
Appendix B
Property Line Setback Assessment



Grand Bend Wind Farm Property Line Setback Assessment Report

Prepared By:

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Prepared for:

Grand Bend Wind Limited Partnership,
Northland Power Inc. as agent

February 2013

File No: PIA 019991

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Record of Revisions

Revision	Date	Description
0	August 24, 2012	Initial Submission to the Ministry of Environment, Municipalities, and Aboriginal Communities
1	February 15, 2013	Application for Renewable Energy Approval

Table of Contents

Record of Revisions.....i

1.0 Introduction.....1

1.1 Project Overview..... 1

1.2 Report Requirements..... 1

2.0 Summary of Property Line Setback Analysis3

2.1 Agricultural Land..... 3

2.1.1 Description of Feature.....3

2.1.2 Potential Adverse Impacts3

2.1.3 Preventative Measures3

2.2 Watercourses..... 4

2.2.1 Description of Feature.....4

2.2.2 Potential Adverse Impacts4

2.2.3 Preventative Measures4

2.3 Woodlots..... 4

2.3.1 Description of Feature.....4

2.3.2 Potential Adverse Impacts4

2.3.3 Preventative Measures5

2.4 Infrastructure..... 5

2.4.1 Description of Feature.....5

2.4.2 Potential Adverse Impacts5

2.4.3 Preventative Measures5

3.0 Conclusion8

Tables

Table 1.1 Property Line Setback Assessment Requirements2

Table 2.1 Property Line Setback Assessment Summary.....6

Appendices

A Figures – Individual Turbine Locations and Property Line Setbacks

1.0 Introduction

1.1 Project Overview

Grand Bend Wind Limited Partnership, with Northland Power Inc. (“Northland”) as agent, are proposing to develop, construct and operate a 100 MW wind facility located north of Grand Bend, Ontario. An application for approval is being prepared under Ontario Regulation 359/09 of the *Environmental Protection Act*. The project is classified as a Class 4 Wind facility under the Regulation. The Grand Bend Wind Farm (“the Project”) is located in Huron County, spanning the lower-tier municipalities of Bluewater and Huron South. Portions of the transmission line also traverse the municipality of Huron East and municipality of West Perth in Perth County.

The basic project components will include up to 48 turbines (Siemens SWT-2.3-113 direct drive wind turbine generators with a total name plate capacity of 100 MW), turbine access roads, a 36 kV electrical collection system, substation, a parts and storage (office/maintenance) building, a new transmission line within municipal road right-of-ways (“ROWS”) along Sararas Road, Rodgerville Road, and Road 183 with connection to the provincial power grid at the 230 kV transmission line south of the Seaforth Transformer Station. During construction temporary components will include access roads and work/storage areas at the turbine locations and transmission connections.

1.2 Report Requirements

Of the 48 turbine sites being assessed for the Project, 20 (turbines 1, 3, 4, 5, 6, 7, 8, 17, 18, 20, 25, 28, 30, 31, 33, 39, 44, 45, 46,47) are located closer than the turbine hub height (99.5 m) to a non-participating land property line. None of the potential turbine sites are located closer than the length of the blade plus 10 m (65 m) to a non-participating land property line. All of the potential turbine sites meet the minimum setback requirement of at least 550 m from the nearest non-participating noise receptor.

The purpose of this Property Line Setback Assessment Report is to provide a review of potential adverse impacts and preventative measures for wind turbines located within the prescribed setback from non-participating parcels of land. For the purposes of this report, the area of non-participating land within 99.5 m of a turbine base will be referred to as the area of encroachment. Setback distances have been measured from the centre of the base of the turbine, as required by O.Reg. 359/09.

Setbacks from adjacent participating landowners are not discussed in this report since the landowners have entered into an agreement permitting the reduced setbacks.

Property Line Setback Assessment Report
February 2013

This Property Line Setback Assessment Report has been prepared in accordance with O.Reg. 359/09 s.53. Property Line Setback Assessments are required to include the information listed below in **Table 1.1**.

Table 1.1 Property Line Setback Assessment Requirements

Content	Reference This Report Section #
As part of an application for the issues of a renewable energy approval or a certificate of approval in respect of the construction, installation or expansion of the wind turbine, the person who is construction, installing or expanding the wind turbine submits a written assessment	
1. Demonstrating that the proposed location of the wind turbine will not result in adverse impacts on nearby business, infrastructure, properties or land use activities, and	Section 2.0
2. Describing any preventative measures that are required to be implemented to address the possibility of any adverse impact.	Section 2.0

2.0 Summary of Property Line Setback Analysis

The following sections describe the features within the areas of encroachment, potential adverse impacts on those features, and preventative measures to address potential adverse impacts. Figures identifying each area of encroachment are provided in **Appendix A**.

Features within the area of encroachment include:

- agricultural land;
- watercourses;
- a woodlot; and,
- infrastructure (public roads, a golf course, and a transmission line).

Each feature is described in the following sections with associated potential impacts and preventative measures. **Table 2.1** summarizes the land descriptions, features, and distances of encroachment.

2.1 Agricultural Land

2.1.1 Description of Feature

As shown in **Table 2.1**, 14 lots designated for agricultural use are located within the areas of encroachment. The agricultural use of the lands is for cash crops.

2.1.2 Potential Adverse Impacts

Adverse impacts to agricultural land, including crop damage and localized soil compaction, may occur in the unlikely event of turbine collapse. Farming operations and field work could occur in the area of encroachment, but in the unlikely event of a turbine collapse, advance warning signs would likely be evident to avoid the area.

2.1.3 Preventative Measures

The turbines will be designed by professional engineers, and will satisfy the requirements of building permit approval with the applicable municipality. The turbines will also be designed with automatic emergency response mechanisms to protect the structure during extreme weather conditions (i.e., fire, lightning, ice, extreme winds). In addition to design features, the turbines will be inspected and maintained regularly to ensure safe and reliable operation. These features are described in further detail in the Design and Operations Report. Landowners and tenants who work in the areas of encroachment will be warned to exercise caution around turbines during extreme weather events.

In the unlikely event of turbine collapse, Northland would provide compensation to the appropriate landowner for any associated crop and/or equipment damage, and soil restoration. Northland will also carry insurance protection.

2.2 Watercourses

2.2.1 Description of Feature

As shown in **Table 2.1**, two watercourses are located within the areas of encroachment. The watercourse near turbine 33 is a municipal drain called the Adams Drain, and is classified as a type “F” drain (intermittent flow/dry for more than two consecutive months). The other watercourse near turbine 46 is a municipal drain called the Maple Grove Branch drain, and is classified as a type “C” drain (permanent flow).

2.2.2 Potential Adverse Impacts

Adverse impacts to watercourses, including temporary siltation, disturbance to fish and fish habitat, and reduced flow conveyance may occur in the unlikely event of turbine collapse.

2.2.3 Preventative Measures

The turbines will be designed by professional engineers, and will satisfy the requirements of building permit approval with the applicable municipality. The turbines will also be designed with automatic emergency response mechanisms to protect the structure during extreme weather conditions (i.e., fire, lightning, ice, extreme winds). In addition to design features, the turbines will be inspected and maintained regularly to ensure safe and reliable operation. These features are described in further detail in the Design and Operations Report, and are sufficient mitigation measures for protection of watercourses in the areas of encroachment.

In the unlikely event of turbine collapse, Northland would restore the watercourse vegetation and flow conveyance to its pre-development condition.

2.3 Woodlots

2.3.1 Description of Feature

As shown in **Table 2.1**, 1 woodlot is located within the areas of encroachment.

2.3.2 Potential Adverse Impacts

Adverse impacts to the woodlot, including vegetation damage and disturbance to related wildlife, may occur in the unlikely event of turbine collapse.

2.3.3 Preventative Measures

The turbines will be designed by professional engineers, and will satisfy the requirements of building permit approval with the applicable municipality. The turbines will also be designed with automatic emergency response mechanisms to protect the structure during extreme weather conditions (i.e., fire, lightning, ice, extreme winds). In addition to design features, the turbines will be inspected and maintained regularly to ensure safe and reliable operation. These features are described in further detail in the Design and Operations Report, and are sufficient mitigation measures for protection of the woodlot in the area of encroachment.

In the unlikely event of turbine collapse and if necessary, Northland would re-plant trees as required to restore the woodlot.

2.4 Infrastructure

2.4.1 Description of Feature

As shown in **Table 2.1**, a review of the encroachment areas revealed the following:

- no structures are present;
- four turbines encroach public roads (turbines 7, 8, 33, 39);
- one turbine encroaches a golf course in an area with no fairways or greens (turbine 17); and,
- one turbine encroaches a 115 kV transmission line (turbine 44).

2.4.2 Potential Adverse Impacts

Damage to infrastructure may occur in the unlikely event of turbine collapse.

2.4.3 Preventative Measures

The turbines will be designed by professional engineers, and will satisfy the requirements of building permit approval with the applicable municipality. The turbines will also be designed with automatic emergency response mechanisms to protect the structure during extreme weather conditions (i.e., fire, lightning, ice, extreme winds). In addition to design features, the turbines will be inspected and maintained regularly to ensure safe and reliable operation. These features are described in further detail in the Design and Operations Report, and are sufficient mitigation measures for protection of infrastructure in the areas of encroachment.

In the unlikely event of turbine collapse, Northland would repair or replace damaged infrastructure as appropriate.

Property Line Setback Assessment Report
February 2013

Table 2.1 Property Line Setback Assessment Summary

Description of Land Within Area of Encroachment	Associated Turbine #	Distance to Non-Participating Property Line (m)	Features Within Area of Encroachment: Agricultural Land (Ag) Watercourse (Wc) Woodlot (W) Infrastructure (I)
Lot 23, East of Lake Rd., Municipality of Bluewater	1	69.4	Ag
Lot 28, Concession 14, Municipality of Bluewater	3	96.8	Ag
Lot 27, Concession 13, Municipality of Bluewater	3	69.6	Ag
Lot 3, East of Lake Rd., Municipality of Bluewater	4	66.5	Ag
Lot 28, Concession 15, Municipality of Bluewater	4	66.5	Ag
Lot 28, Concession 15, Municipality of Bluewater	5	69.8	Ag
Lot 4, East of Lake Rd., Municipality of Bluewater	6	83.3	Ag
Lot 5, East of Lake Rd., Municipality of Bluewater	7	69.1	Ag
Lot 26, Concession 15, Municipality of Bluewater	7	70.1	I (Road Allowance)
Lot 5, East of Lake Rd., Municipality of Bluewater	8	74.2	I (Road Allowance)
Lot 14, East of Lake Rd., Municipality of Bluewater	17	89.7	I (Golf Course)
Lot 14, East of Lake Rd., Municipality of Bluewater	18	74.4	Ag
Lot 14, Concession 13, Municipality of Bluewater	20	66.6	Ag
Lot 13, Concession 15, Municipality of Bluewater	25	77.4	Ag
Lot 19, East of Lake Rd., Municipality of Bluewater	28	70.2	Ag
Lot 23, East of Lake Rd., Municipality of Bluewater	30	68.2	Ag
Lot 25, East of Lake Rd., Municipality of Bluewater	33	95.0	Wc
Lot 25, East of Lake Rd., Municipality of Bluewater	33	74.8	I (Road Allowance)
Lot 30, East of Lake Rd., Municipality of Bluewater	39	67.9	I (Road Allowance)
Lot 6, Concession A, Municipality of South Huron	44	99.1	Ag
Lot 7, Concession A, Municipality of South Huron	44	70.3	I (Transmission Line)
Lot 5, East of Lake Rd., Municipality of South Huron	45	69.6	Ag

Property Line Setback Assessment Report
 February 2013

Description of Land Within Area of Encroachment	Associated Turbine #	Distance to Non-Participating Property Line (m)	Features Within Area of Encroachment: Agricultural Land (Ag) Watercourse (Wc) Woodlot (W) Infrastructure (I)
Lot 5, East of Lake Rd., Municipality of South Huron	46	97.2	Wc
Lot 6, East of Lake Rd., Municipality of South Huron	46	73.1	W
Lot 6, Concession A, Municipality of South Huron	46	78.9	Ag
Lot 6, Concession A, Municipality of South Huron	47	98.2	Ag

Property Line Setback Assessment Report
February 2013


3.0 Conclusion

In conjunction with the details of this report, the location of the Grand Bend Wind Farm turbines conform to the setback requirements of O.Reg 359/09. Appropriate turbine design including adherence to building code regulations and inclusion of turbine safety mechanisms will greatly reduce the risk of turbine collapse and protect neighbouring lands. In the unlikely event of turbine collapse, Northland will expeditiously repair and/or compensate for damages on neighbouring land such that the use of those lands are only temporarily affected.

Burnside has prepared the Grand Bend Wind Farm Property Line Setback Assessment Report for Northland in accordance with O.Reg 359/09. This report has been prepared by Burnside for the sole benefit of Northland, and may not be re-produced by any third party without the express written consent of Northland.

Respectfully submitted,


Neegan Burnside Ltd.

Signature  Date February 2013
Chris Shilton, P.Eng, LEED® AP
Project Engineer

Reviewed by:

Signature  Date February 2013
Lyle Parsons, BES
Project Manager

Approved by:

Signature  Date February 2013
Jim Mulvale, P.Eng.
Manager, Environmental, Health and Safety
Northland Power Inc.

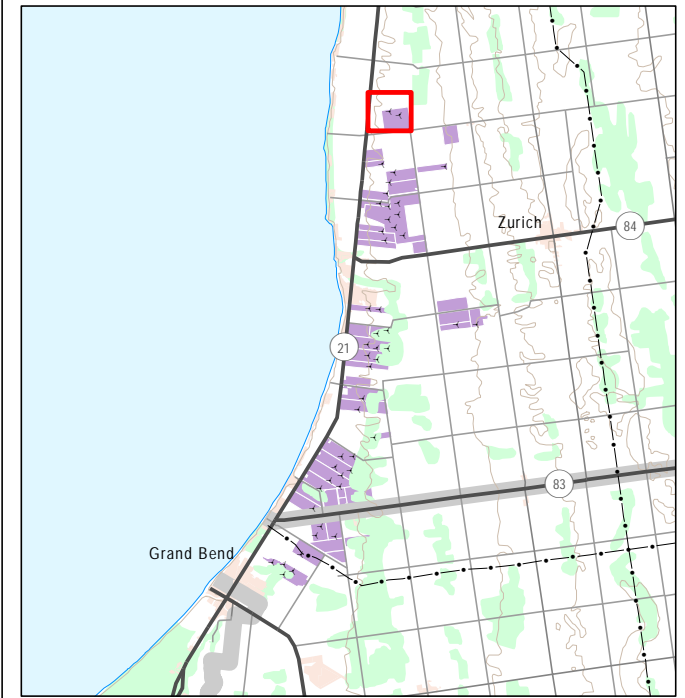
Appendix A

**Figures - Individual Turbine Locations
and Property Line Setbacks**



Property Line Setback Assessment Figure B1

Grand Bend Wind Farm



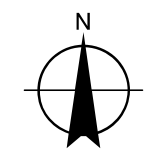
- Wind Turbine Location (Siemens Model SWT-2.3-113)
- 65m Blade Setback
- Participating Property
- 99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:
Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

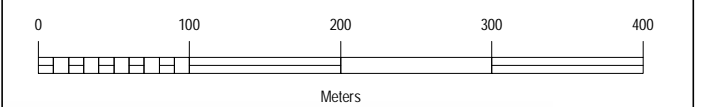
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1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

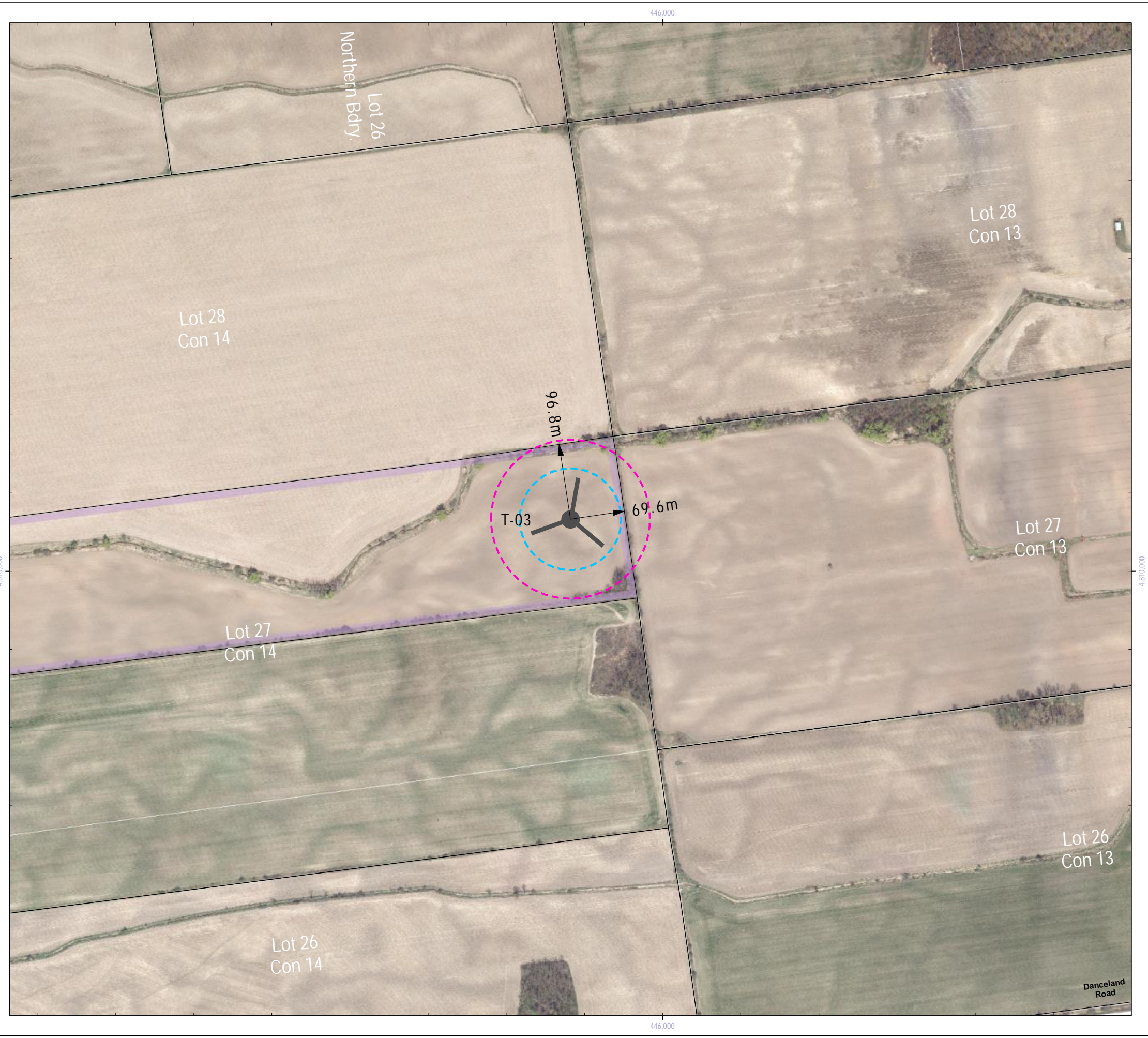
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Property Line Setback Assessment Figure B2

Grand Bend Wind Farm



	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

Notes:

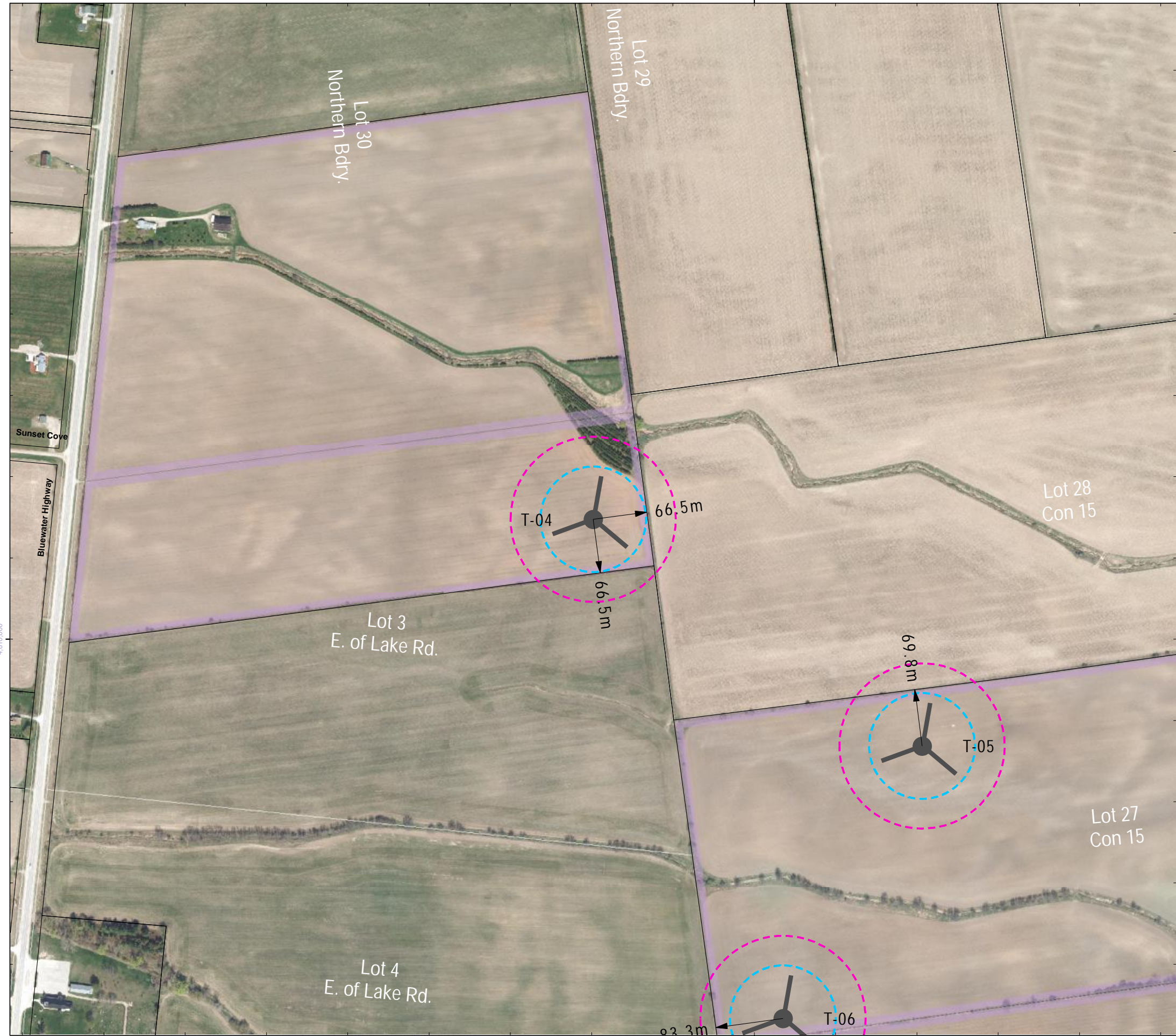
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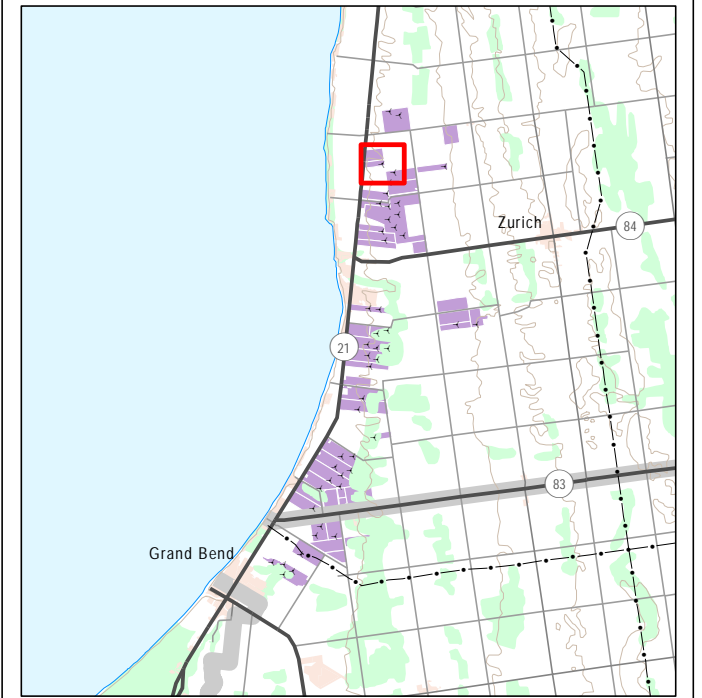
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 Date: 21 August 2012
 Project Number: PIA019991





Prepared: P. Stubbert
 Checked By: C. Shilton



Property Line Setback Assessment Figure B3

Grand Bend Wind Farm



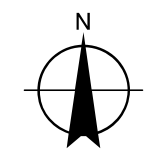
	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

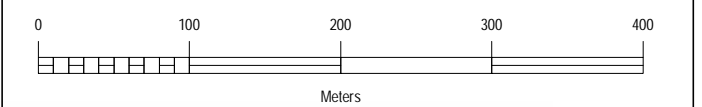
Notes:
 1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

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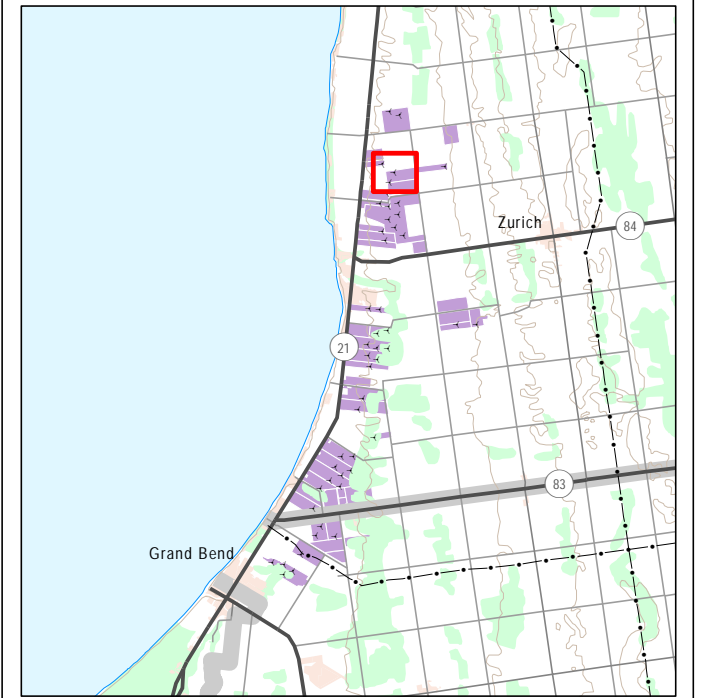
Prepared: P. Stubbart
 Checked By: C. Shilton









Property Line Setback Assessment Figure B4

Grand Bend Wind Farm



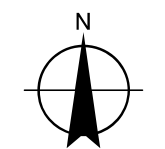
	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

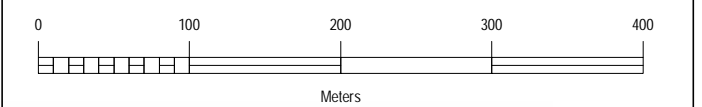
Notes:
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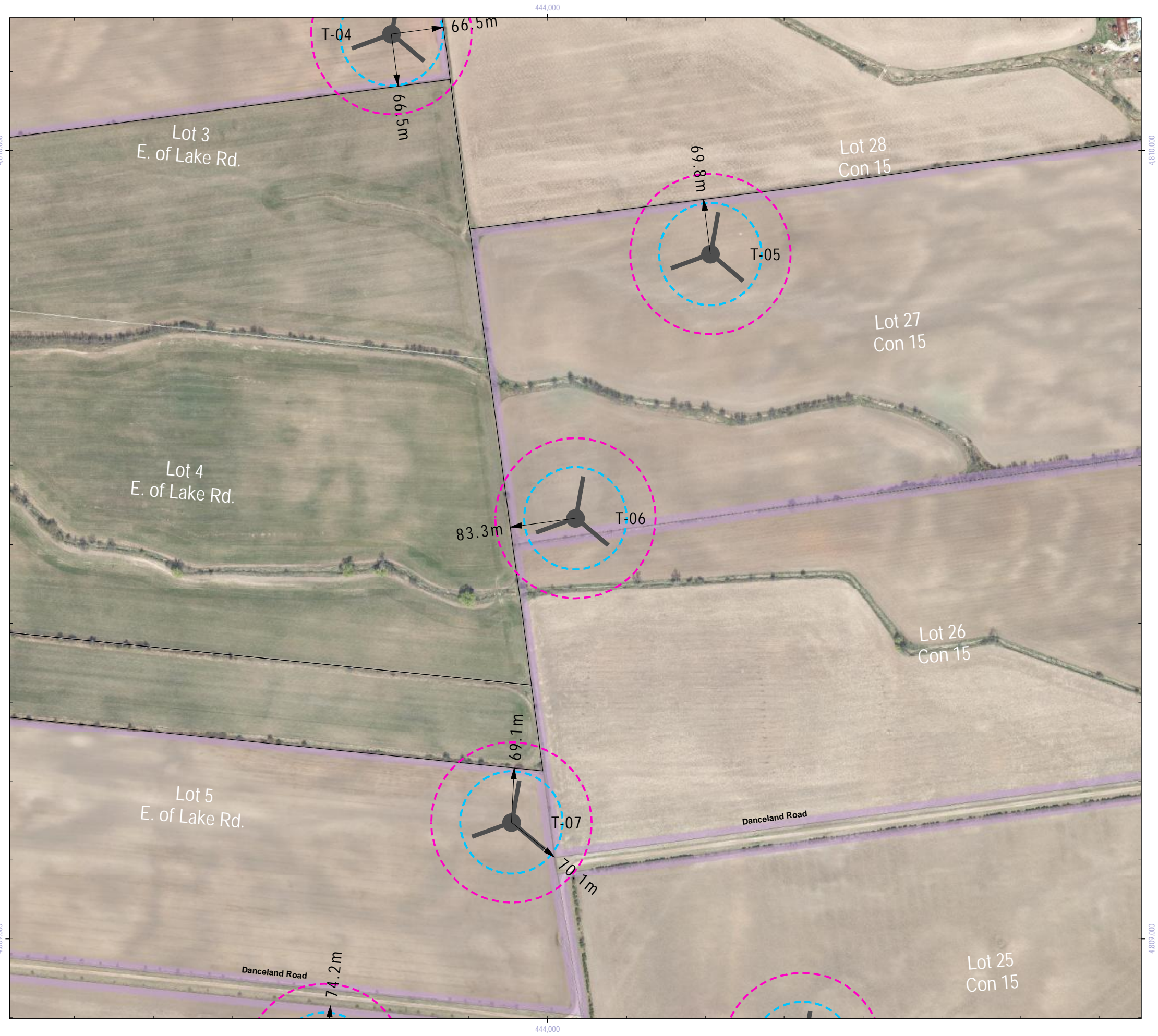
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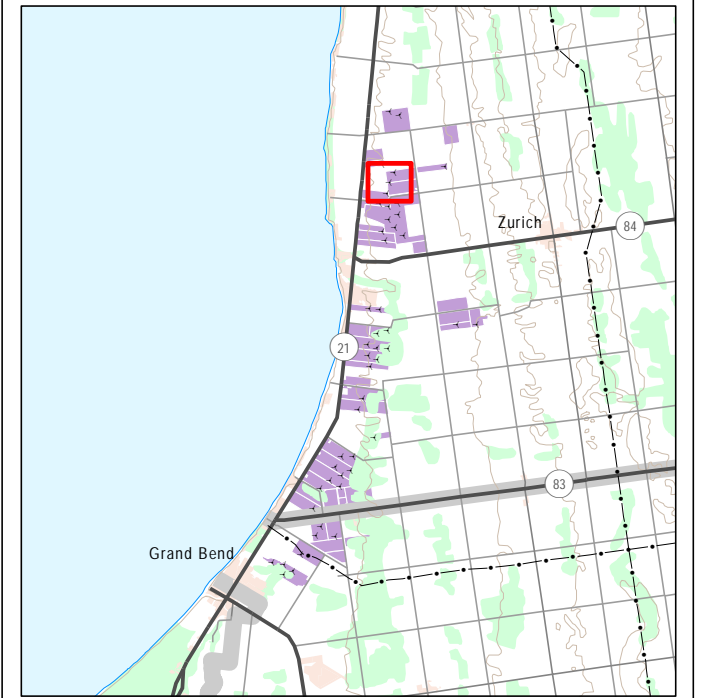
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Property Line Setback Assessment Figure B5

Grand Bend Wind Farm



	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

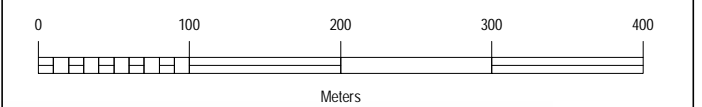
Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

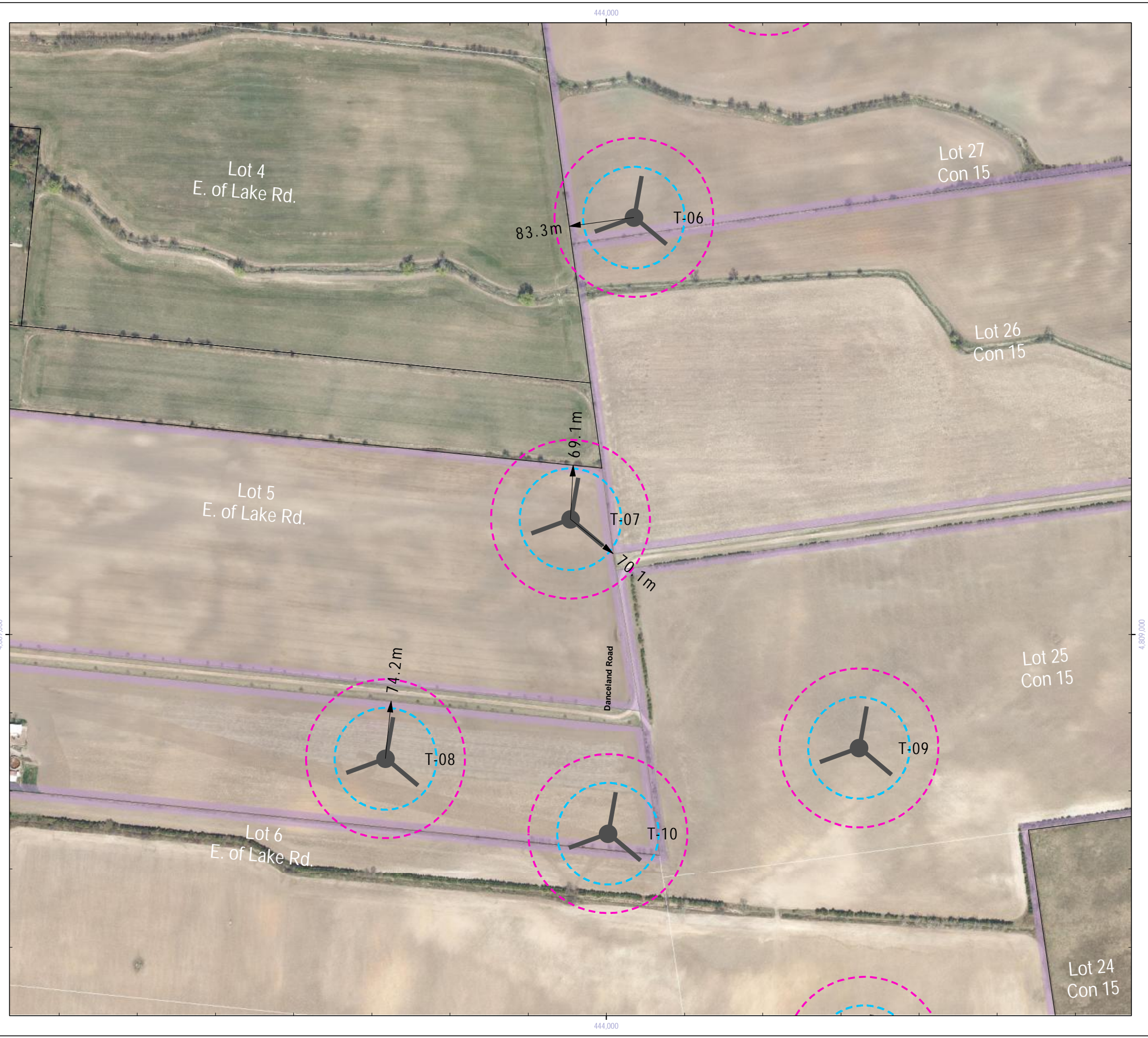
Notes:
 1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

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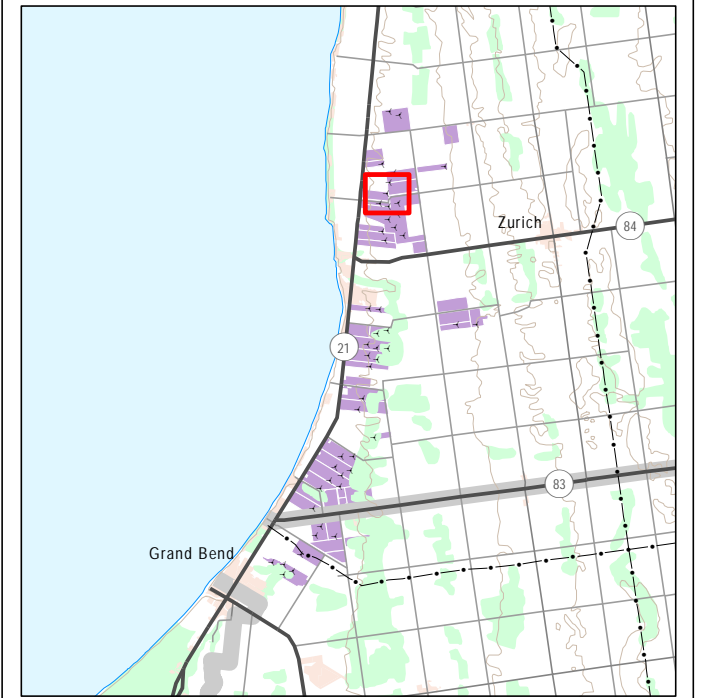
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Property Line Setback Assessment Figure B6

Grand Bend Wind Farm



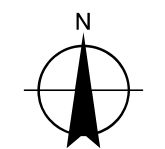
	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

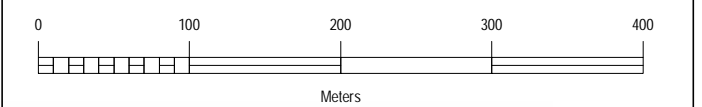
Notes:
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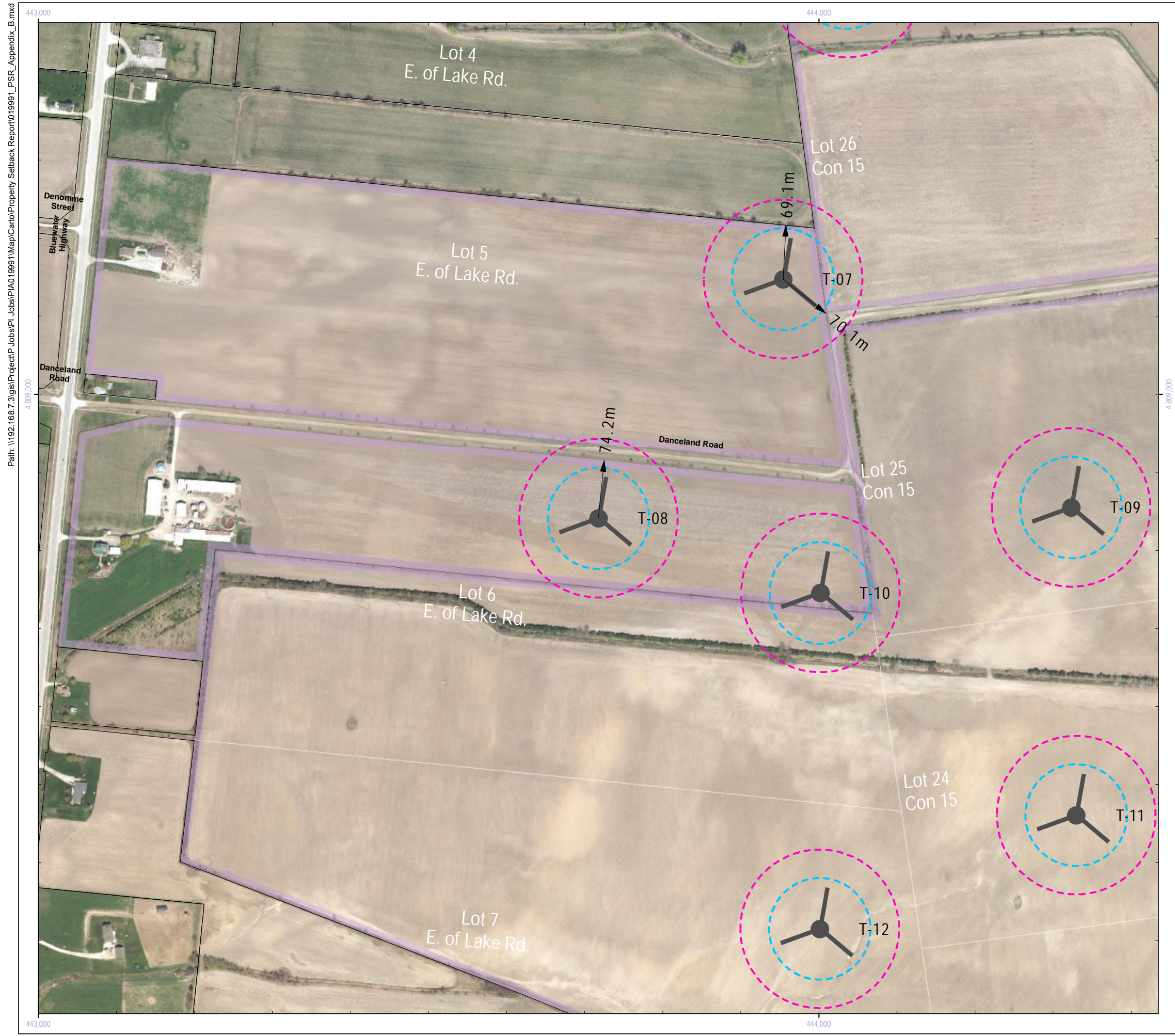
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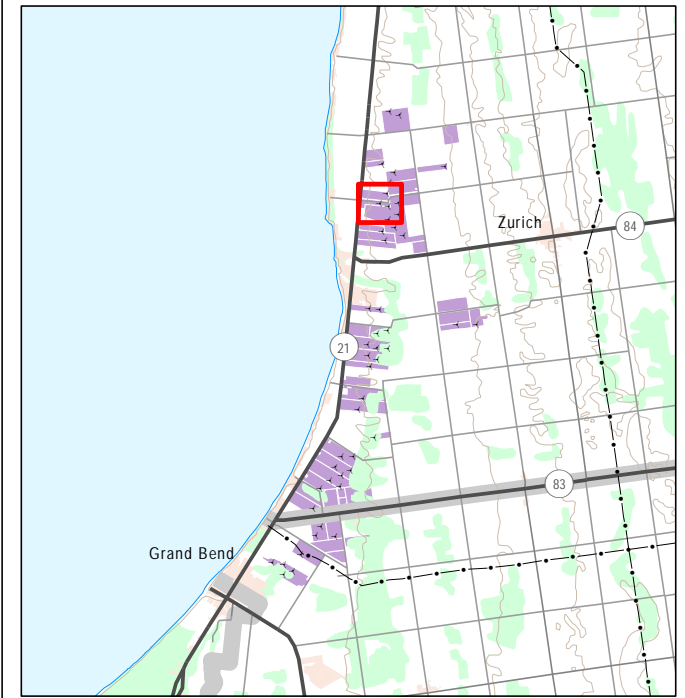
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Property Line Setback Assessment Figure B7

Grand Bend Wind Farm



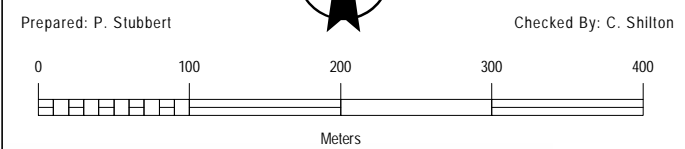
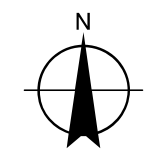
	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

Notes:
 1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

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Property Line Setback Assessment Figure B8

Grand Bend Wind Farm



 T-02	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:

Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

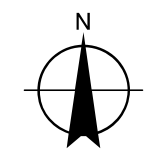
Notes:

1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

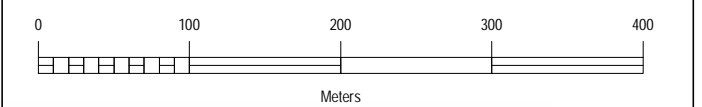
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Property Line Setback Assessment Figure B9

Grand Bend Wind Farm



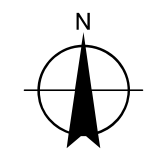
- Wind Turbine Location (Siemens Model SWT-2.3-113)
- 65m Blade Setback
- Participating Property
- 99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:
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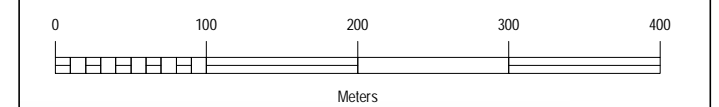
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Property Line Setback Assessment Figure B10

Grand Bend Wind Farm



	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

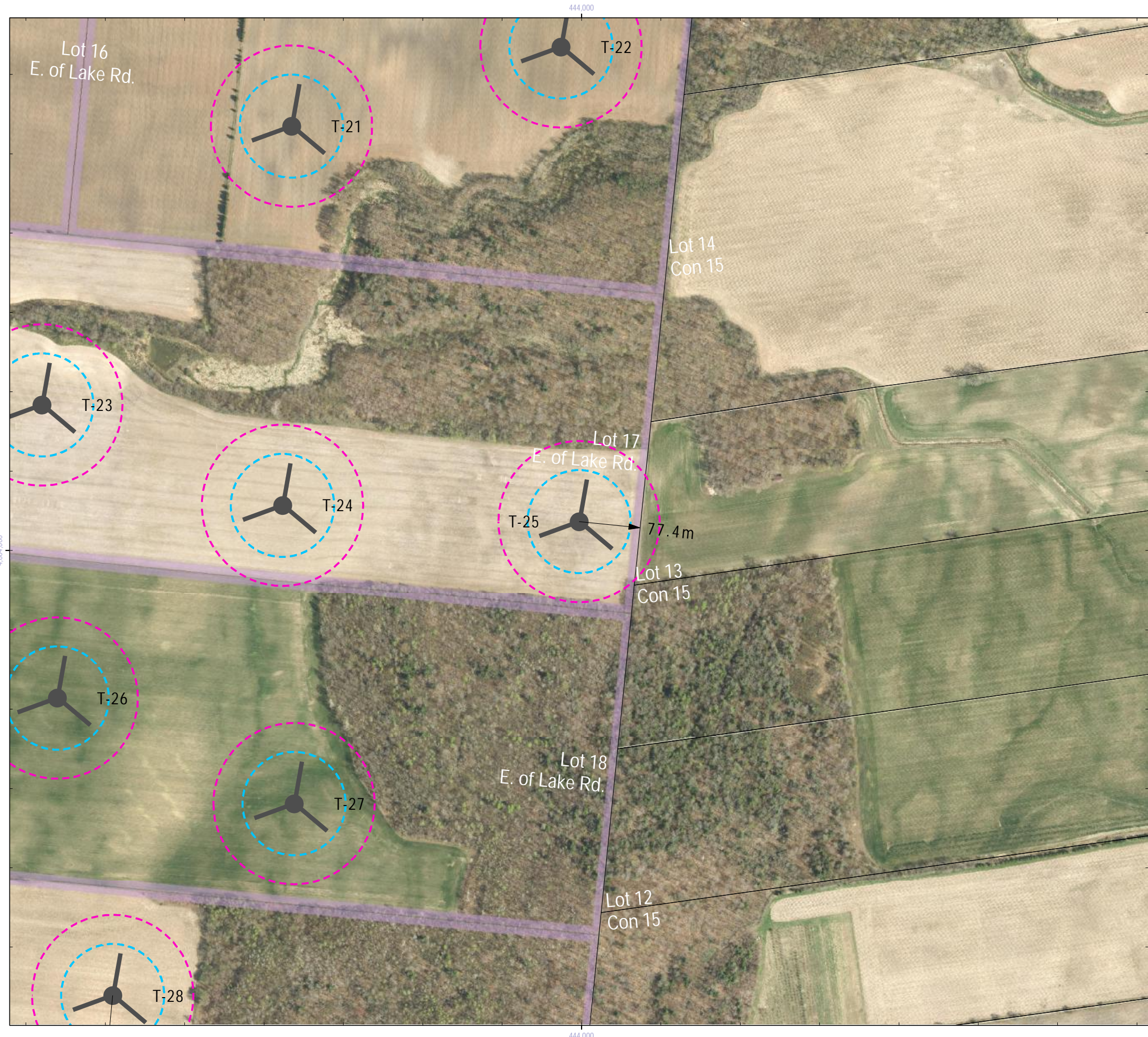
Notes:
 1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

Data Sources:
 1. County of Huron (including Imagery: 2010)
 2. Ministry of Natural Resources, © Queen's Printer for Ontario
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Scale: 1:5,000
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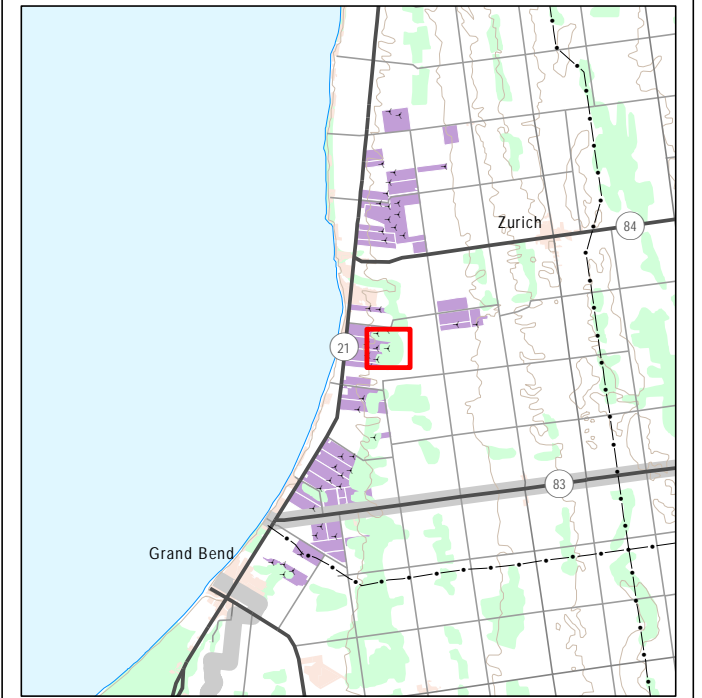
Prepared: P. Stubbert Checked By: C. Shilton









Property Line Setback Assessment Figure B11

Grand Bend Wind Farm



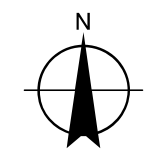
	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

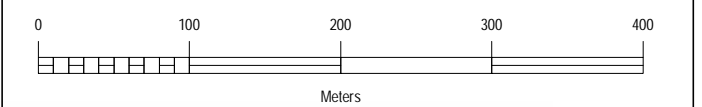
Notes:
 1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

Data Sources:
 1. County of Huron (including Imagery: 2010)
 2. Ministry of Natural Resources, © Queen's Printer for Ontario
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Scale: 1:5,000
 Date: 21 August 2012
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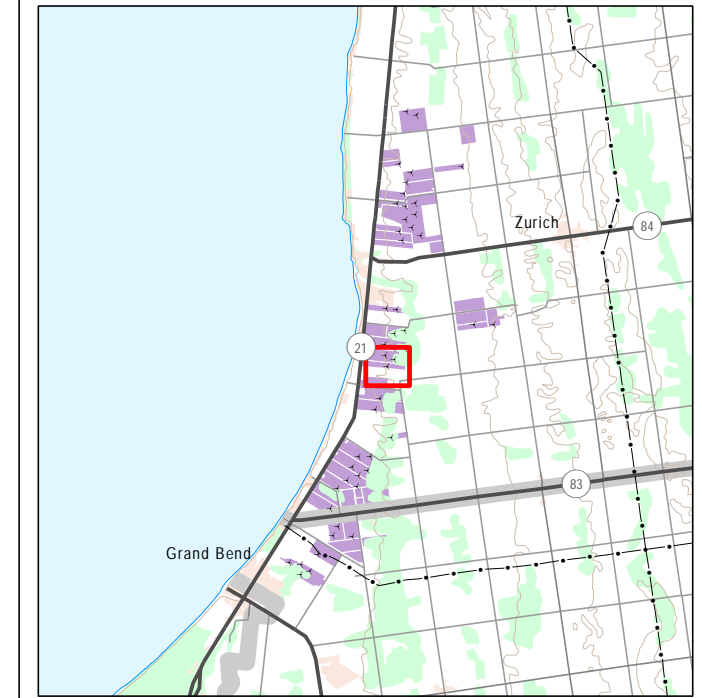
Prepared: P. Stubbert Checked By: C. Shilton









Property Line Setback Assessment Figure B12

Grand Bend Wind Farm



	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

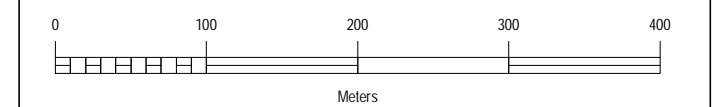
Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

Notes:
 1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

Data Sources:
 1. County of Huron (including Imagery: 2010)
 2. Ministry of Natural Resources, © Queen's Printer for Ontario
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Scale: 1:5,000
 Date: 21 August 2012
 Project Number: PIA019991

Prepared: P. Stubbart
 Checked By: C. Shilton

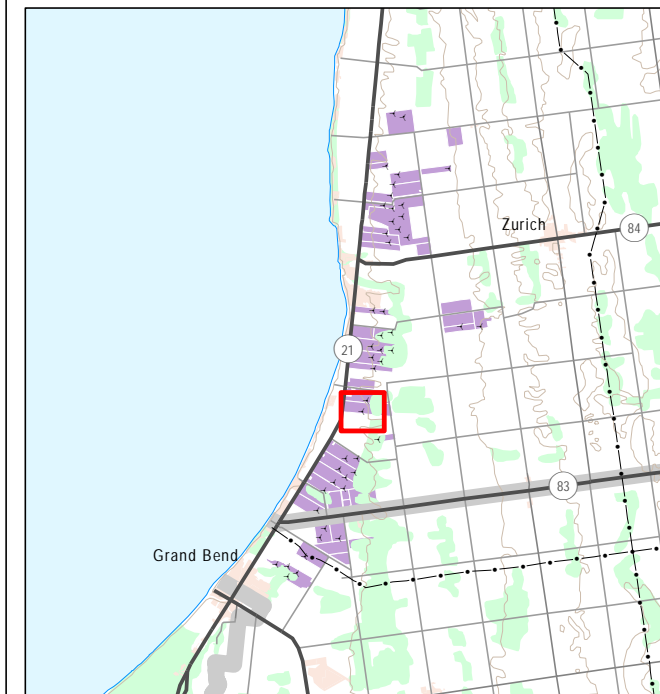


Path: \\192.168.7.3\gis\ProjectP_Jobs\PIA019991\Map\Carto\Property_Setback_Report019991_PSR_Appendix_B.mxd



Property Line Setback Assessment Figure B13

Grand Bend Wind Farm



- T-02 Wind Turbine Location (Siemens Model SWT-2.3-113)
- 65m Blade Setback
- Participating Property
- 99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:

Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

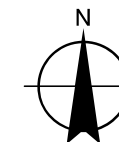
Notes:

1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

Data Sources:

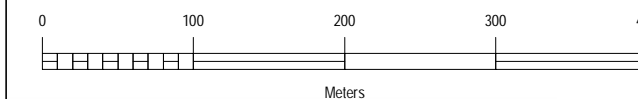
1. County of Huron (including Imagery: 2010)
2. Ministry of Natural Resources, © Queen's Printer for Ontario
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Scale: 1:5,000
Date: 21 August 2012
Project Number: PIA019991



Prepared: P. Stubbart

Checked By: C. Shilton









Property Line Setback Assessment Figure B14

Grand Bend Wind Farm



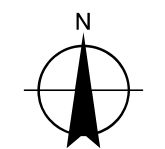
	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

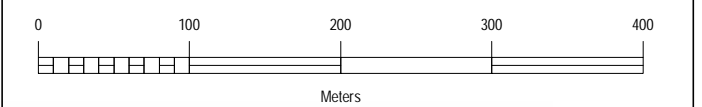
Notes:
 1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

Data Sources:
 1. County of Huron (including Imagery: 2010)
 2. Ministry of Natural Resources, © Queen's Printer for Ontario
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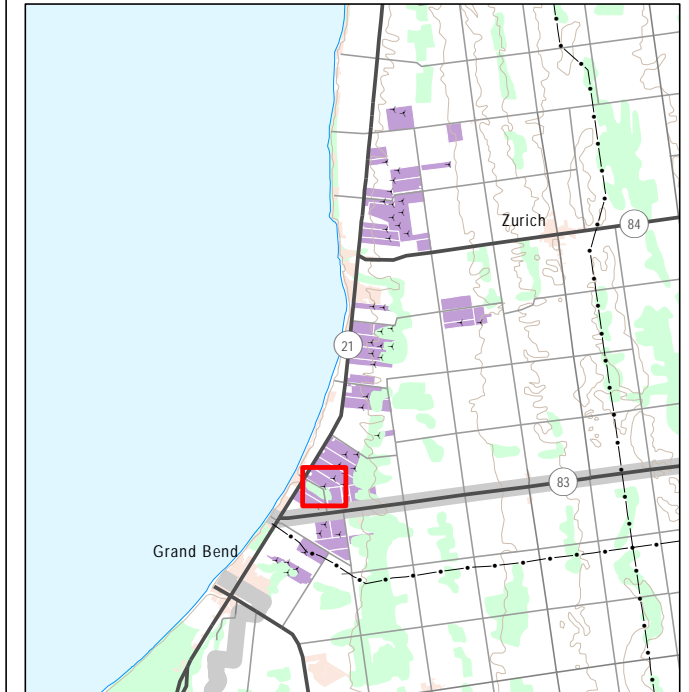
Prepared: P. Stubbert Checked By: C. Shilton





Property Line Setback Assessment Figure B15

Grand Bend Wind Farm



	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:

Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

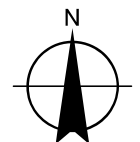
Notes:

1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

Data Sources:

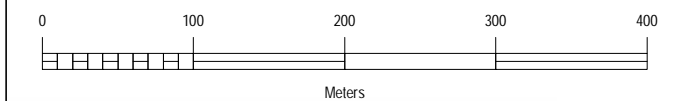
1. County of Huron (including Imagery: 2010)
2. Ministry of Natural Resources, © Queen's Printer for Ontario
3. Natural Resources Canada © Her Majesty the Queen in Right of Canada

Scale: 1:5,000
Date: 21 August 2012
Project Number: PIA019991



Prepared: P. Stubbert

Checked By: C. Shilton





Property Line Setback Assessment Figure B16

Grand Bend Wind Farm



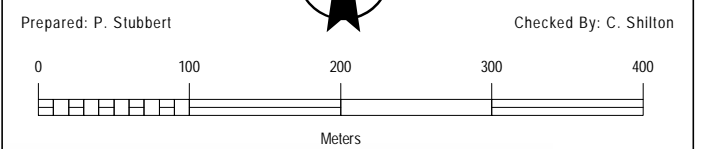
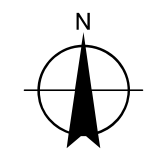
- T-02 Wind Turbine Location (Siemens Model SWT-2.3-113)
- 65m Blade Setback
- 99.5m Tower Setback
- Participating Property

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

Notes:
 1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

Data Sources:
 1. County of Huron (including Imagery: 2010)
 2. Ministry of Natural Resources, © Queen's Printer for Ontario
 3. Natural Resources Canada © Her Majesty the Queen in Right of Canada

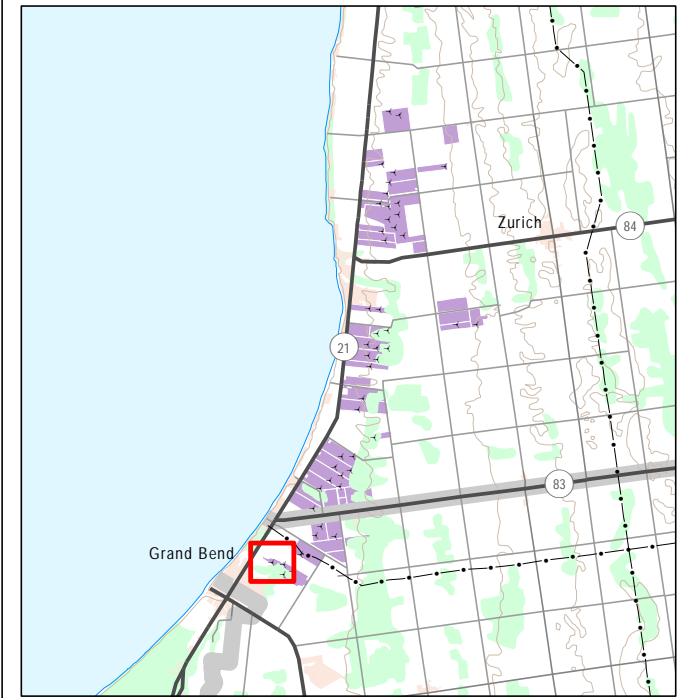
Scale: 1:5,000
 Date: 21 August 2012
 Project Number: PIA019991





Property Line Setback Assessment Figure B17

Grand Bend Wind Farm



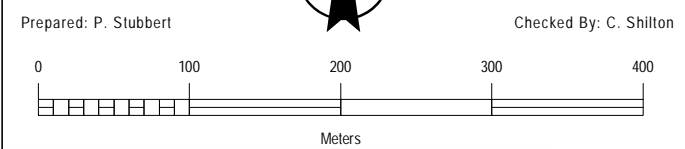
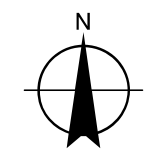
	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

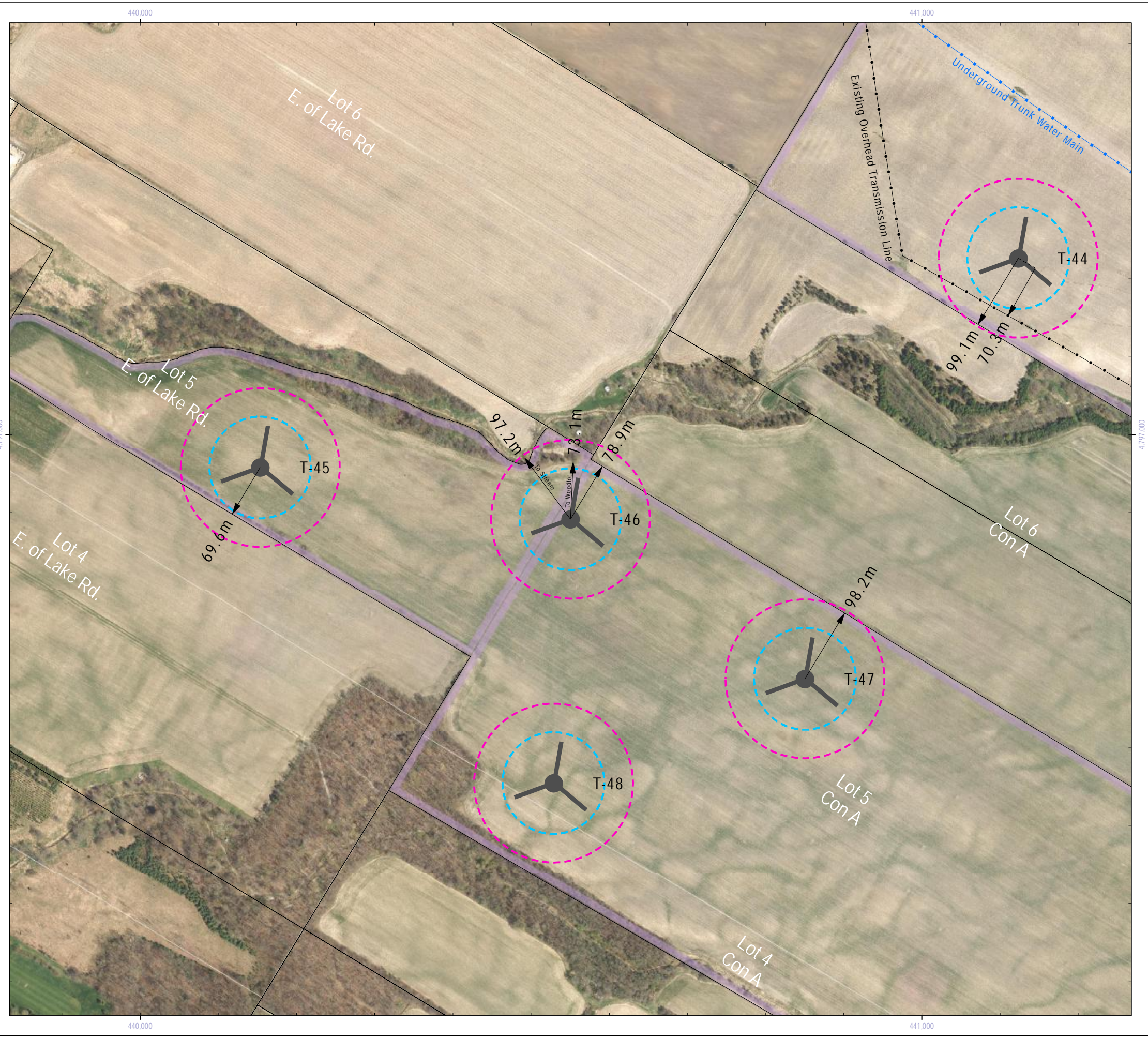
Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

Notes:
 1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

Data Sources:
 1. County of Huron (including Imagery: 2010)
 2. Ministry of Natural Resources, © Queen's Printer for Ontario
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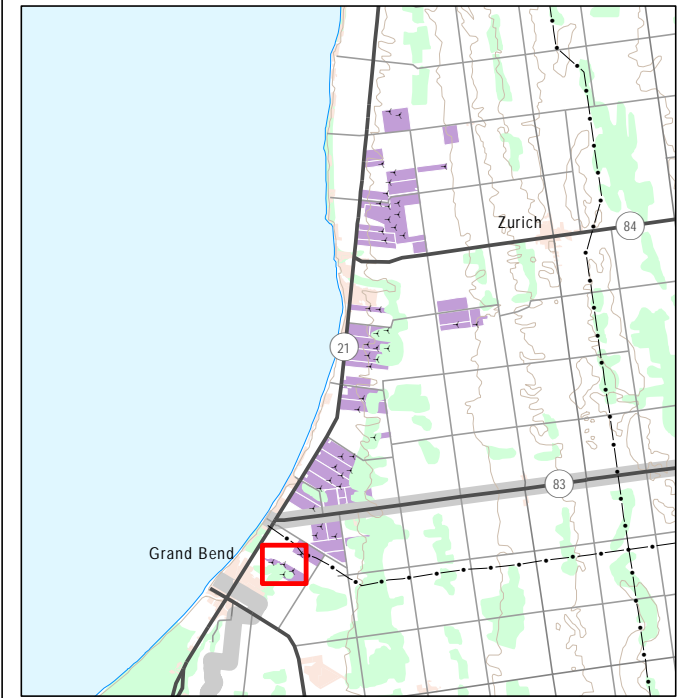
Scale: 1:5,000
 Date: 21 August 2012
 Project Number: PIA019991





Property Line Setback Assessment Figure B18

Grand Bend Wind Farm



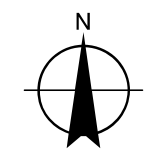
	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

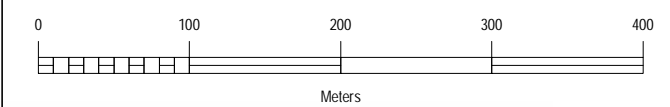
Notes:
 1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

Data Sources:
 1. County of Huron (including Imagery: 2010)
 2. Ministry of Natural Resources, © Queen's Printer for Ontario
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Scale: 1:5,000
 Date: 21 August 2012
 Project Number: PIA019991



Prepared: P. Stubbert Checked By: C. Shilton





Property Line Setback Assessment Figure B19

Grand Bend Wind Farm



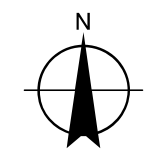
	Wind Turbine Location (Siemens Model SWT-2.3-113)		65m Blade Setback
	Participating Property		99.5m Tower Setback

Siemens SWT-2.3-113 Turbine:
Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

Notes:
1. Measurements from turbine to feature are only shown for turbines in question and less than or equal to 99.5m.

Data Sources:
1. County of Huron (including Imagery: 2010)
2. Ministry of Natural Resources, © Queen's Printer for Ontario
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Date: 21 August 2012
Project Number: PIA019991



Prepared: P. Stubbert Checked By: C. Shilton

