSS will be a 121 kV switching station owned and operated by the generator customers. The station will consist of a four breaker ring and will be located in the Municipality of North Middlesex.

An 11.4 km, 121 kV customer-owned transmission line will then connect Bornish CSS to the generator's 500 kV transformer station located close to Hydro One's ROW. This transformer station will be called Parkhill CTS (Customer Transformer Station). At this station, the power will be transformed to 500 kV via one 525/121 kV 256/341/426 MVA transformer. The 500 kV bus at Parkhill CTS will connect to the new Hydro One 500 kV switching station known as Evergreen SS. Please see Appendix A, Figure 2.

The wind farm's dynamic Var compensation is provided via their Siemens 2.3 Series Wind Turbine Generators (WTG). The WTG are designed to supply or absorb reactive power to or from the transmission grid to regulate and stabilize the voltage. In addition, it was determined in the System Impact Assessment that this project, in conjunction with the three NEXTera WEC's, will also require static Var compensation of 120 MVAr that can be provided via shunt capacitor banks located at the Parkhill CTS 121 kV bus.

1.2.2 Addendum: Connection to Hydro One's 500 kV Transmission System

The combined CPWP and NWEC will connect their generated power via 500 kV Hydro One owned interconnection station called Evergreen SS. The Parkhill CTS 525/121 kV power transformer will connect directly via 1-500 kV breaker and 1 motorized disconnect switch onto a 500 kV 3-breaker ring bus at Evergreen SS, Appendix A, Figure 3. This ring bus will split Hydro One's existing 500 kV circuit B562L from Bruce A TS to Longwood TS into 2 sections: Bruce A TS x Evergreen SS and Evergreen SS x Longwood TS. This sectionalizing will occur approximately 36.5 km from Longwood TS, near tower number 563 of existing B562L. Both Evergreen SS and Parkhill CTS will be adjacent or as close as possible to Hydro One's existing ROW to limit the additional exposure to Hydro One's 500 kV system. In addition, it was determined in the System Impact Assessment that Evergreen SS will experience overvoltage during certain system configurations.

To manage the overvoltage concerns at Evergreen SS, Hydro One is proposing to construct Evergreen SS with equipment capable of withstanding the overvoltage. This additional capability will forego the previous requirement of a shunt reactor.

1.3 Customers in the Study Area

The primary focus of this study was on customers supplied from stations directly connected to existing circuit B562L and in the local electrical area. Affected customers are show in Table 1.

Table 1: Transmission Customers connected in the study area

Station	Customer
Bruce A TS	Bruce Power L.P.
Bruce B SS	Bruce Power L.P.
Bruce Heavy Water Plant B TS	Bruce Power L.P.
Douglas Point TS	Hydro One Networks Inc. (Distribution) Westario Power Inc.
Longwood TS	Hydro One Networks Inc. (Distribution) Middlesex Power Distribution Corp.

1.4 Operating Conditions

Normal operating conditions are such that CPWP will solely generate onto NEXTera's 121 kV circuit J1BTS. When NEXTera's 500 kV transformer breaker at Parkhill CTS that connects to the 500 kV ring bus at Evergreen SS is taken out of service, CPWP will not generate onto Hydro One's systems, transmission nor distribution.

2.0 ADDENDUM - SHORT CIRCUIT RESULTS

Short-circuit studies were carried out to assess the fault contribution when the CPWP is connected to the NWEC subsystem and a total of 383.5 MW is generating into Evergreen SS.

The study results are summarized in Tables 3 and 4 below showing both symmetric and asymmetric fault currents in kA, respectively. The anticipated fault levels after the incorporation of all committed and proposed generation in the Bruce area are shown in Table 5.

Table 3: CPWP & NWEC impact on symmetrical fault levels

Station	without CPWP & NWEC* (kA)		with CPWP & NWEC (kA)		% Difference	
	3-Phase	L-G	3-Phase	L-G	3-Phase	L-G
Bruce B SS 500 kV	36.92	41.55	37.13	41.74	0.57	0.46
Bruce A TS 500 kV	37.13	41.72	37.35	41.93	0.59	0.50
Bruce A TS 230 kV	42.82	54.20	42.90	54.3	0.19	0.18
BHWP B TS 13.8 kV A	19.77	1.98	19.77	1.98	0.00	0.00
BHWP B TS 13.8 kV B	19.75	1.98	19.75	1.98	0.00	0.00
Douglas Point TS 44 kV	14.37	6.89	14.37	6.89	0.00	0.00
Longwood TS 500 kV	20.05	20.95	20.50	21.75	2.24	3.82
Longwood TS 230 kV	37.36	44.74	37.86	45.53	1.34	1.77
Longwood TS 27.6 kV	15.41	10.79	15.43	10.79	0.13	0.00

* Includes existing and committed generation projects up to the award of FIT3 and Samsung Phase 2 & 3 contracts

Table 4: CPWP & NWEC impact on asymmetrical fault levels

Station	without CPWP & NWEC* (kA)		with CPWP & NWEC (kA)		% Difference	
	3-Phase	L-G	3-Phase	L-G	3-Phase	L-G
Bruce B SS 500 kV	54.27	63.52	54.56	63.79	0.53	0.43
Bruce A TS 500 kV	54.40	63.15	54.71	63.44	0.57	0.46
Bruce A TS 230 kV	57.47	78.24	57.57	78.37	0.17	0.17
BHWP B TS 13.8 kV A	23.04	1.98	23.04	1.98	0.00	0.00
BHWP B TS 13.8 kV B	22.33	1.98	22.33	1.98	0.00	0.00
Douglas Point TS 44 kV	16.34	8.82	16.34	8.83	0.00	0.11
Longwood TS 500 kV	24.36	26.68	24.95	27.67	2.42	3.71
Longwood TS 230 kV	45.70	57.93	46.44	59.03	1.62	1.90
Longwood TS 27.6 kV	21.54	15.67	21.57	15.68	0.14	0.06

*Includes existing and committed generation projects up to the award of FIT3 and Samsung Phase 2 & 3 contracts

Table 5: Anticipated Fault Levels Resulting from FIT3 and Samsung Phase 2 & 3 contracts

Station	Symmetrical Fault Level (kA)		Asymmetrical Fault Level (kA)	
	3-Phase	L-G	3-Phase	L-G
Bruce B SS 500 kV	37.85	42.53	55.57	64.89
Bruce A TS 500 kV	38.09	42.66	55.76	64.45
Bruce A TS 230 kV	44.36	55.86	59.39	**80.43**
BHWP B TS 13.8 kV A	19.79	1.98	23.06	1.98
BHWP B TS 13.8 kV B	19.77	1.98	22.35	1.98
Douglas Point TS 44 kV	14.92	6.97	17.00	8.95
Longwood TS 500 kV	20.77	21.99	25.27	27.97
Longwood TS 230 kV	38.35	46.04	47.03	59.68
Longwood TS 27.6 kV	15.44	10.80	21.59	15.69

*Includes existing, committed and proposed generation projects in the Bruce Transmission Area as per applications received by December 2011

Observations made from the short-circuit study results in Tables 3 & 4 above may be summarized as follows:

- Table 3 shows that fault levels are below the maximum symmetrical three-phase and single line-to-ground fault values set out in Appendix 2 of the *Transmission System Code* (TSC).

- Table 3 shows that although there is a 3.82 % increase in the symmetrical short-circuit level at Longwood TS 500 kV bus, the fault levels are well below the allowable 500 kV fault limits and are acceptable to Hydro One.

- Table 4 shows that although there is a 3.71 % increase in the asymmetrical short-circuit level at Longwood TS 500 kV bus, the fault level is within Hydro One's asymmetrical breaker ratings** and are acceptable to Hydro One.

It can be observed from Table 5 that the anticipated fault levels at the stations shown are below the maximum symmetrical three-phase and single line-to-ground fault values set out in Appendix 2 of the TSC. In addition, with the exception of Bruce A TS 230 kV bus**, the anticipated fault levels are within Hydro One's breaker ratings.

**Note: The asymmetrical fault current at Bruce A 230 kV before and after the incorporation of the projects will exceed the interrupting capability of the existing breakers. To address this issue in the long term, Hydro One has planned to replace the Bruce 230 kV breakers to improve fault current interrupting capability. Before the circuit breakers are replaced, temporary operational mitigation measures have been developed by Hydro One in collaboration with the IESO. The CPWP has no impact on this issue.

Conclusion

The short-circuit level increases at Bruce A TS, Bruce B SS, BHWP B TS, Douglas Point TS and Longwood TS are acceptable to Hydro One and are below Hydro One's 5 % TSC margin limit.

3.0 ADDENDUM - VOLTAGE ANALYSIS

Load flow studies were carried out to analyze the impact of CPWP in conjunction with NWEC on the voltage performance of Hydro One customers in the affected area.

Local voltage impact was assessed using load flow contingency analysis. The incorporation of CPWP and NWEC at full output was used to assess voltage change during peak summer loading conditions.

The following contingencies were used to assess the voltage impact:

a) A single contingency loss of Parkhill CTS with all generation at full output, 383.5 MW
b) A single contingency loss of Bruce A TS x Evergreen SS 500 kV circuit
c) A single contingency loss of Evergreen SS x Longwood TS 500 kV circuit
d) A double contingency loss of Evergreen SS x Longwood TS circuit and Parkhill CTS (due to Breaker Failure B/F at Evergreen SS)
e) A double contingency loss of Evergreen SS x Longwood TS circuit and Parkhill CTS (due to Breaker Failure B/F at Evergreen SS), with Ashfield SS x Longwood TS 500 kV circuit out of service pre-contingency
f) A double contingency loss of Bruce A TS x Evergreen SS circuit and Parkhill CTS (due to Breaker Failure B/F at Evergreen SS), with Bruce B SS x Ashfield SS 500 kV circuit out of service pre-contingency

Basic Assumptions:

- New 500 kV switching station Ashfield SS will sectionalize companion circuit B563L approximately 61.5 km from Bruce B SS to incorporate another wind energy project known as K2 Wind.
- *No 500 kV shunt reactor installed at Evergreen SS (contrary to the original CIA assessment for this connection point)*
- A 120 MVAr at 121 kV shunt capacitor will be installed at Parkhill CTS for the combined generators reactive power capability as per IESO System Impact Assessment requirements.
- ULTC – Under Load Tap Changer
- For the period of time labeled "After ULTC", the switching of reactive devices such as reactors and capacitors is implemented.

Results are shown in Appendix B, Tables 1 – 5 and the impact to existing customers is summarized below:

- Table B1: For the loss of Parkhill CTS (the proposed generators) the maximum voltage change is 0.18% at Longwood TS 500 kV bus before ULTC operation and is 0.16% at Longwood TS 500 kV bus after ULTC operation.

- Table B2: For the loss the 500 kV circuit between Bruce A TS and Evergreen SS the maximum voltage change is -0.67% at Longwood TS 500 kV bus before ULTC operation and is -0.67% at Longwood TS 500 kV bus after ULTC operation.

- Table B3: For the loss of the 500 kV circuit between Evergreen SS and Longwood TS, the maximum voltage change is -0.42% at Longwood TS 500 kV bus before ULTC operation and is -0.41% at Longwood TS 500 kV bus after ULTC operation.

- Table B4: For the loss of the 500 kV circuit between Evergreen SS and Longwood TS with a breaker failure at Evergreen SS which disconnects Parkhill CTS (the generators), the maximum

voltage change is -0.88% at Longwood TS 27.6 kV bus before ULTC operation and is -0.91% at Longwood TS 27.6 kV bus after ULTC operation

- Table B5: Given the 500 kV circuit from Ashfield SS to Longwood TS is out of service, for the loss of the 500 kV circuit between Evergreen SS and Longwood TS with a breaker failure at Evergreen SS which disconnects Parkhill CTS, the maximum voltage change is -1.98% at Longwood TS 500 kV bus before ULTC operation and is -2.01% at Longwood TS 500 kV bus after ULTC operation.

- Table B6: Given the 500 kV circuit from Bruce B SS to Ashfield SS is out of service, for the loss of the 500 kV circuit between Bruce A TS and Evergreen SS with a breaker failure at Evergreen SS which disconnects Parkhill CTS, the maximum voltage change is -0.53% at Longwood TS 27.6 kV bus before ULTC operation and is -0.56% at Longwood TS 27.6 kV bus after ULTC operation.

Conclusion
Load flow studies thus confirmed that the incorporation of 383.5 MW of wind generation between Bruce A TS and Longwood TS will not result in substantial change in the voltage profile of customers supplied from these stations and in the local electrical area. Following the worst contingency, the voltage changes are well within the voltage decline guideline for customer buses of less than 10% and 5% voltage change before- and after- transformer tap-changer operation.

4.0 ADDENDUM - CONCLUSIONS AND RECOMMENDATIONS

This Addendum: Customer Impact Assessment (CIA) presents results of short-circuit and voltage performance study analyses. The report has confirmed that CPWP can be incorporated into the NWEC without adverse impact on existing customers supplied from Bruce A TS and Longwood TS and in the local electrical area provided that the required facilities are installed. In addition to the facilities required by the IESO by issue of the original SIA's and their subsequent Addendums (http://www.ieso.ca/imoweb/pubs/caa/CAA_2011-446_Final_Report.pdf; http://www.ieso.ca/imoweb/pubs/caa/CAA_2011-443_Final_Report.pdf; http://www.ieso.ca/imoweb/pubs/caa/CAA_2011-441_Final_Report.pdf; http://www.ieso.ca/imoweb/pubs/caa/CAA_2011-445_Final_Report.pdf) and required by the original CIA, CPWP and NWEC are required to install the following facilities as part of their connection:

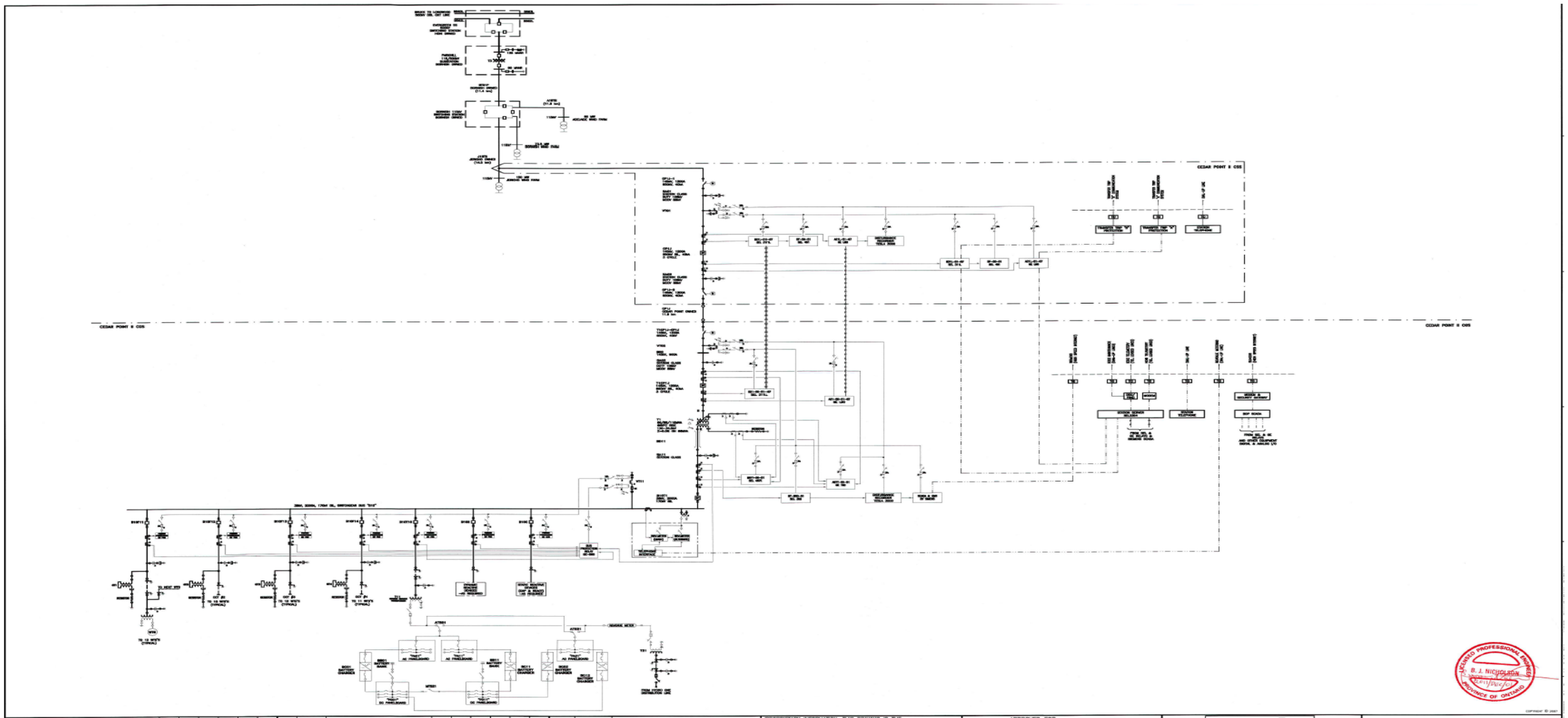
- Connection facilities at Parkhill CTS must have the capability to operate continuously at a maximum operating voltage of at least 570 kV.
- Fully duplicated protection and telecommunication systems must be installed as outlined in the Transmission System Code.
- SCADA facilities to allow transmission of generation facility components: i.e. status, measurement quantities & alarms, as outlined in the IESO's SIA and Hydro One's planning specification for the connection of CPWP.

Facilities to permit the above work must be provided.

All customers are required to check to ensure that the equipment and grounding system at their stations/facilities meet the expected increase in fault level.

APPENDIX A: DIAGRAMS

Figure 1: Suncor Cedar Point II WPP, Overall Project
(Drawing from generator)



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STAMP/SEAL

PRELIMINARY

APPROVED FOR

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE

PROJECT NO.	ACTIVITY NO.
161973	
SCALE	PACKAGE CODE
NTS	

	BY	DDMMMYY
DSN	B.J.N.	NOV11
DRN	RS	NOV11
CHK		NOV11
APP		NOV11

SUNCOR ENERGY

AREA: CEDAR POINT II WIND POWER PROJECT

SUBJECT: 115kV SUBSTATION SINGLE LINE DIAGRAM

amec

CLIENT DWG. NO.

DRAWING NO.: 169434-0000-141-SLD-0001-001

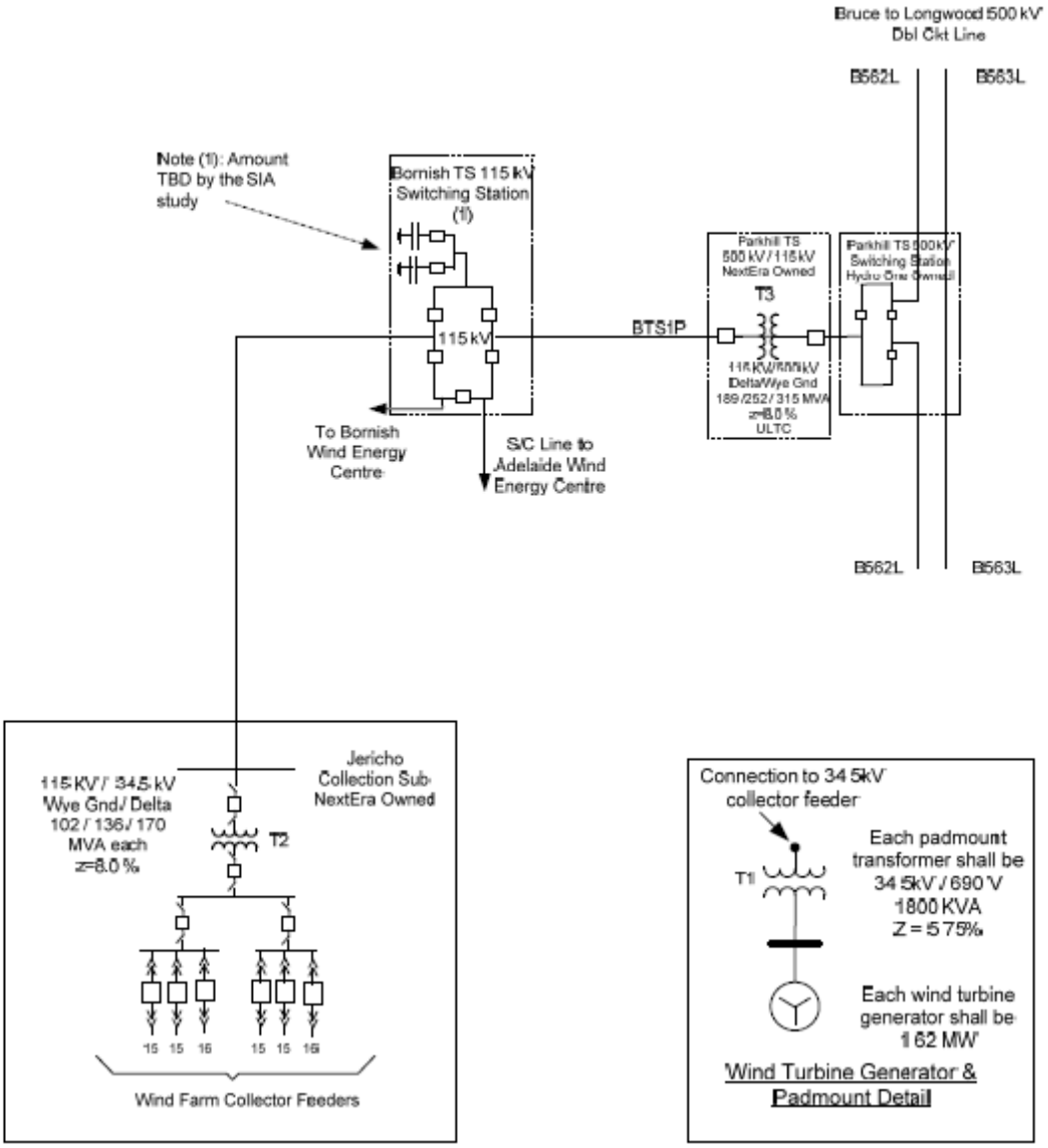
REV.: B

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
B	013EC11	ISSUED FOR SA/DA APPLICATION	RS	BJN	IS			
A	17NOV11	ISSUED FOR REVIEW	RS	BJN	IS			

REF	NUMBER	TITLE
		REFERENCES

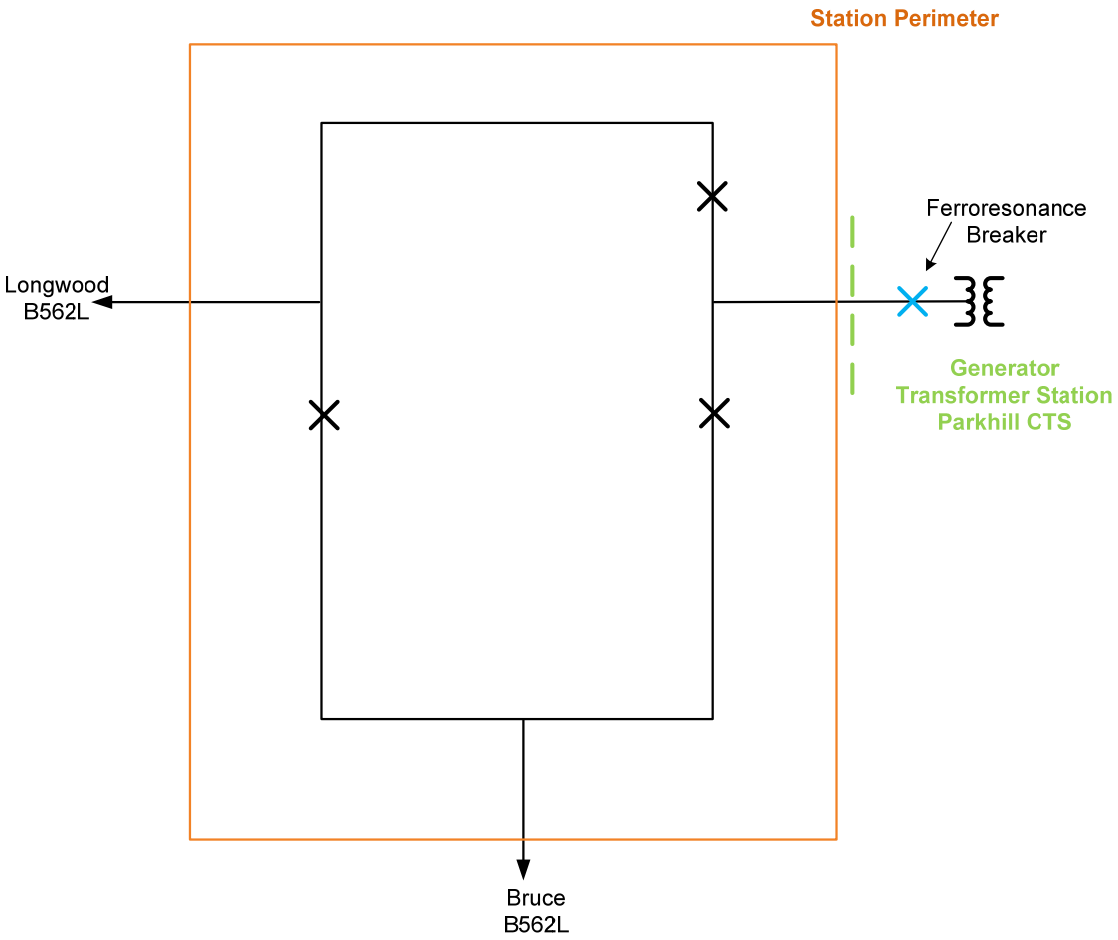
Figure 2: NEXTera Jericho Wind Energy Centre
(Drawing from generator)

Parkhill TS 500 kV Switching Station renamed to Evergreen SS.
Parkhill TS 115 kV/500kV station renamed to Parkhill CTS



Jericho WEC

Figure 3: Evergreen Switching Station



APPENDIX B: VOLTAGE PERFORMANCE RESULTS

Table 1: Loss of Parkhill CTS

Bus	Initial Voltage (kV)	Before ULTC (kV)	% Change	After ULTC (kV)	% Change
Bruce A TS 500 kV	548.19	548.76	0.10	548.73	0.10
Bruce A TS 230 kV	247.12	247.26	0.06	247.25	0.06
Bruce B SS 500 kV	548.92	549.44	0.09	549.41	0.09
BHWP B TS 13.8 kV A bus	14.52	14.52	0.06	14.52	0.06
BHWP B TS 13.8 kV B bus	14.53	14.54	0.06	14.54	0.06
Douglas Point TS 44 kV	46.13	46.16	0.06	46.15	0.06
Evergreen SS 500 kV	547.17	549.61	0.45	549.50	0.43
Longwood TS 500 kV	545.66	546.64	0.18	546.51	0.16
Longwood TS 230 kV	244.82	244.63	-0.08	244.55	-0.11
Longwood TS 27.6 kV	29.04	29.01	-0.08	29.00	-0.12

Table 2: Loss of Bruce A TS x Evergreen SS

Bus	Initial Voltage (kV)	Before ULTC (kV)	% Change	After ULTC (kV)	% Change
Bruce A TS 500 kV	548.19	547.07	-0.20	547.07	-0.20
Bruce A TS 230 kV	247.12	246.84	-0.11	246.84	-0.11
Bruce B SS 500 kV	548.92	547.98	-0.17	547.98	-0.17
BHWP B TS 13.8 kV A bus	14.52	14.50	-0.11	14.50	-0.11
BHWP B TS 13.8 kV B bus	14.53	14.51	-0.11	14.51	-0.11
Evergreen SS 500 kV	547.17	541.12	-1.11	541.11	-1.11
Douglas Point TS 44 kV	46.13	46.07	-0.12	46.07	-0.12
Longwood TS 500 kV	545.66	542.02	-0.67	542.02	-0.67
Longwood TS 230 kV	244.82	243.47	-0.55	243.47	-0.55
Longwood TS 27.6 kV	29.04	28.87	-0.57	28.87	-0.58

Table 3: Loss of Evergreen SS x Longwood TS

Bus	Initial Voltage (kV)	Before ULTC (kV)	% Change	After ULTC (kV)	% Change
Bruce A TS 500 kV	548.19	547.69	-0.09	547.69	-0.09
Bruce A TS 230 kV	247.12	246.98	-0.06	246.98	-0.06
Bruce B SS 500 kV	548.92	548.45	-0.09	548.45	-0.09
BHWP B TS 13.8 kV A bus	14.52	14.51	-0.06	14.51	-0.06
BHWP B TS 13.8 kV B bus	14.53	14.52	-0.06	14.52	-0.06
Douglas Point TS 44 kV	46.13	46.10	-0.06	46.10	-0.06
Evergreen SS 500 kV	547.17	549.21	0.37	549.21	0.37
Longwood TS 500 kV	545.66	543.39	-0.42	543.40	-0.41
Longwood TS 230 kV	244.82	243.97	-0.35	243.98	-0.35
Longwood TS 27.6 kV	29.04	28.93	-0.36	28.93	-0.36

Table 4: Loss of Evergreen SS x Longwood TS & Parkhill CTS

Bus	Initial Voltage (kV)	Before ULTC (kV)	% Change	After ULTC (kV)	% Change
Bruce A TS 500 kV	548.19	549.31	0.21	549.29	0.20
Bruce A TS 230 kV	247.12	247.39	0.11	247.39	0.11
Bruce B SS 500 kV	548.92	549.85	0.17	549.83	0.17
BHWP B TS 13.8 kV A bus	14.52	14.53	0.11	14.53	0.11
BHWP B TS 13.8 kV B bus	14.53	14.55	0.11	14.55	0.11
Douglas Point TS 44 kV	46.13	46.18	0.11	46.18	0.11
Evergreen SS 500 kV	547.17	**559.78***	2.30	**559.75***	2.30
Longwood TS 500 kV	545.66	541.60	-0.74	541.45	-0.77
Longwood TS 230 kV	244.82	242.75	-0.85	242.67	-0.88
Longwood TS 27.6 kV	29.04	28.78	-0.88	28.77	-0.91

*****Overvoltage at Evergreen SS will be managed by installing equipment capable of handling it.

Table 5: Loss of Evergreen SS x Longwood TS & Parkhill CTS while Ashfield SS x Longwood TS Out-of-Service

Bus	Initial Voltage (kV)	Before ULTC (kV)	% Change	After ULTC (kV)	% Change
Bruce A TS 500 kV	546.97	548.00	0.19	547.99	0.19
Bruce A TS 230 kV	246.81	247.05	0.10	247.04	0.10
Bruce B SS 500 kV	547.82	548.57	0.14	548.56	0.14
BHWP B TS 13.8 kV A bus	14.50	14.51	0.10	14.51	0.10
BHWP B TS 13.8 kV B bus	14.51	14.53	0.10	14.53	0.10
Douglas Point TS 44 kV	46.07	46.11	0.10	46.11	0.10
Evergreen SS 500 kV	539.60	**558.44***	3.49	**558.43***	3.49
Longwood TS 500 kV	536.13	525.52	-1.98	525.37	-2.01
Longwood TS 230 kV	245.05	240.44	-1.88	240.37	-1.91
Longwood TS 27.6 kV	29.06	28.50	-1.95	28.49	-1.98

*****Overvoltage at Evergreen SS will be managed by installing equipment capable of handling it.

Table 6: Loss of Bruce A TS x Evergreen SS & Parkhill CTS while Bruce B SS x Ashfield SS Out-of-Service

Bus	Initial Voltage (kV)	Before ULTC (kV)	% Change	After ULTC (kV)	% Change
Bruce A TS 500 kV	547.55	546.28	-0.23	546.26	-0.24
Bruce A TS 230 kV	246.96	246.64	-0.13	246.64	-0.13
Bruce B SS 500 kV	548.19	547.07	-0.20	547.05	-0.21
BHWP B TS 13.8 kV A bus	14.51	14.49	-0.13	14.49	-0.13
BHWP B TS 13.8 kV B bus	14.52	14.50	-0.13	14.50	-0.13
Douglas Point TS 44 kV	46.10	46.04	-0.13	46.04	-0.13
Evergreen SS 500 kV	546.82	544.24	-0.47	544.08	-0.50
Longwood TS 500 kV	545.35	543.59	-0.32	543.44	-0.35
Longwood TS 230 kV	244.70	243.46	-0.51	243.37	-0.54
Longwood TS 27.6 kV	29.02	28.87	-0.53	28.86	-0.56