Appendix J

Visual Change Modeling Report

OSTRANDER POINT WIND ENERGY PARK - VISUAL CHANGE MODELLING REPORT

DRAFT

File No. 160960369
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Prepared for:

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1.0 Project Summary

As an important part of our energy future, the Government of Ontario has made a commitment to the generation of electricity from renewable sources. Gilead Power Corporation (“Gilead”) is proposing to develop the Ostrander Point Wind Energy Park (“Project”) in Prince Edward County, Province of Ontario. The proposed Project will generate up to 24 MW (nameplate capacity) of renewable energy through the installation of 12 turbines and is expected to produce enough electricity for approximately 6,000 homes.

As part of the Environmental Review Report (“ERR”) being completed for the Project under the Ontario Ministry of the Environment’s (“MOE”) Environmental Screening Process (“ESP”) for electricity projects (i.e., Ontario Regulation 116/01), Stantec Consulting Ltd. (“Stantec”) undertook Visual Change Modelling (“VCM”) with the intent of understanding and describing the visual character that may be created by the Project.

Specifically, this report presents information relevant to items 6.1 and 7.2 of the MOE’s environmental screening checklist: *will the project*

- *have negative effects on neighbourhood or community character?*
- *have negative effects on scenic or aesthetically pleasing landscapes or views?*

1.1 SCOPE OF WORK

Assessing the potential visual change that a proposed wind farm may create in the landscape is an important element in the successful planning for a renewable energy project. Further to the MOE's screening checklist requirements outlined in Section 1.0, the use of VCM as part of environmental assessments is becoming common practice in understanding the visual influence that a proposed development could have on an existing landscape.

The scope of work has been developed to illustrate the potential visual changes the proposed Project may create on the landscape as seen from key vantage points in the vicinity of the project study area. Using photo realistic computer generated simulations, the wind turbines are shown as they are likely to appear from a given vantage point once the Project has been fully constructed.

1.2 PROJECT LOCATION

The Project is located on Crown land within Prince Edward County. The Study Area for this ERR falls within the ward of South Marysburgh. Prince Edward County is located in the “Golden Triangle” between Toronto, Ottawa and Montreal.

The general Project location is shown in Figure 1.0: Ostrander Point Wind Energy Park Study Area.

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0 500 1,000 1,500 2,000 Meters

1:45,000

- Study Area
- Existing Roads
- Existing Transmission Line
- Proposed Transmission Line
- Proposed Access Roads
- Watercourses
- Wetland - Mapped but not present (pending MNR confirmation)
- Wetlands - Provincial
- Wetlands - Unevaluated
- Waterbody
- ANSI
- Wooded Area
- MET Tower
- Turbine
- Transformer Station

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FIGURE NO. 1.0

OSTRANDER POINT WIND ENERGY PARK STUDY AREA

Initiated: April, 2008
Revised: January 20, 2009

2.0 Assumptions

Assumptions for the VCM are established as a means of focusing the effort for collecting data and depicting the potential visual conditions. The following assumptions have been defined for the VCM based on the best available information known at the time when the study was undertaken:

- The turbine blades will all be the same length (i.e., 41 m);
- The turbine heights will all be the same height, with a maximum height to the centre of the hub of 78 metres;
- The turbines will all be the same model (i.e., Enercon E82 – 2.0 MW);
- The power lines on-site will be underground and will therefore have no visual impact;
- Ancillary facilities (i.e. transmission lines and transformers) associated with the Project are not within the scope of work. In addition, other proposed wind farm(s) layouts were not available at the time of completion of this VCM report;
- Consideration of cumulative visual change for proposed wind farm(s) that may be adjacent to the Project, is not within the scope of work;
- The number, location, and scale of turbines forms the final preferred turbine layout for the ERR;
- All 12 proposed wind turbines will be built; and
- All wind turbines will be operational.

3.0 Methodology

There is no standardized methodology for completing a VCM in Ontario. Building upon a literature review of methodologies from other jurisdictions and Stantec's experience with VCM, the methodology established for the Project VCM lays out the following set of procedures for collecting, generating, and simulating potential changes.

STEP 1: BACKGROUND INFORMATION

Digital data was collected to establish a base plan upon which the model and simulations could be built. In order to construct the base plan and 3D model, digital information was collected from the following sources:

- Ontario Base Maps ("OBM") from Ontario Land Information Distribution Services (LIDS), Ontario Ministry of Natural Resources, (2006).
  - 1:20,000 scale accuracy

- Digital Elevation Model from Ontario Ministry of Natural Resources Source (January 8, 2001- December 20, 2002).
  - Cell resolution to 10 metres

Aerial photography of study area from Google Earth Pro 2008

Preferred turbine layout for the Project that includes Geographic Positioning System ("GPS") coordinates for each turbine provided by Gilead.

Building and vegetation elevations were not included as part of the base plan or three dimensional ("3D") model because of: limitations of available information, increased risk of not accurately depicting their physical characteristics for spatial layout and height in the study area, and the inability to guarantee the long term and continued consistency of these variables on the landscape.

The method of not providing building and vegetation information in the model is that visual change will illustrate worst case scenarios. This will depict the turbines without the additional visual buffering that the buildings and vegetation would provide.

STEP 2: BASE PLAN

A digital base plan was established by compiling the digital information collected in Step 1. Once all the layers of information were overlaid on top of each other, the base plan provided details about the topographical conditions, locations of turbines, built elements and infrastructure within the study area.

STEP 3: DIGITAL ELEVATION MODEL ("DEM")

Once the base plan was established to represent the existing study area conditions, a 3D surface model was created. The surface model extrudes the contour elevations at one meter intervals to accurately reflect the existing terrain. Through the use of graphic rendering, the terrain was shaded to provide a clear visualization of the landforms within the study area. The study area has a relatively flat topography and with such minimal grade change the surface model did not provide any significant visualization of landforms within the study area.

STEP 4: SELECTING VANTAGE POINT LOCATIONS

Vantage points, are defined as specific locations which have been identified within the study area to be simulated with a photorealistic image to illustrate what the proposed wind energy project will look like (from that location) once constructed. Through site investigation, a total of six vantage points were identified. The six vantage points for the Project were selected based on stakeholder input and the vantage point's representation of public views from along public transportation corridors such as Babylon Road, County Road #13 and Helmer Road. The locations for the six vantage points selected for simulations are illustrated in Figure 2.0: Proposed Turbine Layout & Vantage Points.

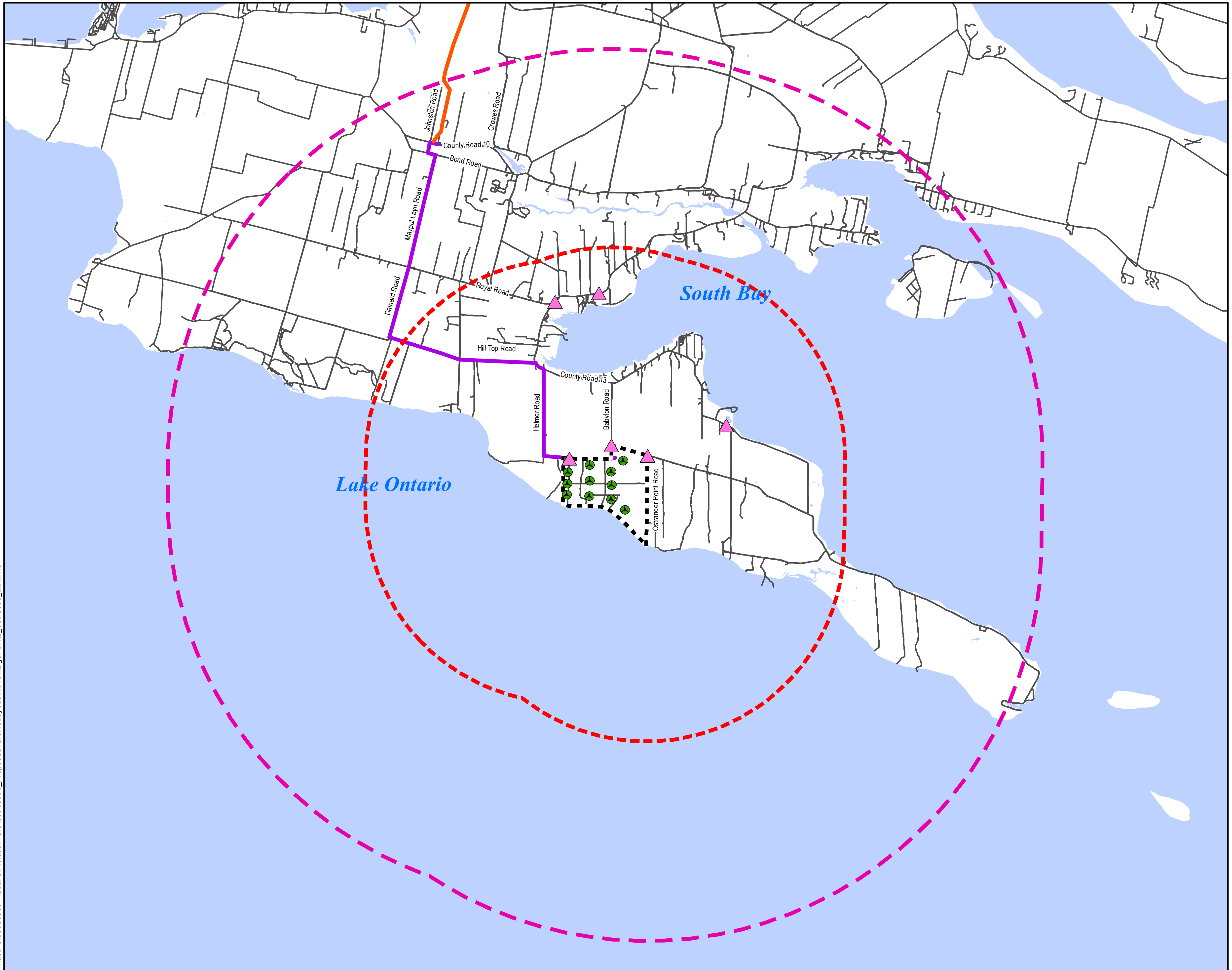
STEP 5: VERIFYING THE VANTAGE POINTS

A viewshed is identified as the area within which the proposed development is likely to be visible. Typically a viewshed is generated by placing a 360 degree virtual camera on the top of the upper vertical blade for each turbine and running a complete 3D analysis program which compares the turbine heights against the existing terrain model. Where virtual cameras can 'see' terrain, the area is included in the viewshed and where terrain is 'hidden' from the camera's view by intervening topography, it is not included in the viewshed. As the terrain for Prince Edward County is relatively flat, the 3D analysis would not delineate 'hidden' areas within the viewshed; therefore, a 10 km catchment area surrounding the project has been defined as the viewshed. It is common practice to use a 10km viewshed catchment area because beyond this distance, the proposed development has minimal visual prominence and it is less likely that the viewer can discern details, therefore, the development is more likely to be observed as part of the larger surrounding landscape.

Distance plays an important role when determining a study boundary, viewshed and the selection of vantage points. The New York State Department of Environmental Conservation ("DEC"), Policy on 'Assessing and Mitigating Visual Impacts' (NYSDEC, 2000), states that with increasing distance, views of the turbines are mitigated by atmospheric conditions as well as other landscape characteristics, such as topography, vegetation cover, buildings and infrastructure (University of Guelph, School of Environmental Design and Rural Planning, 2006).

On a national scale, planning guidelines for visual catchment areas are commonly defined at a 10 km limit. Some exceptions include the planning requirements for wind energy facilities in Bruce County where the visual limits are defined starting at five kilometers and in the DEC, which states the visual limits at eight kilometers.

In Prince Edward County, it is likely that the turbines will be noticeable from distances up to 10 km's under clear atmospheric conditions. The 10 km viewshed area is illustrated in **Figure 2.0 Proposed Turbine Layout & Vantage Points**.The viewshed for the Project does not consider views blocked by buildings or vegetation. Additionally, it does not consider the change in visual effect one might experience as they move further from the study area. Field checking was completed for each of the selected vantage points to verify the relative extent of the viewshed.



Stantec

0 1,000 2,000 3,000 4,000 Meters

1:95,000

- Vantage Points
- Turbine
- Study Area
- Study Area 5 km Buffer
- Study Area 10 km Buffer
- Roads
- Existing Transmission Line
- Proposed Transmission Line
- Waterbody
- water

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OSTRANDER POINT WIND PROJECT

FIGURE NO. 2.0

PROPOSED TURBINE LAYOUT AND VANTAGE POINTS

Initiated: April, 2008
Revised: December 8, 2008

W:\active\60960369\Visual Simulation\GIS\60960369_ProposedTurbineLayoutAndVantagePoints_08Dec08_ED.mxd

STEP 6: SITE INVENTORY

A site inventory was completed for each of the six vantage points to collect photography, GPS coordinates, and basic site conditions.

Photographs were collected from within public road allowances. Site specific photography was taken on August 15, 2008 when deciduous vegetation was still in leaf. Deciduous vegetative buffering will provide a natural screening to the turbines during various seasons of the year, but not year round. All photographs were taken during meteorological conditions which were overcast and rainy, as shown in the simulations included in Appendix A – Visual Simulations

Where possible, the photographs were taken to include identifiable landmarks. For example, road signs, buildings, community parks and attractions which provide a visually scaleable reference for the vantage point.

The digital photographs form the foundations for the simulations. In order to maintain accuracy, the photographs were taken consistently in a panoramic format at a consistent 1.5 m (5’1”) height above grade and at a focal length representative of normal human vision.

GPS coordinates were collected at each of the vantage points. The GPS information is critical in verifying the locations of the vantage points on the digital terrain model and for registering the 3D Modelling in the photographic simulations. The GPS coordinates were collected with a Thales Navigation Mobilemapper CE Network Generation.

Basic site conditions such as local topography and general landscape characteristics were observed to assist in understanding the vantage points and their relationship to the Project.

STEP 7: GENERATION OF THREE DIMENSIONAL VIEWS

The 3D elevations derived in Step 3 and the GPS coordinates acquired in Step 6 were incorporated into the 3D elevation model. In addition, a 3D model of the proposed turbine was created and inserted into the model using the coordinates provided for each turbine in the layout.

Each turbine tower is 78 metres high at the hub and each blade is 41 metres in length. When a blade is in the vertical position above the tower, the total height of the turbine above ground level is 119 metres. Blades are shown in the model in a variety of configurations to simulate an active facility.

Using the GPS data recorded, virtual cameras were placed at each vantage point within the model and calibrated with the same parameters that were used in capturing the digital photographic image (Step 6). By setting the time and date parameters in the model to match the time and date the photos were collected, the 3D model can simulate realistic shadows on the turbines. The virtual camera then creates a 3D rendered landscape, including the wind turbines.

STEP 8: GENERATING SIMULATIONS

The typical field of view for the average person is sixty degrees (Dines and Brown, 2001). The field of view is not the same as peripheral vision and only includes the focused scene. The photographic simulations for this VCM are representations of an average observer's view of the proposed development from each vantage point. The simulations are created by overlaying the rendered 3D modelled view of each vantage point, which includes the turbines, on top of the existing photograph. Landmarks within the 3D modelled view are registered (i.e., matched) to those in the existing photograph.

To ensure that the 3D model is accurately registered in the photograph, a minimum of two points of landmark references are used for the photographs. The final image illustrates the correct size, colour, and finish of the turbines in order to portray a photo realistic representation of the wind plant.

4.0 Existing Landscape Characteristization

The Ostrander Wind Energy Park is located near the shores of Lake Ontario. Once developed, the Project will modify the local landscape as seen from Port Milford, Point Traverse, Balfour and South Marysburgh in Prince Edward County as well as from Lake Ontario.

Prince Edward County

County Road #13, connects the small hamlets of Port Milford, Point Traverse, Balfour and South Marysburgh in Prince Edward County. Located adjacent to Lake Ontario in an area known as South Bay the county road is the primary transportation route for all of these hamlets. The majority of the population in this area is concentrated on both sides of the road. The residential properties surrounding the Project area are a combination of year round single family residential and seasonal recreational/cottage.

Located within the Peninsula Physiographic Region, the Project area has a relatively flat topography and consists of low plateau of flat limestone (typically between 75 and 100 msl) (Chapman & Putnam, 1984). Grassland and shrubland type vegetation is the dominant vegetative cover in the study area and surrounding region; however, woodlands and agricultural lands are also present.

County Road #13 in the area of Port Milford, is the highest topographic setting in the five kilometer viewshed. This higher setting establishes long viewsheds over Lake Ontario and towards the Project site. It is likely that views of the wind park will be most prevalent in this area.

5.0 Results

The visual simulations produced as the result of the VCM for the six selected vantage points have been printed using an 11 x 17 page format and are provided in Appendix A – Visual Simulations.

Stakeholders may benefit from viewing the simulations in the field from the various vantage points. In this manner, stakeholders can directly compare the level of detail visible in the simulations with actual field observed conditions.

6.0 Discussion

The Ostrander Point Wind Energy Park simulations illustrate that the wind turbines will be visible from the six vantage points. The vantage points were taken from locations where the wind project would be viewed at distances that range from approximately five kilometres away to less than one kilometre away. The relatively flat topography and low grassland and shrubland landscape establishes a highly visible contrast with the vertical elevations of the proposed wind towers and blades. This visible contrast causes the turbines to be prominent in the landscape and creates a significant visible change to the study area. Minor mitigation occurs with increased distance from the project due to the increased effect of the earth's curvature and decreased ability to discern visual detail.

Minor mitigation also occurs with different seasons and with various atmospheric conditions. For example, it is likely that there will be higher visibility of the turbines in the winter when the trees are not in leaf and in weather conditions that provide a clear sky. In contrast, filtered views of the turbines will occur in seasons when vegetative cover is in leaf and in weather conditions where there is an accumulation of fog, atmospheric haze, precipitation or snow.

The visual impact appears most significant when viewed from across South Bay towards the proposed wind energy farm. As the simulations in Figures A.1 and A.2 illustrate, the turbines appear very prominent in the landscape because the level of detail seen in the immediate landscape does not draw attention away from the turbines. There is no mitigation for the visibility of the turbines due to the openness of the views related to the bay.

The vantage points simulated in Figures A.4 to A.6 illustrate how the low shrubland does little to mitigate the tall contrast of the wind turbines. These impacts however, affect mostly the seasonal residents whom live within 0.5 to 1.0 km of the proposed wind farm. As seasonal residents, mitigation from trees or shrubs will be most significant in the time they occupy their homes because leaf cover will buffer views of the turbines.

In conclusion, the relatively flat topography which dominates the study area as well as the consistent horizontal character of Lake Ontario establishes a highly visible contrast with the strong vertical elevations of the wind towers and blades. This visible contrast causes the turbines to be prominent in the landscape which creates a significant visible change to the study area. Although minor mitigation can occur the turbines will still be visible even at the furthest modeled vantage point, approximately 5 km from the proposed wind farm.

7.0 Selected References

Brown, Kyle D. and Dines, Nicholas T. (2001). Landscape Architect's Portable Handbook (Paperback). McGraw Hill Publishing, Toronto, Ontario

Chapman, L.J. and Putnam, D.F. (1984). Ontario Geological Survey Special Volume 2. The Physiography of Southern Ontario Third Edition. Canadian Cataloguing in Publication Data, Toronto, Ontario

County of Bruce, Planning& Economic Development Department. Application Requirements for Commercial Wind Energy (Turbine) Facilities. Walkerton, Ontario.

The Landscape Institute, Institute of Environmental Management & Assessment.(2002). Guidelines for Landscape and Visual Impact Assessment, Second Edition. Spon Press, New York, New York.

University of Guelph, School of Environmental Design and Rural Planning. (March 24, 2006). Landscape and Visual Assessment Guidance For Wind Energy Farm Development. Guelph, Onatrio.

Appendix A

Visual Simulations

EXISTING VIEW

CONCEPTUAL VIEW OF THE PROPOSED TURBINE LAYOUT

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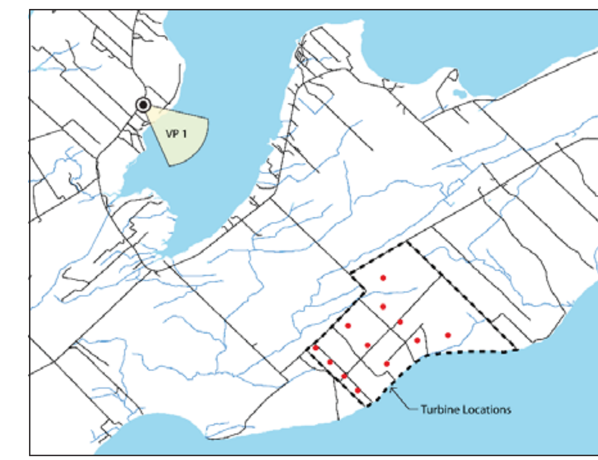
FOR DISCUSSION

VANTAGE POINT KEY MAP



NOTE:
Simulations illustrating spring/summer conditions (vegetation in leaf)

GILEAD POWER CORP.
Ostrander Point Wind Energy Park

VISUAL CHANGE MODELLING

FIGURE NO. December 8, 2008

A.1

Vantage Point 1

FILE: 60960369_vsim.indd		PROJECT NUMBER: 60960369
REV NO. 1	SHEET NO. 1 OF 6	DRAWN BY: DL

EXISTING VIEW

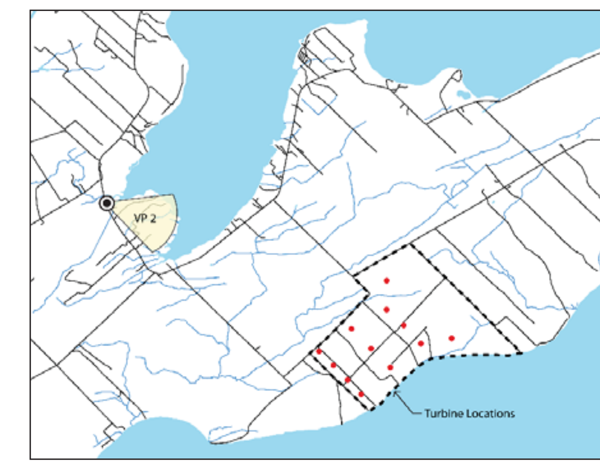
CONCEPTUAL VIEW OF THE PROPOSED TURBINE LAYOUT

GILEAD POWER CORP.

Stantec

DRAFT
FOR DISCUSSION

VANTAGE POINT KEY MAP



NOTE:
Simulations illustrating spring/summer conditions (vegetation in leaf)

GILEAD POWER CORP.
Ostrander Point Wind Energy Park

VISUAL CHANGE MODELLING

FIGURE NO. December 8, 2008

A.2

Vantage Point 2

FILE: 60960369_vsim.indd

PROJECT NUMBER: 60960369

REV NO. 1

SHEET NO. 2 OF 6

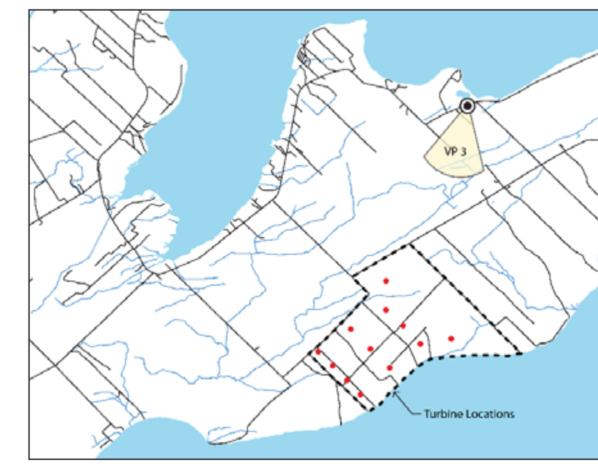
DRAWN BY: DL

EXISTING VIEW

CONCEPTUAL VIEW OF THE PROPOSED TURBINE LAYOUT

DRAFT FOR DISCUSSION

VANTAGE POINT KEY MAP



NOTE:
Simulations illustrating spring/summer conditions (vegetation in leaf)

GILEAD POWER CORP.
Ostrander Point Wind Energy Park

VISUAL CHANGE MODELLING

FIGURE NO. December 8, 2008

A.3

Vantage Point 3

FILE: 60960369_vsim.indd

PROJECT NUMBER: 60960369

REV NO. 1

SHEET NO. 3 OF 6

DRAWN BY: DL

EXISTING VIEW

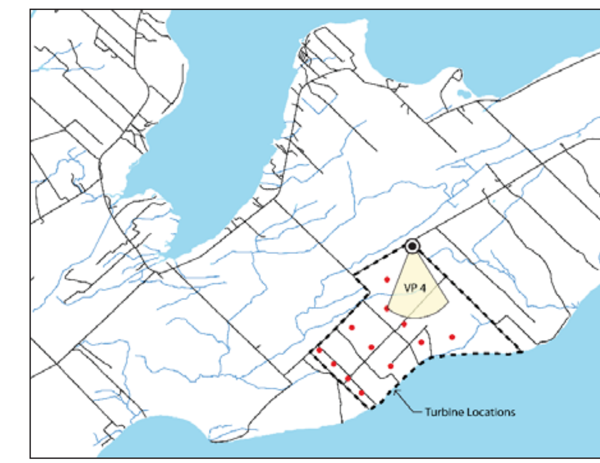
CONCEPTUAL VIEW OF THE PROPOSED TURBINE LAYOUT

GILEAD POWER CORP.

Stantec

DRAFT FOR DISCUSSION

VANTAGE POINT KEY MAP



NOTE:
Simulations illustrating spring/summer conditions (vegetation in leaf)

GILEAD POWER CORP.
Ostrander Point Wind Energy Park

VISUAL CHANGE MODELLING

FIGURE NO. December 8, 2008

A.4

Vantage Point 4

FILE: 60960369_vsim.indd

PROJECT NUMBER: 60960369

REV NO. 1

SHEET NO. 4 OF 6

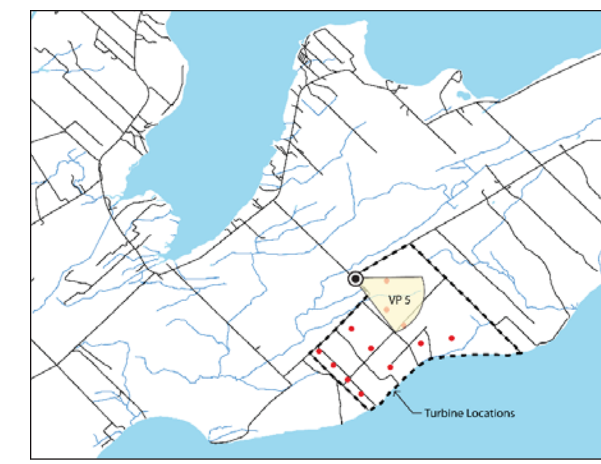
DRAWN BY: DL

EXISTING VIEW

CONCEPTUAL VIEW OF THE PROPOSED TURBINE LAYOUT

DRAFT
FOR DISCUSSION

VANTAGE POINT KEY MAP



NOTE:
Simulations illustrating spring/summer conditions (vegetation in leaf)

GILEAD POWER CORP.
Ostrander Point Wind Energy Park

VISUAL CHANGE MODELLING

FIGURE NO. December 8, 2008

A.5

Vantage Point 5

FILE: 60960369_vsim.indd

PROJECT NUMBER: 60960369

REV NO. 1

SHEET NO. 5 OF 6

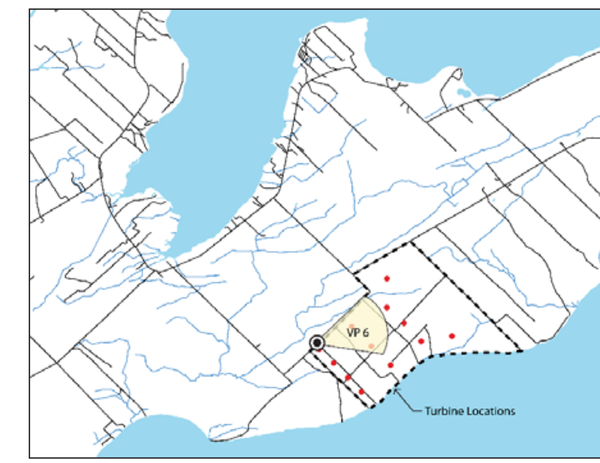
DRAWN BY: DL

EXISTING VIEW

CONCEPTUAL VIEW OF THE PROPOSED TURBINE LAYOUT

DRAFT FOR DISCUSSION

VANTAGE POINT KEY MAP



NOTE:
Simulations illustrating spring/summer conditions (vegetation in leaf)

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VISUAL CHANGE MODELLING

FIGURE NO. December 8, 2008

A.6

Vantage Point 6

FILE: 60960369_vsim.indd		PROJECT NUMBER: 60960369
REV NO. 1	SHEET NO. 6 OF 6	DRAWN BY: DL