



# WELCOME TO EDF EN CANADA'S OPEN HOUSE

## CYPRESS WIND POWER PROJECT

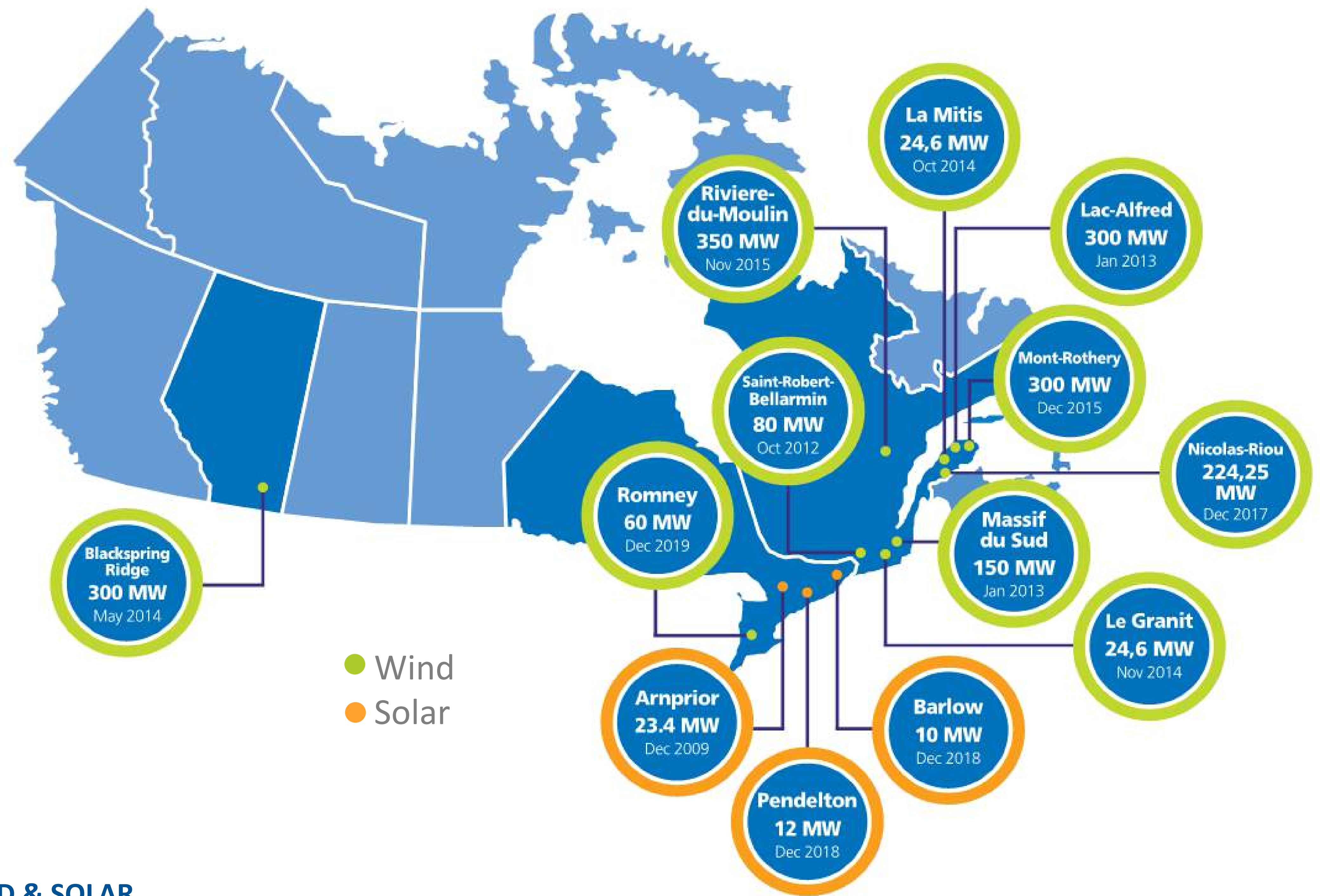
Today you will be able to meet the team, learn more about the Project and get answers to your questions.



# EDF EN CANADA

## 1 680 MW

Put into Service, under  
Construction or in  
Development



### WIND & SOLAR

**1 374 MW** (350 000 homes) Commissioned Capacity

**224 MW** (54 900 homes) Under Construction

**82 MW** (20 100 homes) In Development

### OPERATIONS & MAINTENANCE

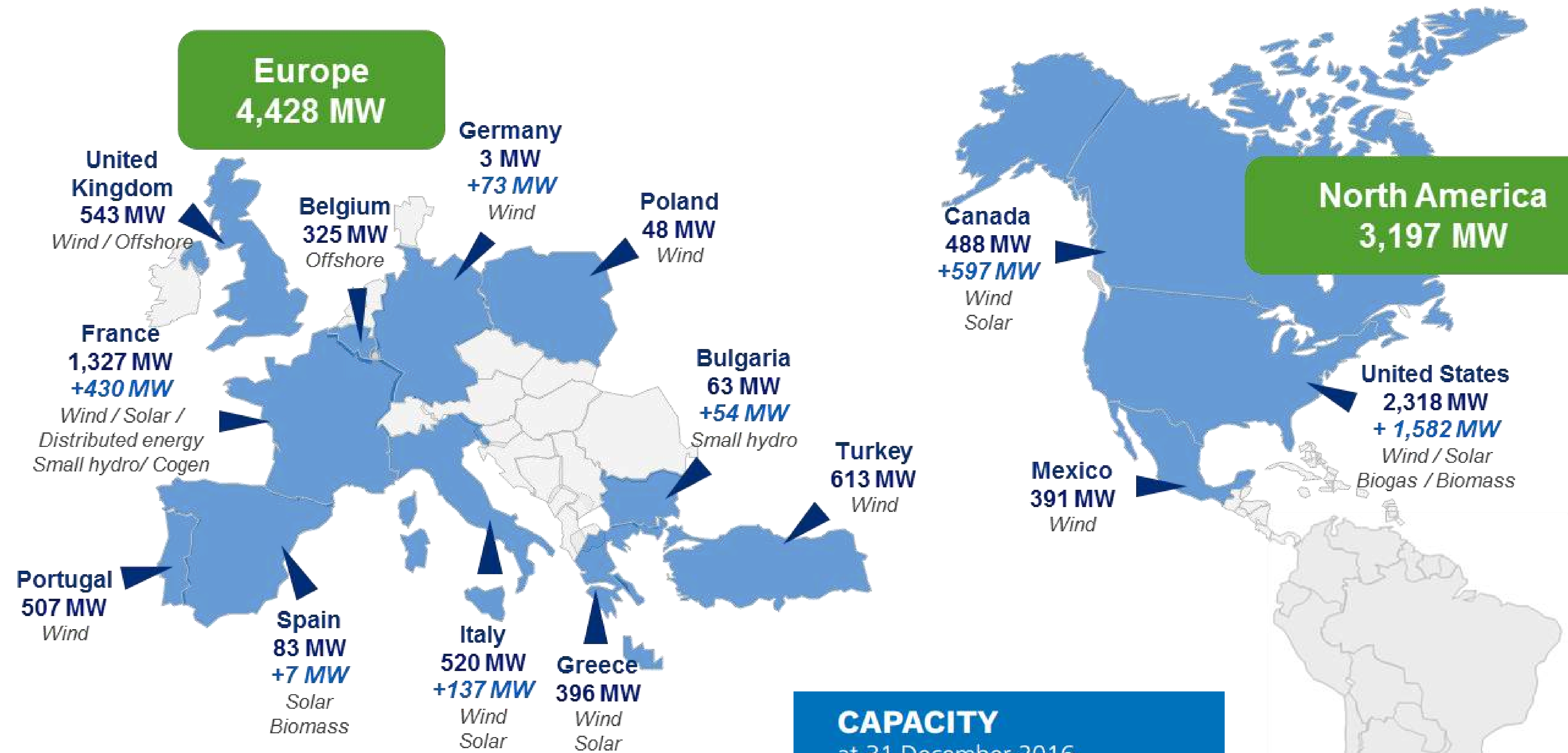
**1 061 MW** Wind

**516 MW** Solar

**>\$3.5 billion** invested  
in Canada since 2008

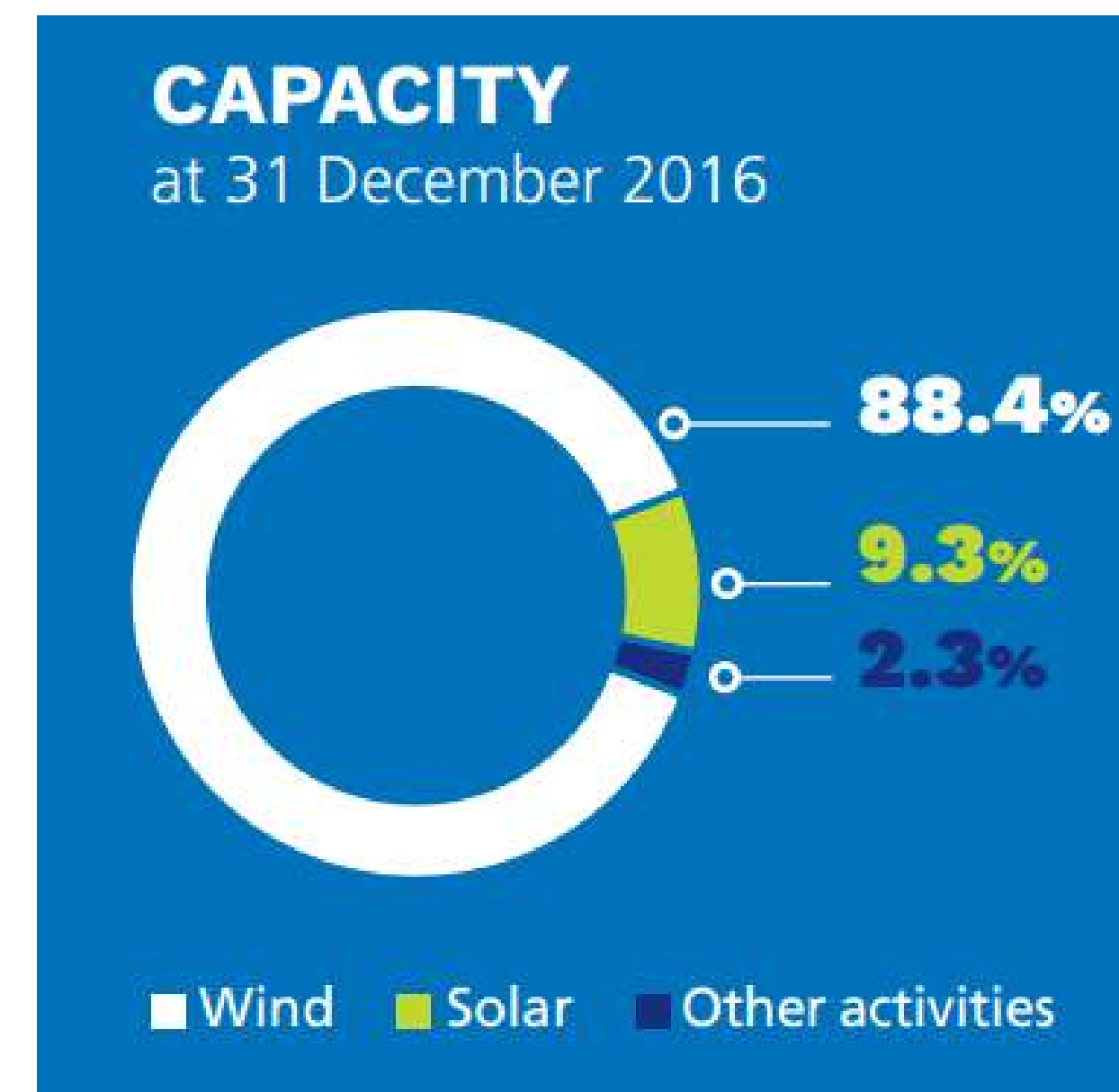
EDF ENERGIES  
NOUVELLES

A WORLD  
LEADER IN  
RENEWABLE  
ENERGY



LEGEND

- MW : EDF EN installed capacity
- MW : EDF EN developed, built and sold capacity



21 countries throughout North America, South America, Europe, Africa, the Middle East, and India

> 3,000 employees

# WHAT IS THE AESO RENEWABLE ELECTRICITY PROGRAM?

**Alberta is changing the mix of power generation** to include a larger portion of renewable energy in the province - including wind and solar.

In March 2017, **the Alberta Electric System Operator (AESO)** launched the Renewable Electricity Program (REP) – a competitive procurement program intended to encourage the development of 5,000 MW by 2030.

**The REP will administer a series of competitions.** Round 1 of the program started in 2017 and the Project is interested in this program.

**The first round of the REP** competition includes the procurement of up to 400 MW of renewable electricity for projects that will be operational by December 1, 2019.

More information can be found at [www.aeso.ca](http://www.aeso.ca)

# WHY DID WE PICK THIS PROJECT SITE?

## ALBERTA'S WIND RESOURCE



**Close proximity** to existing transmission



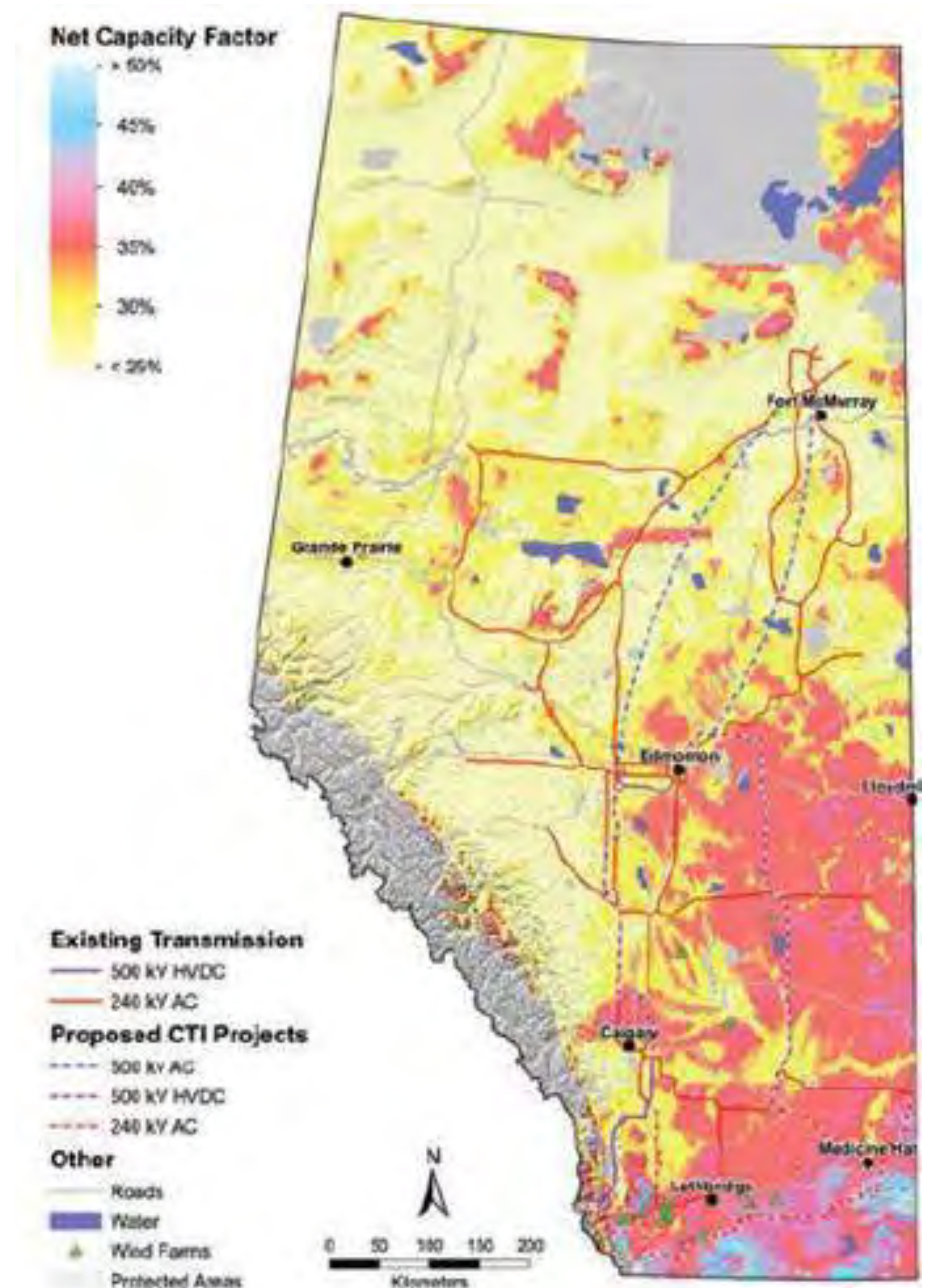
**Strong wind resource**



**Supportive local community**



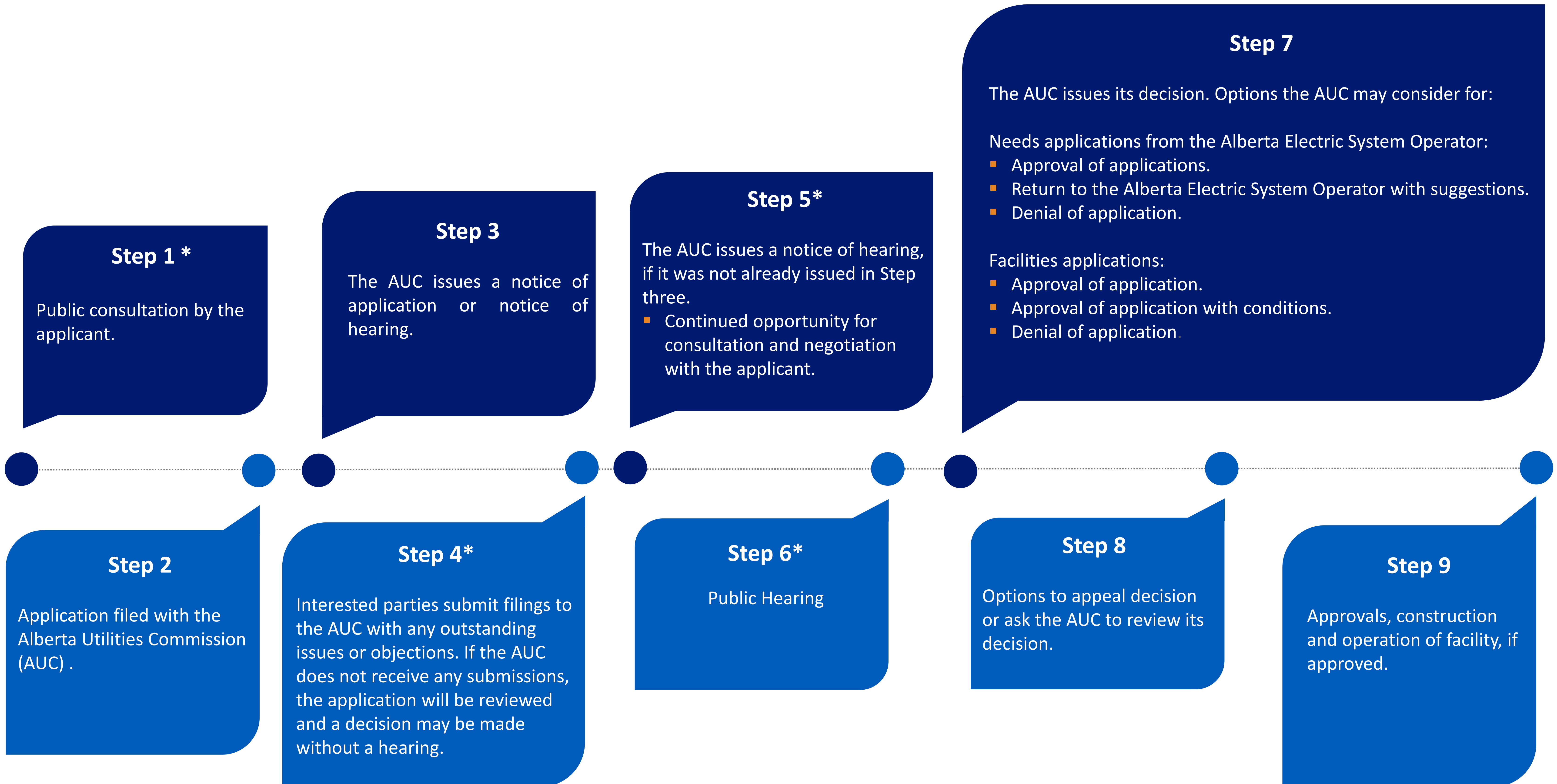
**Compatible** with existing agricultural use



## ANTICIPATED PROJECT TIMELINE

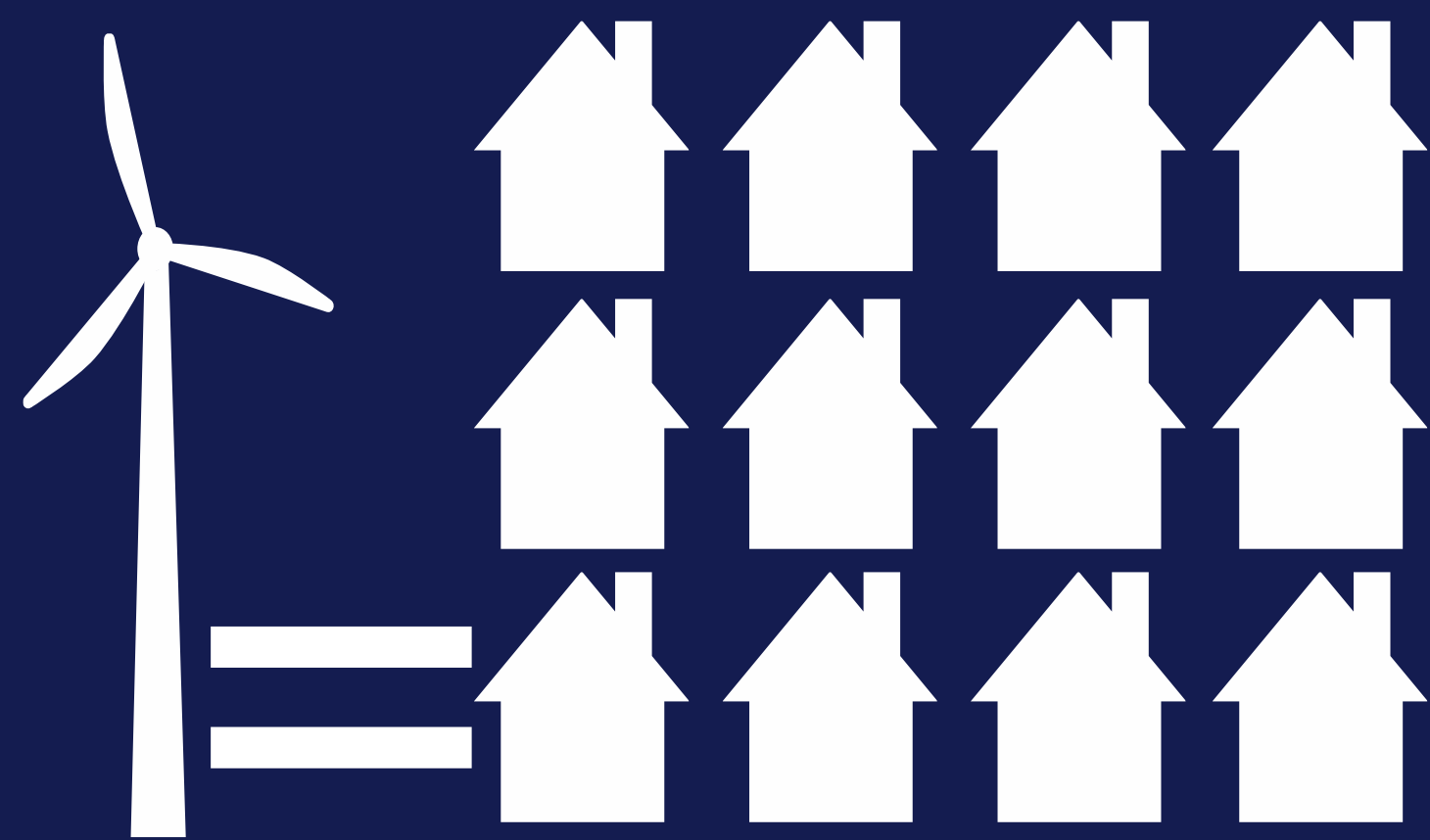


# ALBERTA'S RENEWABLE ENERGY APPROVAL PROCESS



\*Denotes opportunity for public involvement.

# WHY WIND MAKES SENSE



1 MW Turbine = ~ 300 homes

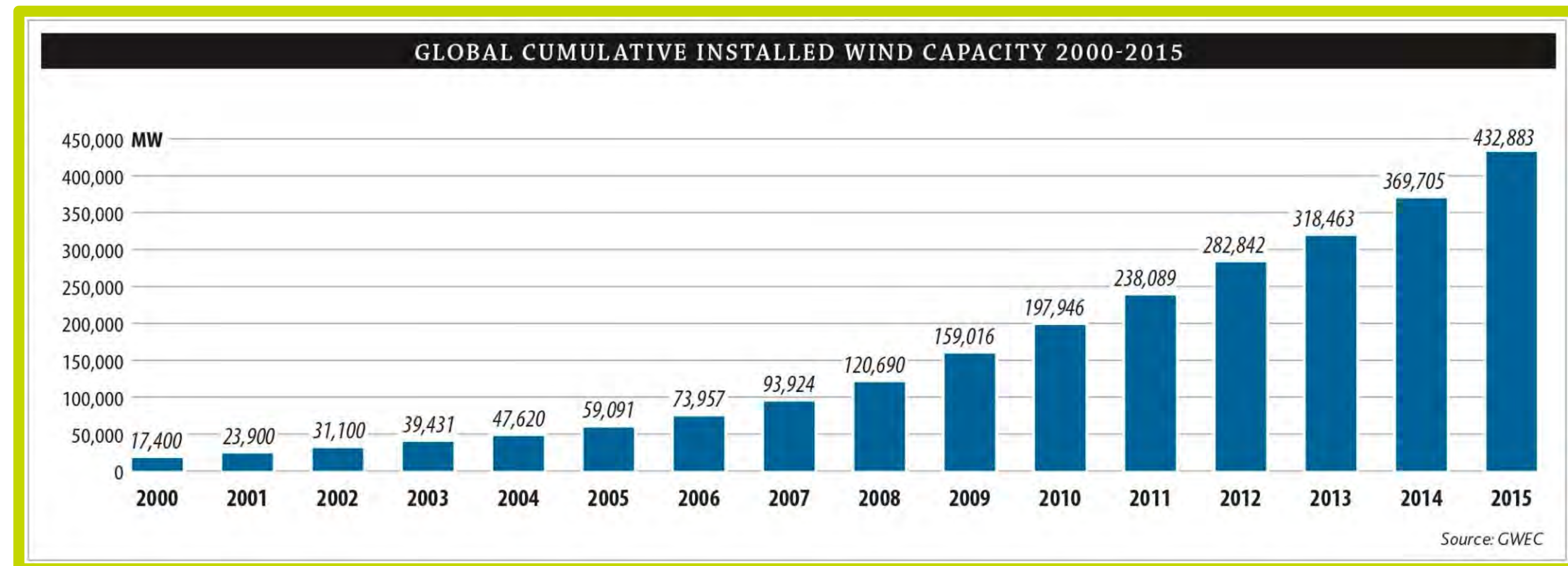
 = 25 Households

Every 1 000 MW of new wind energy drives \$2.5 billion in investments, creates 10 500 person-years of employment, and provides enough clean power for over 300 000 Canadian homes.

Source: CanWEA <http://windfacts.ca/community-property>



## Global Installed Wind Capacity 2000-2015



### Clean power

Wind energy reduces dependence on other forms of electricity generation that contribute to greenhouse gas emissions.

### Local job opportunities

Contractors, suppliers and local businesses benefit from the direct and indirect economic activity the project brings to the local economy.

### Clear air

Wind energy emits no greenhouse gas during the production of electricity.

### Water conservation

Wind turbines do not use water to produce electricity.

### Predictable pricing

Wind generated electricity prices are fixed and stable, unlike natural gas or oil which have volatile and unpredictable pricing.



# HEALTH CANADA STUDY: WIND TURBINE NOISE AND HEALTH STUDY



In 2014, Health Canada commissioned a \$1.2 million study on the potential impacts of wind turbines on human health.

A hardcopy of the key findings brochure is available. Please ask any EDF EN Canada staff for a copy.

- **Illness and disease**

No evidence was found to support a link between exposure to wind turbine sound and any of the self-reported illnesses and/or chronic conditions.

- **Stress**

No association was found between the multiple measures of stress and exposure to wind turbine sound.

- **Sleep**

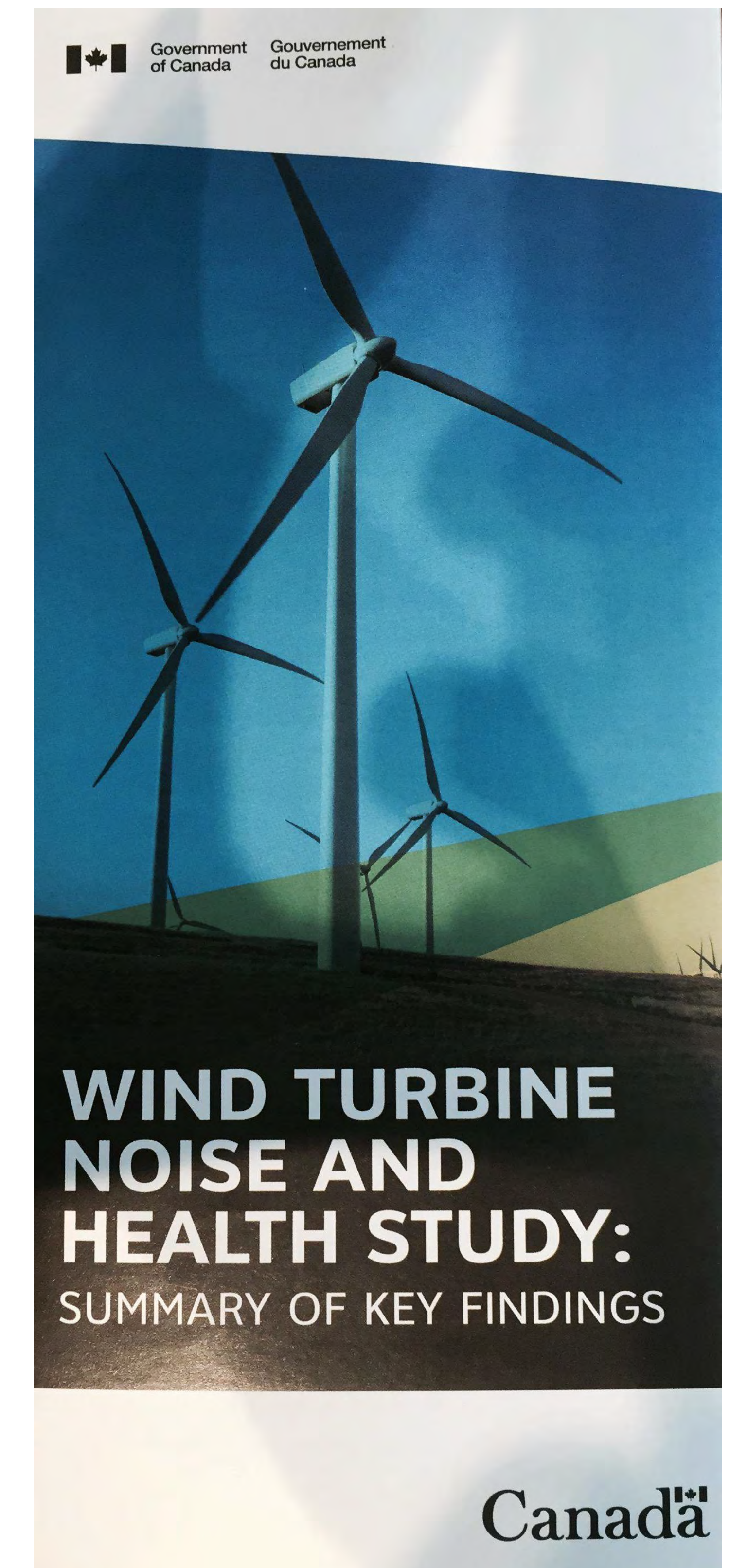
No association between wind turbine sound and self-reported or measured sleep quality.

- **Annoyance and quality of life**

No association was found with any significant changes in reported quality of life, or with overall quality of life and satisfaction with health.\*

Ontario Chief Medical Officer's 2010 report which concluded:

*There is "no scientific evidence of any direct causal link between wind turbines and adverse health effects."*



\*Assessed using the World Health Organization's Quality of Life Scale.

# WIND AND PROPERTY VALUES

According to CANWEA, studies have consistently shown there is no causal relationship between wind farms and negative impacts on property values.

“The Board finds there is no evidence to allow the Board to conclude that since the construction of the wind farm properties on what [the landowner] defines as the west side of the Island have sold for less than properties on the east side.”

*(Source: Ontario Assessment Review Board. File No: WR 113994. Municipality: Township of Frontenac Islands)*



In 2014, MPAC (Municipal Property Assessment Corporation) performed a study that looked at all properties close to 1 157 turbines in total, and concluded that “there is no statistically significant impact on sale prices of residential properties in these market areas resulting from proximity to an industrial wind turbine.”

*(Source: Municipal Property Assessment Corporation)*

# AVIAN IMPACTS

*“It is estimated that each year more than 10 000 migratory birds are killed in Toronto between the hours of 11:00 p.m. and 5:00 a.m. in collisions with brightly lit office towers.”*

Source: [www.flap.org](http://www.flap.org)

## Well sited wind projects should have minimal impacts upon local bird and bat populations.

- Working closely with Alberta Environment and Parks, EDF EN Canada Development will undertake significant bird and bat studies to quantify potential risks and develop mitigation tools to ensure sustainable development.
- Potential impact on birds, bats and raptors will be considered in the Environmental Evaluation.
- A multi-year post-construction wildlife monitoring program will be undertaken to determine the actual Project effects.

A report published in Avian Conservation & Ecology stated:

*“Overall...the effects of collisions, nest mortality, and lost habitat on birds associated with Canadian wind farms appear to be relatively small compared to other sources of mortality.”*

Source: Zimmerling, R. J., Pomeroy, A.C., d'Entremont, M. V., and Francis, C.M. (2013)

# IN HARMONY WITH AGRICULTURE

- Support of local landowners is paramount to EDF EN Canada's success. We work diligently to ensure our neighbors have a full understanding of the proposed projects.
- Well-designed wind energy projects complement farming activity with minimal disruption.
- We work very closely with our landowners to have project infrastructure fit with current and future land use.



# ENVIRONMENTAL AND TECHNICAL ACTIVITIES UNDERWAY

*Wind power project design includes consideration of impacts on wildlife and vegetation.*

**EDF EN Canada** commenced environmental studies in 2016. Studies that will be completed in 2017 include:

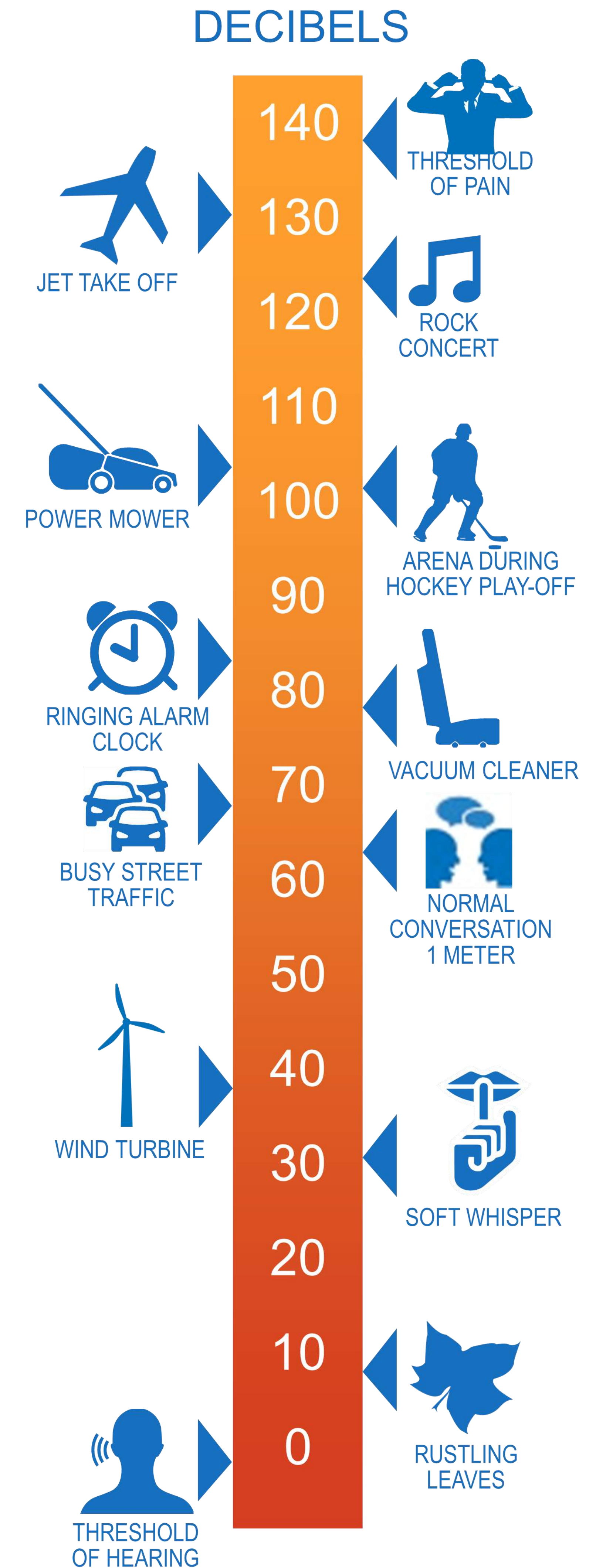
- Wildlife – birds, bats and other wildlife
- Wetlands
- Noise Impact Assessment
- Historical Resources

Throughout the development of the Project, we will work closely with Alberta Environment and Parks to ensure a robust understanding of the site.



# NOISE IMPACT ASSESSMENT

- All wind energy projects must meet Alberta Utilities Commission (AUC) Rule 012: Noise Control.
- The Noise Impact Assessment will be completed for all residences and dwellings within 1.5 kilometres of the Project.
- The study will include the noise from the Project and other operational and proposed facilities nearby.
- The results of the Noise Impact Assessment were used to determine the final turbine layout.
- The resulting noise contours are available on the Infrastructure, Shadow Flicker, and Noise Maps for Options A and B.



# MUNICIPAL AND LOCAL COMMUNITY BENEFITS

EDF EN Canada values the long-term benefits of working with the local community. If the Project is approved, the local community will benefit from:

- **Employment** opportunities during the construction and operation phases of the Project
- **Contract opportunities** for local businesses
- **Local investments** into hospitality and construction services during the development, construction and operation phases of the Project
- **Tax revenues** throughout the life of the Project



# LOCAL ECONOMIC BENEFITS

## ■ Direct benefits

The Project will result in increased job opportunities for the local area. Some of these job opportunities may include:

Surveying

Civil engineering

Mechanical work

Electrical work

Road construction

Transportation equipment

Earthwork activities

Maintenance of vehicle fleet

Maintenance paths

Snow removal

Other related services



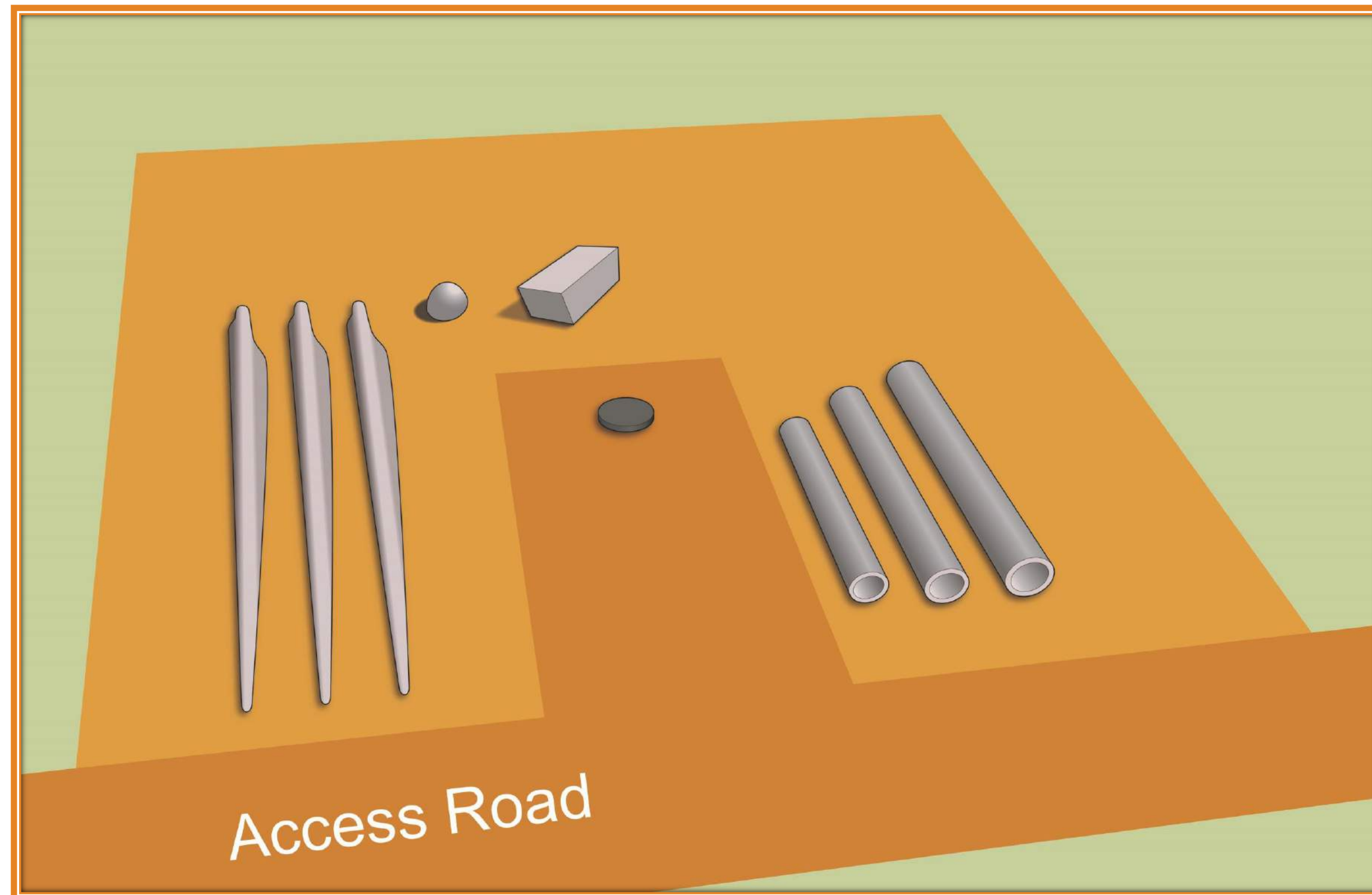
## ■ Indirect benefits

Increased spending on goods and services during the operations and construction phases.



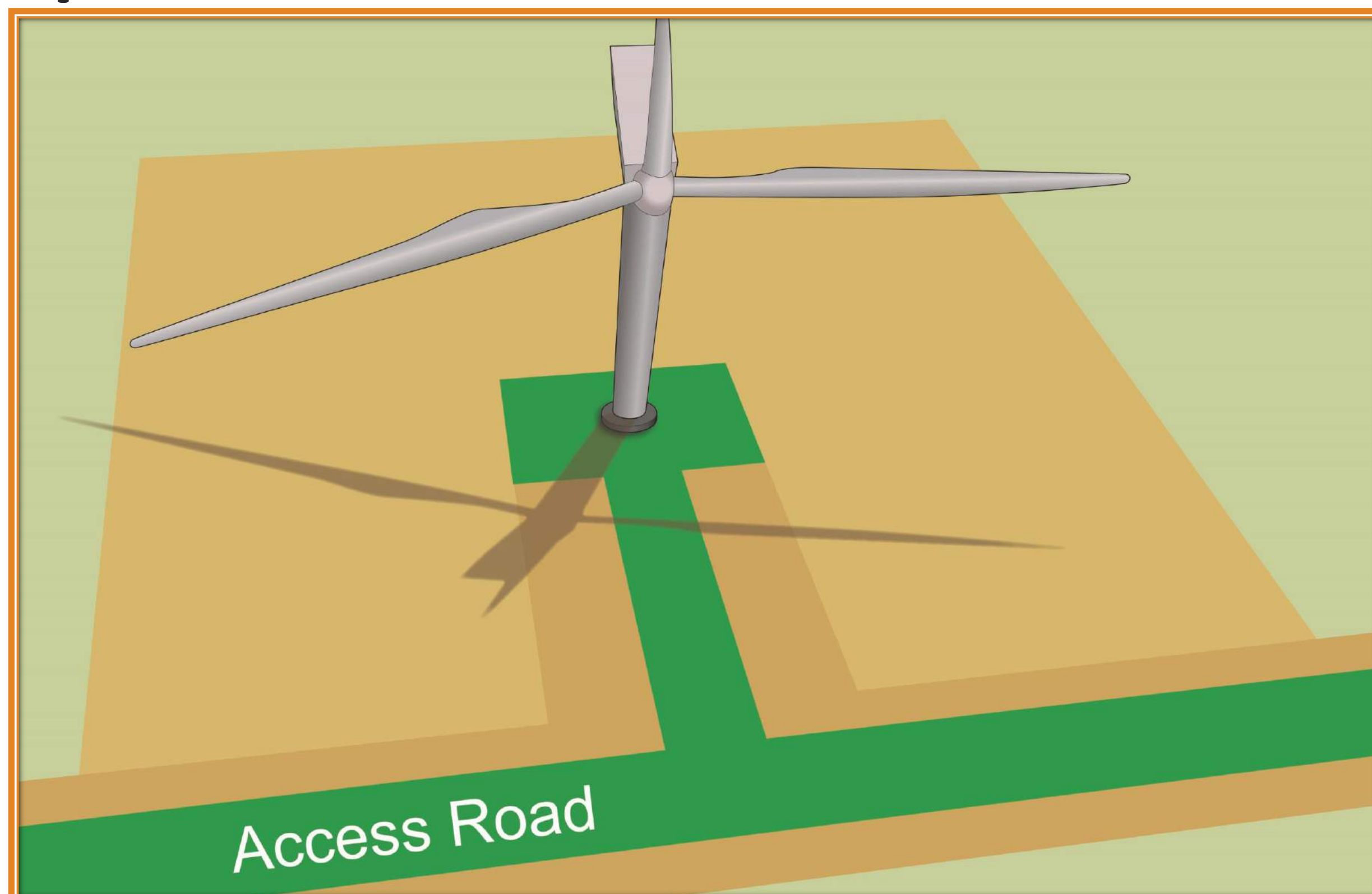
# ACCESS ROAD & TURBINE PAD

## Construction Phase - 5 acres / turbine

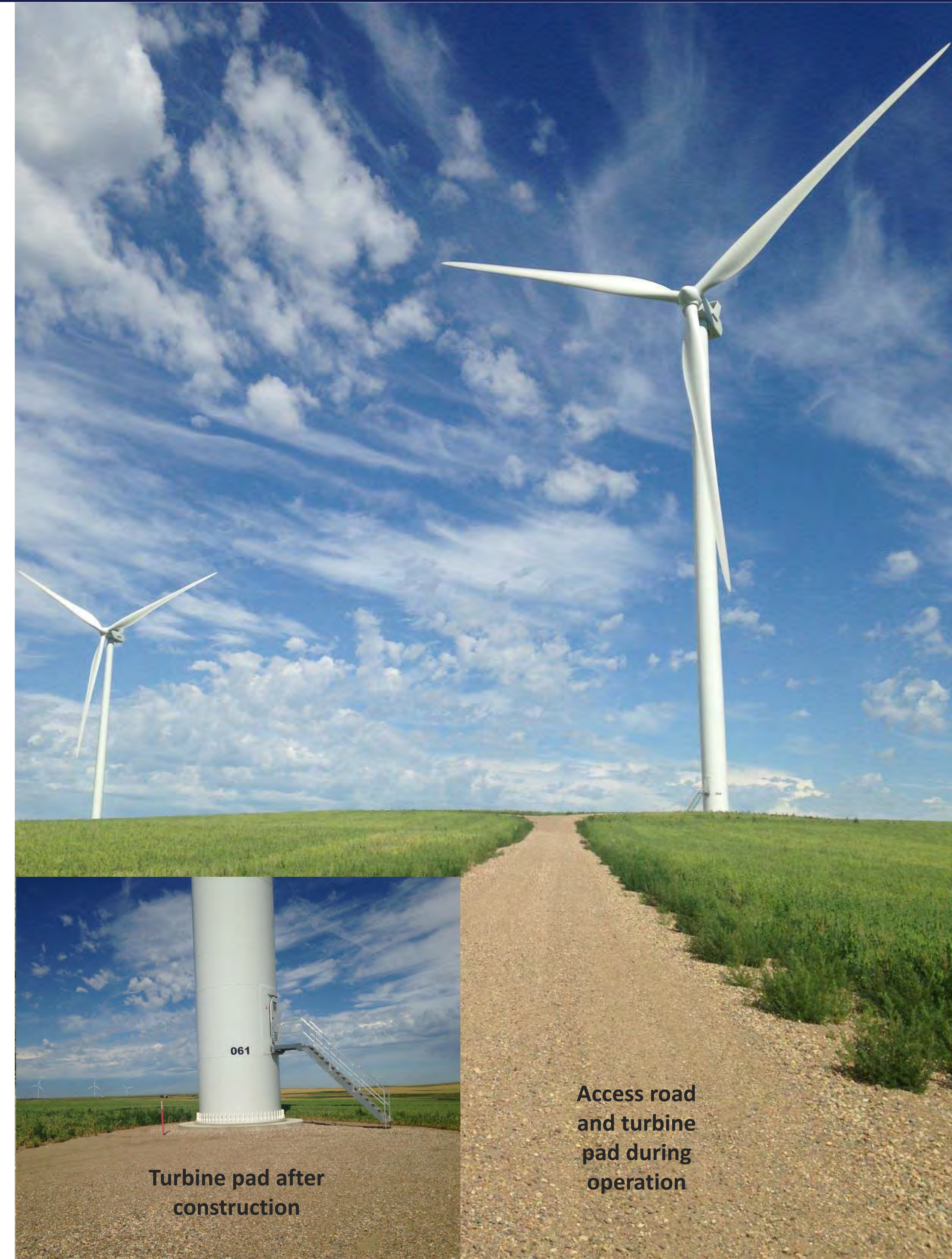


A temporary turbine pad area of about 80m diameter will be created at each turbine location, in order to deliver all the required turbine components on each turbine pad.

## Operational Phase – approximately 0.25 to 0.5 acres / turbine



After construction, the access road width and the turbine pad will be reduced to limit impacts on agricultural use.



Turbine pad after construction

Access road and turbine pad during operation

# TURBINE FOUNDATION & COLLECTION SYSTEM CONSTRUCTION

- The turbines will be installed on top of a buried, cast-in-place reinforced concrete foundation.



Foundation excavation. Diameter approx. 20 m



Reinforcing steel installation. Between 40-50 tons of rebar



Each foundation requires approx. 400-600 m<sup>3</sup> of concrete.

- The electrical system will consist of underground cables or overhead lines and a Project collector substation. Ploughing, trenching, and directional drilling will be used to install underground cables. The cabling will be buried at a depth that will not interfere with normal agricultural practices.

Buried collection system



Substation connecting a project to a transmission line



# TURBINE ASSEMBLY



## Transportation of turbine components

Approximately 12 trucks are required for delivery of a complete turbine.



**Tower assembly**  
6 to 7 tower sections.



**Nacelle installation**  
The nacelle weighs about 65 tons.



**Blade assembly**  
The blades will be attached to the hub on the ground or lifted one at a time onto the hub.

# OPERATION AND MAINTENANCE BUILDING & PERMANENT METEOROLOGICAL TOWERS



- An operation and maintenance (O&M) building will be built to allow operators to maintain the turbines and house spare parts.
- Wind speed, wind direction, temperature and humidity will be measured by permanent meteorological towers. At least one permanent meteorological tower will remain on site for the duration of the Project.





## PROJECT DESCRIPTION

<b>DEVELOPER</b>	EDF EN Canada Inc.
<b>PROJECT NAME</b>	Cypress Wind Power Project
<b>HOST MUNICIPALITIES</b>	Cypress County
<b>CONTRACT CAPACITY</b>	Up to 235.2 MW

### ENERGY

The Project will generate sufficient electricity to power up to 70,000 homes

### LOCATION

Located on approximately 12,500 acres of privately owned land

### ELECTRIC SYSTEM

Each turbine will be linked to the Project collector substation by a collector system that will be underground, wherever practical. The location of the Project collector substation has not been determined at this time.

### INTERCONNECTION

The Project will be interconnected to the 240 kilovolt (kV) transmission system in the area that is operated by AltaLink.





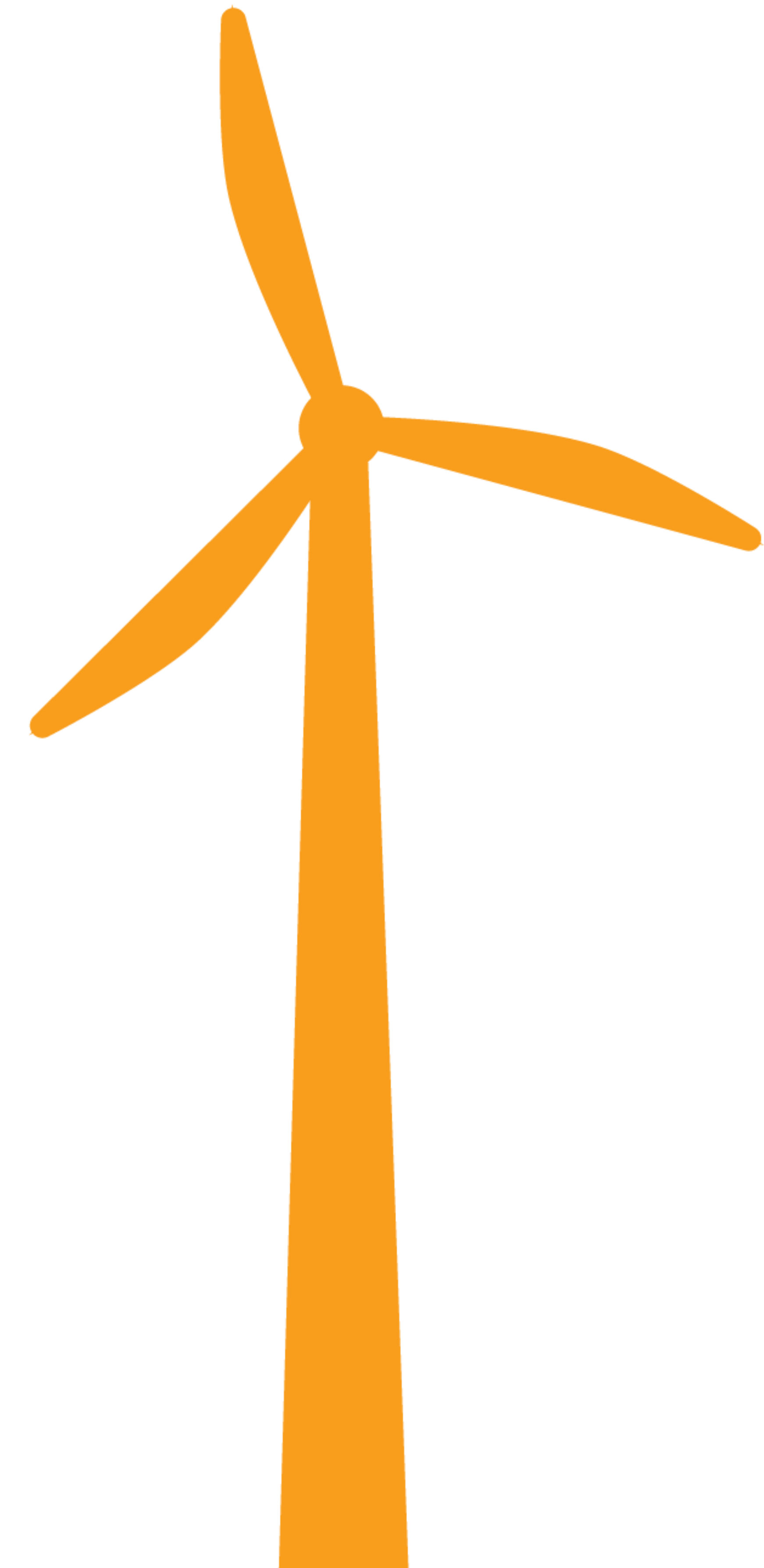
## UPDATES SINCE APRIL 2017 OPEN HOUSE



Starting in 2016, we have continued to consider your feedback and have developed two project layouts. These are for the two proposed turbine models: Option A and Option B. We will file only one turbine model in the AUC application.

### **New Project updates include:**

- Turbine Options A and B – Selected the [Vestas V136 4.2 MW](#) and the [Gamesa G132 3.465 MW](#) models
- [Visual Simulations](#) – Images for what the Project may look like are available for review for Option A and Option B.
- [Environmental Studies](#) – Field work will be complete in 2017.
- Changes to the Project boundary – Reduced to [minimize impact on the community](#).
- [Shadow Flicker Analysis](#) – Results are available in the Infrastructure, Shadow Flicker, and Noise Maps for Option A and Option B.
- [Noise Impact Assessments](#) – Noise contours are available in the Infrastructure, Shadow Flicker, and Noise Maps for Option A and Option B.



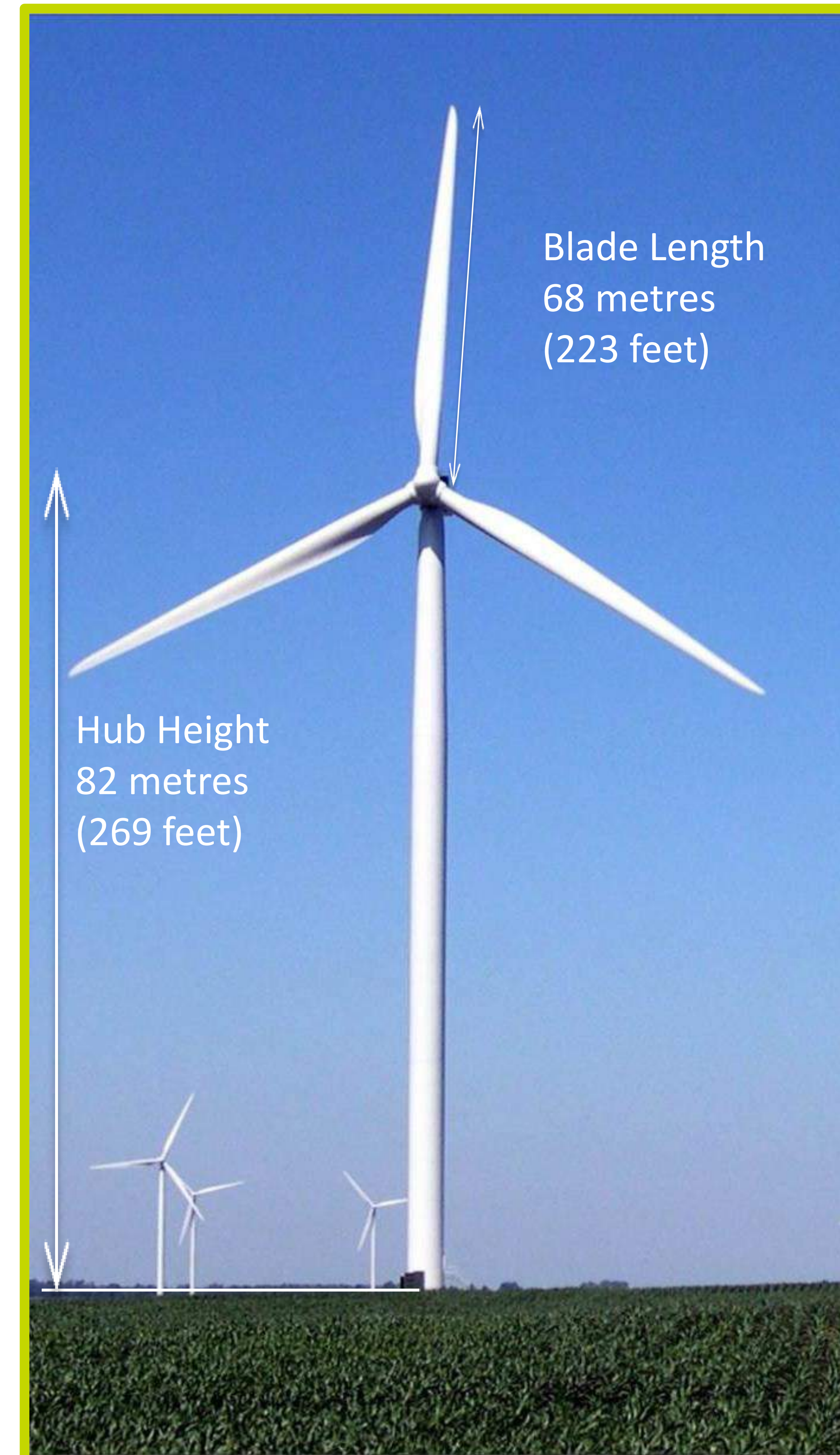


## TYPICAL PROJECT INFRASTRUCTURE

### TURBINE OPTION A: VESTAS V136 4.2 MW



- Wind Turbines
  - Vestas Turbines
  - Blades (68 metres)
  - Hub Height (82 metres)
  - Rotor Diameter (136 metres)
  - Foundation
  - Capacity (4.2 megawatts)
- Access Roads
- Temporary Laydown Area
- Collector System
- Project Collector Substation
- Operation and Maintenance Building
- Temporary and Permanent Meteorological Towers



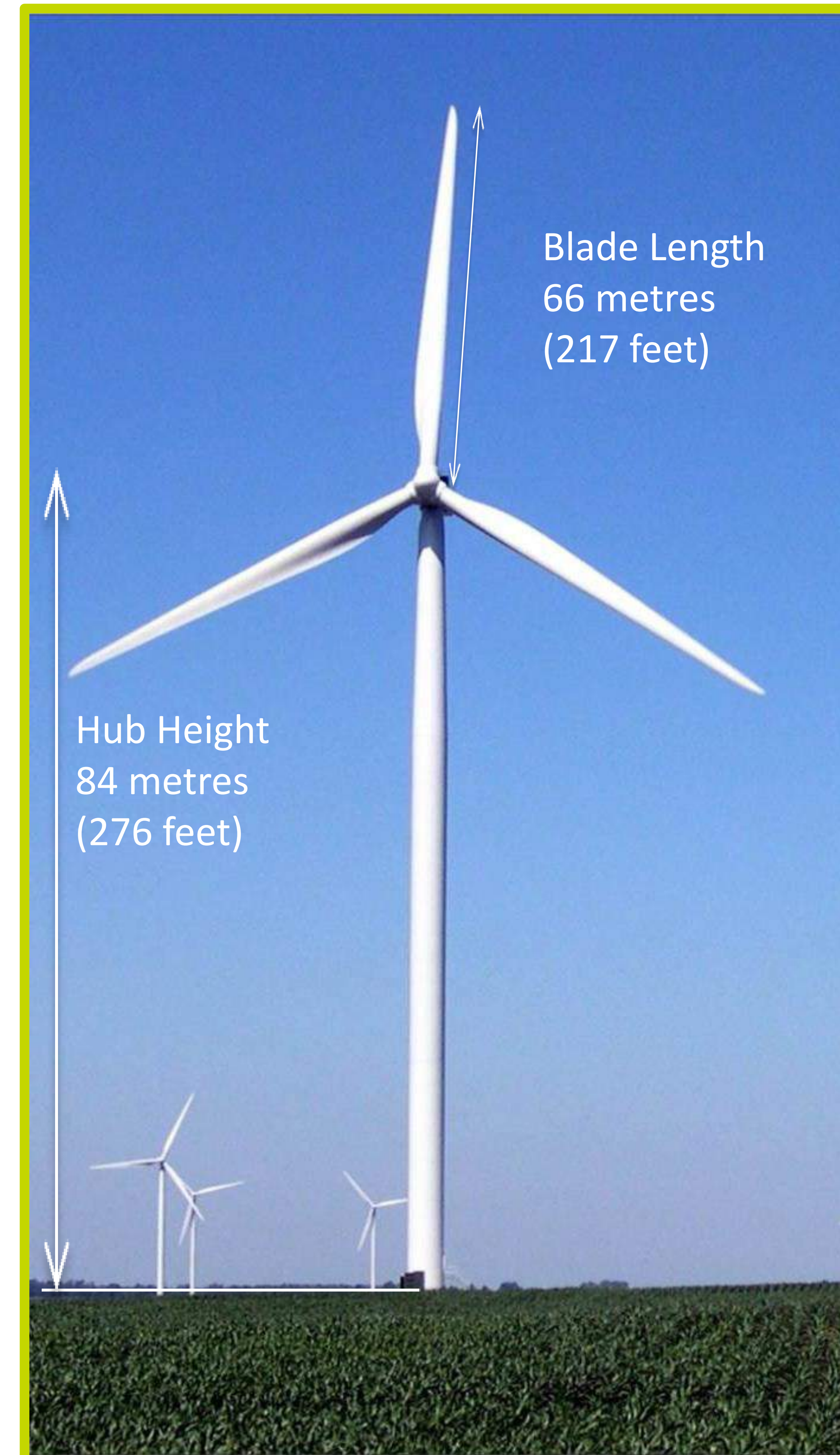


## TYPICAL PROJECT INFRASTRUCTURE

### TURBINE OPTION B: GAMESA G132 3.465 MW



- Wind Turbines
  - Gamesa Turbines
  - Blades (66 metres)
  - Hub Height (84 metres)
  - Rotor Diameter (132 metres)
  - Foundation
  - Capacity (3.465 megawatts)
  
- Access Roads
- Temporary Laydown Area
- Collector System
- Project Collector Substation
- Operation and Maintenance Building
- Temporary and Permanent Meteorological Towers







# TURBINE OPTION A AND TURBINE OPTION B

Based on public consultation and studies including environmental studies, constraints analyses, and wind resource assessments, we have selected Turbine Option A and Turbine Option B. Each Turbine Option is illustrated in the Infrastructure, Shadow Flicker and Noise maps.

	Turbine Option A	Turbine Option B
Turbine Model	Vestas V136 4.2	Gamesa G132 3.465
Turbine Capacity (MW)	4.2	3.465
Rotor Diameter (metres)	136	132
Hub Height (metres)	82	84
Blade Length (metres)	68	66
Number of Turbine Locations	56	61
Total Project Capacity (MW)	235.2	211.37



# SHADOW FLICKER ANALYSIS

- **Shadow flicker** is caused when the turbine blades cast a shadow on nearby residences.
- Residences within **2km** of the project were considered in the shadow flicker.
- The worst-case scenario was evaluated, and does not account for **the orientation of windows** or mitigation from nearby trees or structures.
- The shadow flicker results are presented on a color scale that correlates with the anticipated worst-case annual hours of shadow flicker. These are available on the **Infrastructure, Shadow Flicker, and Noise Maps for Options A and B.**



## THANK YOU FOR ATTENDING

Your feedback is important to us

Did you fill out a feedback form ?

**A WORLD  
LEADER IN  
RENEWABLE  
ENERGY**



### CONTACT US

PHONE:

844-55-EDF-EN /  
844-553-3336

WEBSITE:

[www.edf-  
en.ca/project/cypress-  
wind-power-project/](http://www.edf-en.ca/project/cypress-wind-power-project/)







Before



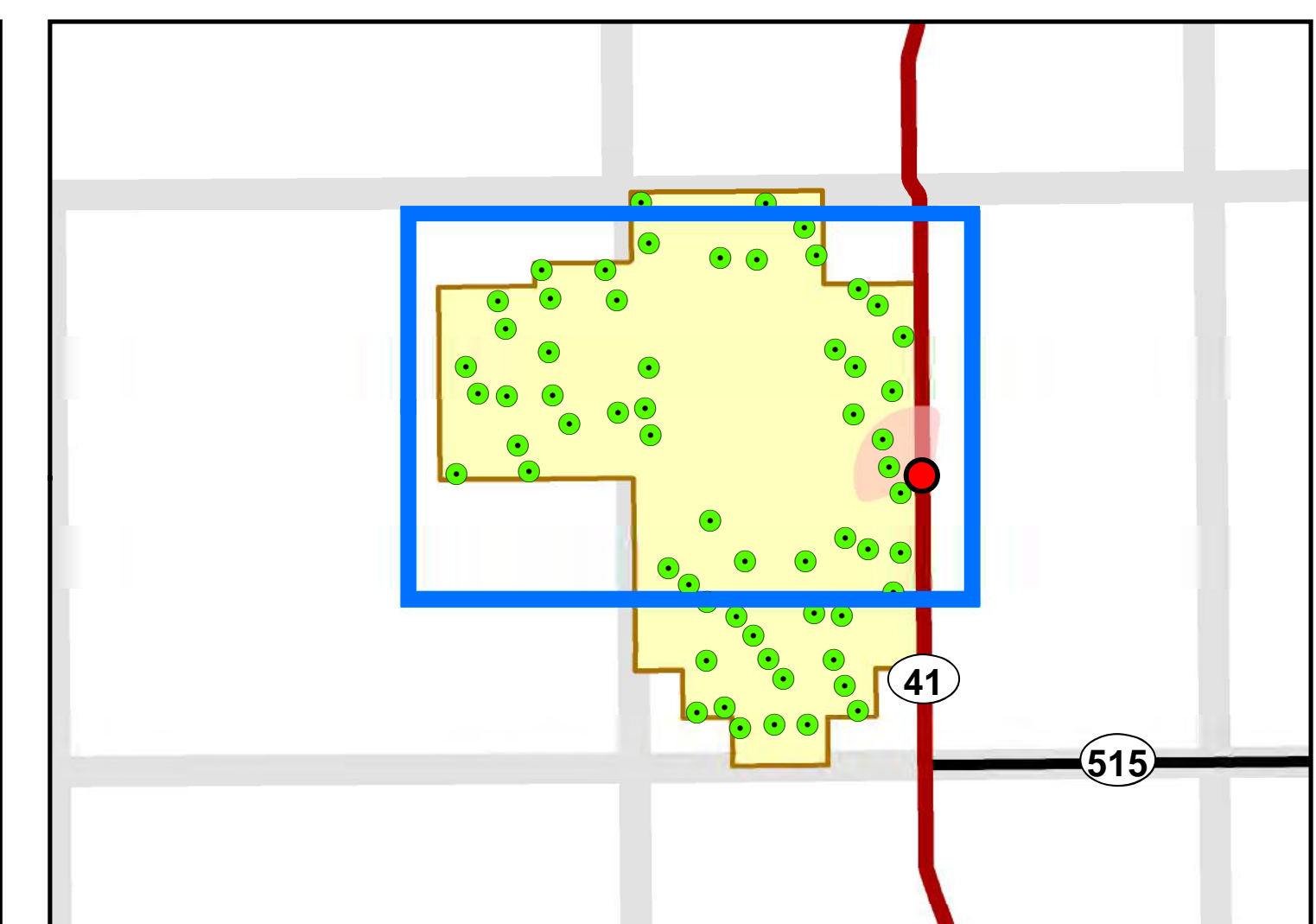
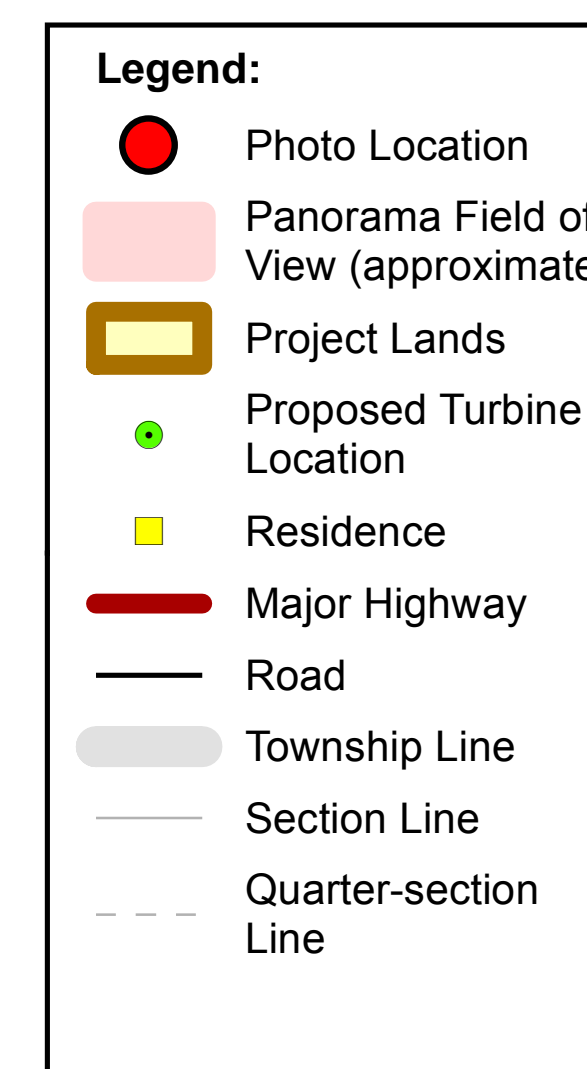
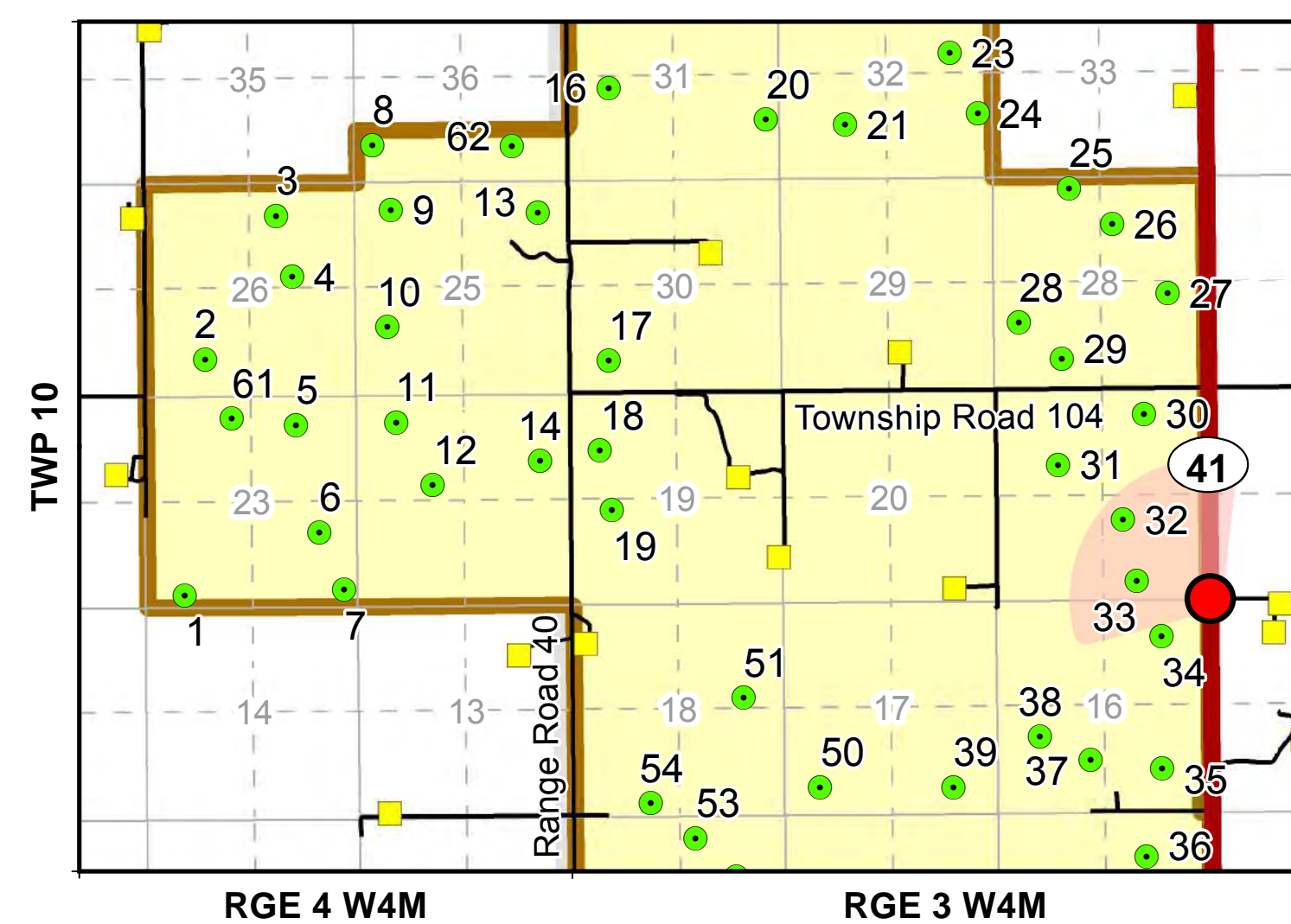
After

<b>Title:</b>	<b>Photomontage: Location 9 (G132)</b>
<b>Client:</b>	<b>Cypress Wind Project</b>
 	<b>Datum:</b> NAD 83 <b>Projection:</b> UTM Zone 12N <b>Scale:</b> N.T.S.
	<b>Date:</b> 2017-11-09 <b>Version:</b> 1 <b>Prepared By:</b> WSP Canada Inc. <b>Author:</b> S. Schnick <b>Reviewed:</b> A. Louro <b>Approved:</b> R. Istchenko

**Notes:**  
 Photographs taken with Canon ESO 5D Mk II camera and Canon EF24-70mm f/2.8L lens set at 50 mm. Panoramic view compiled from multiple individual photographs. Photomontage simulated using Siemens-Gamesa G132 3.465 MW turbine with rotor diameter of 132 m and hub height of 84 m using 61 turbine locations (Layout Lv07).

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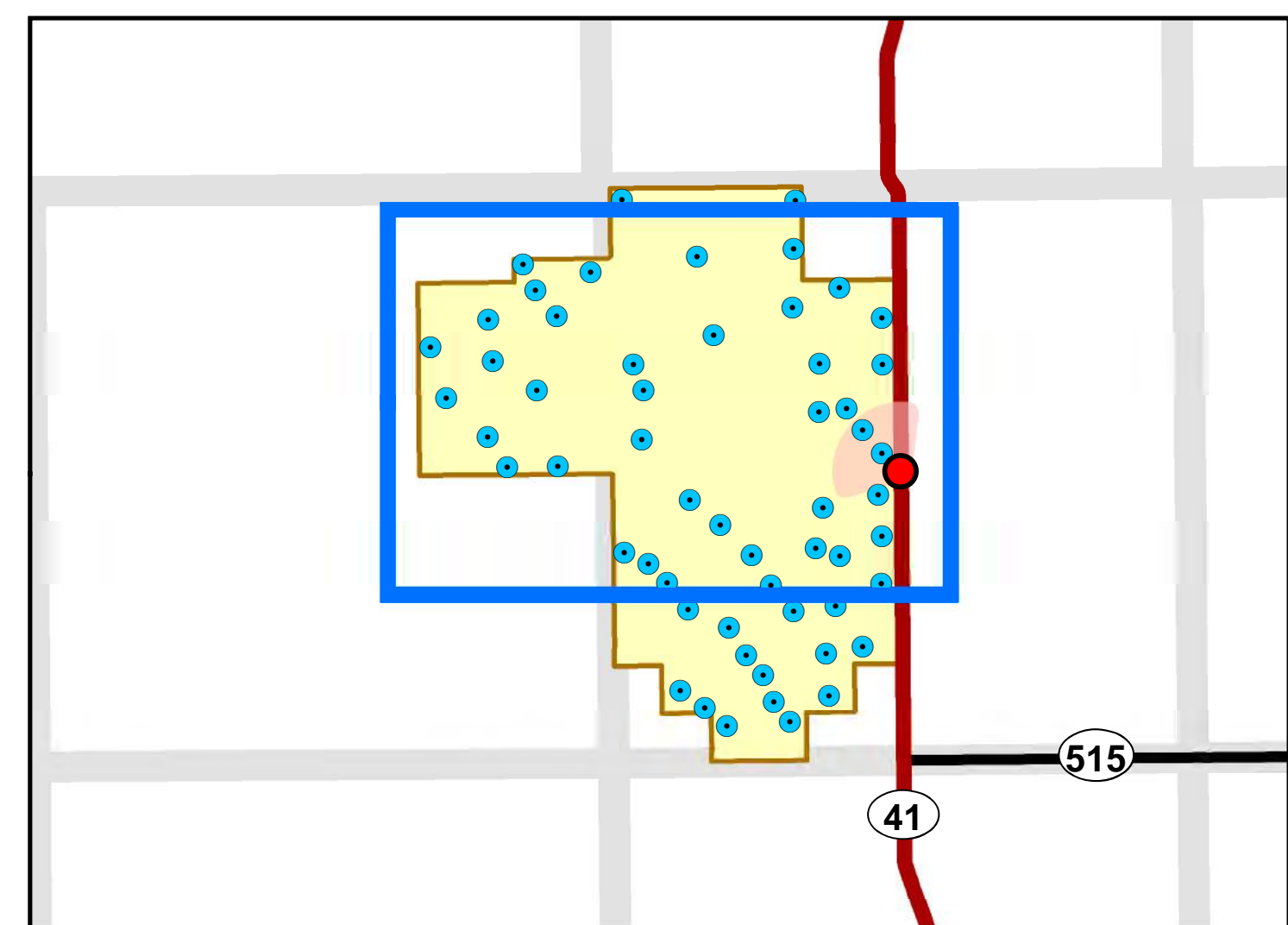
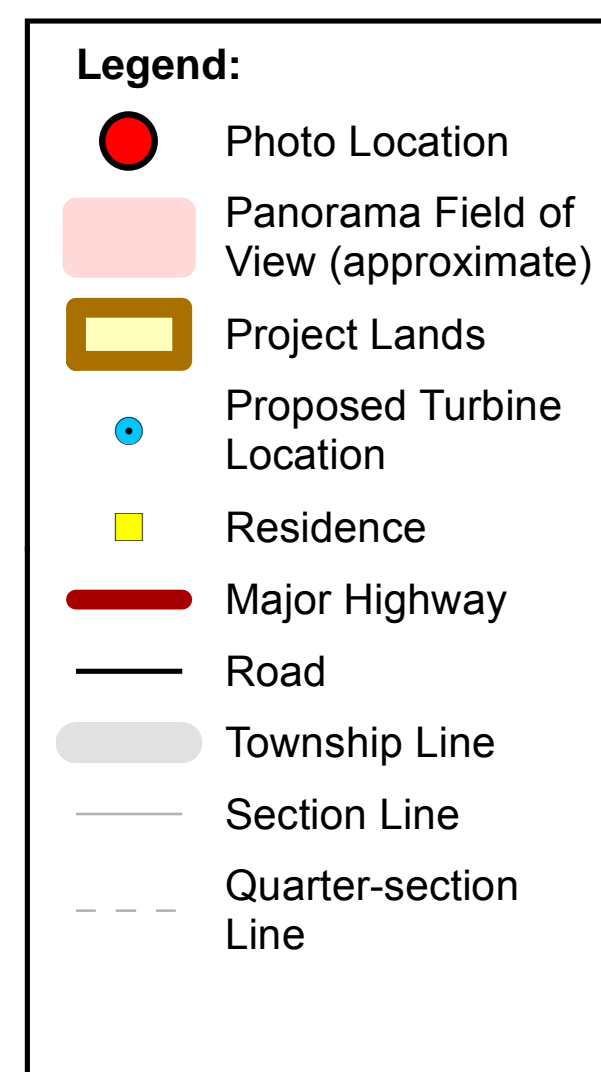
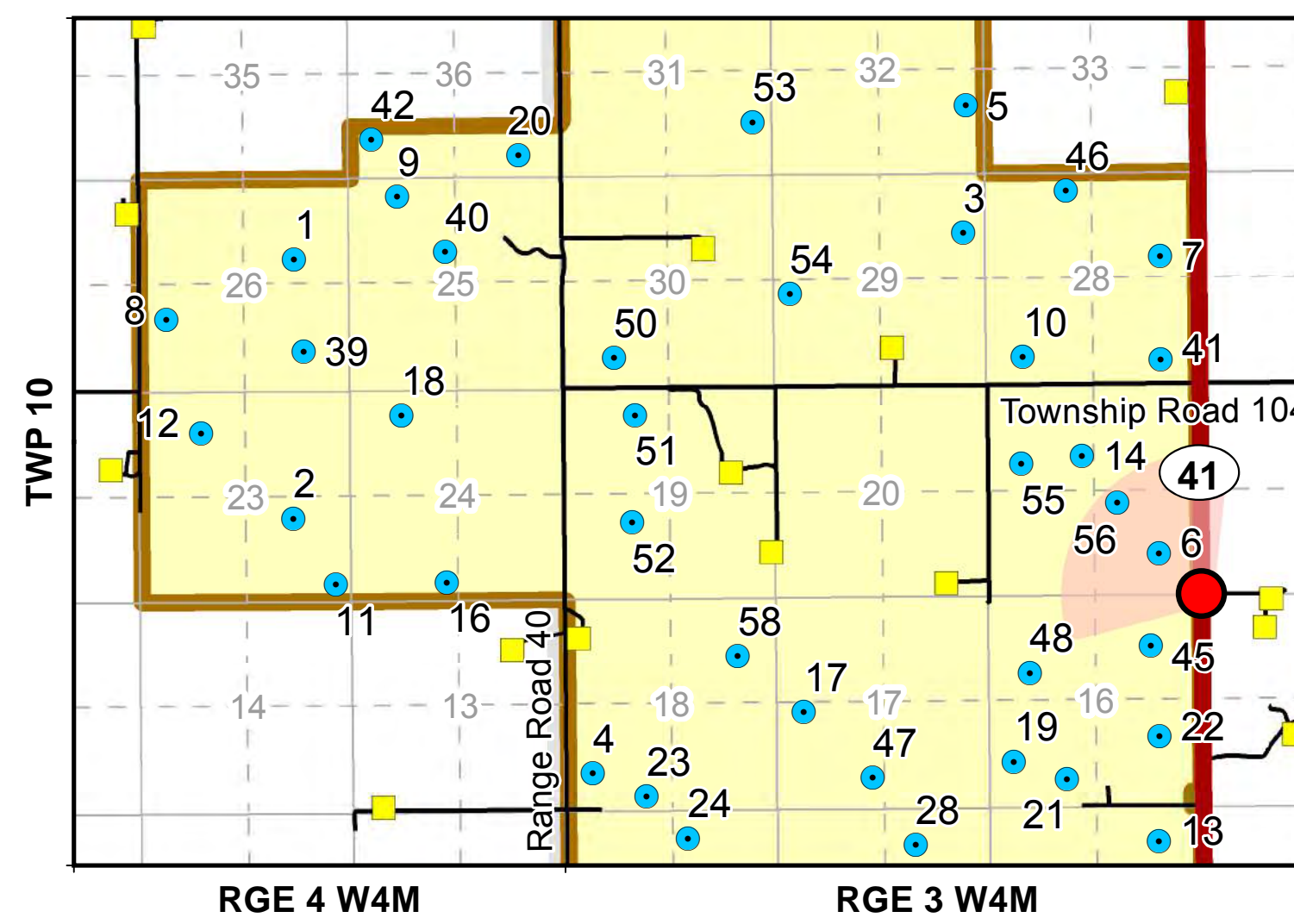
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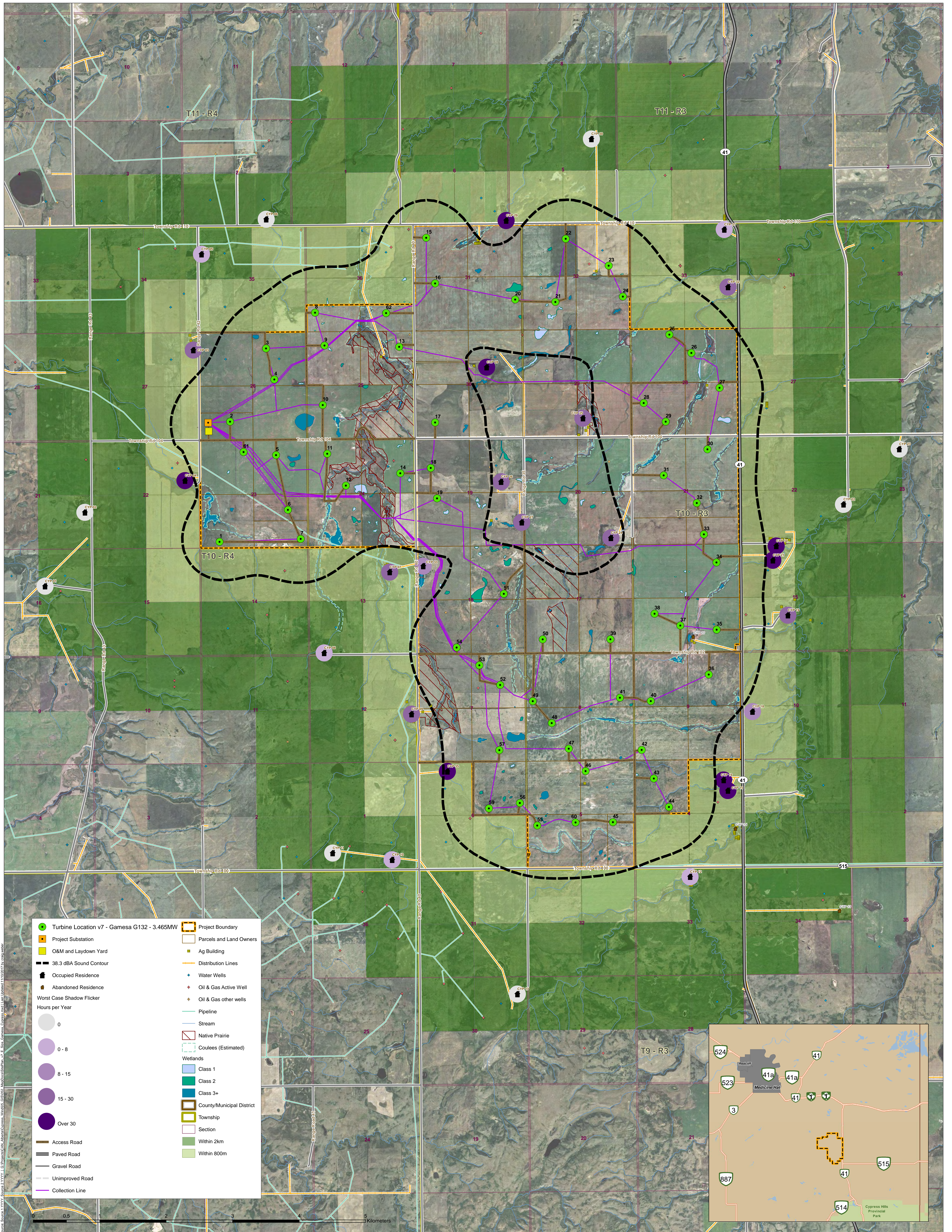
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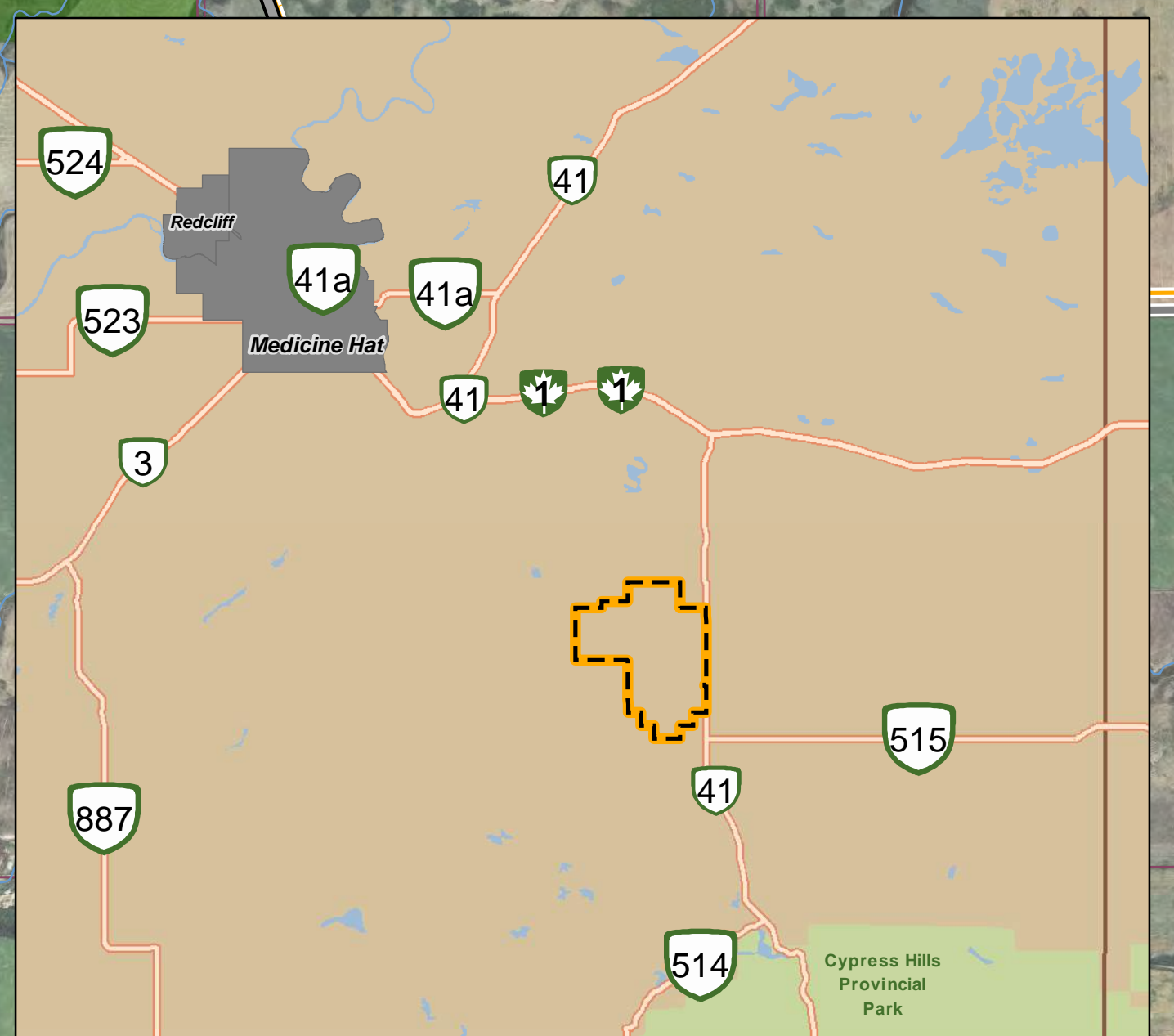
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- Turbine Location v7 - Gamesa G132 - 3.465MW
- Project Boundary
- Project Substation
- O&M and Laydown Yard
- 38.3 dBA Sound Contour
- Occupied Residence
- Abandoned Residence
- Worst Case Shadow Flicker Hours per Year
- 0
- 0 - 8
- 8 - 15
- 15 - 30
- Over 30
- Access Road
- Paved Road
- Gravel Road
- Unimproved Road
- Collection Line
- Parcels and Land Owners
- Ag Building
- Distribution Lines
- + Water Wells
- + Oil & Gas Active Well
- + Oil & Gas other wells
- Pipeline
- Stream
- Native Prairie
- Coulees (Estimated)
- Wetlands
- Class 1
- Class 2
- Class 3+
- County/Municipal District
- Township
- Section
- Within 2km
- Within 800m









Before



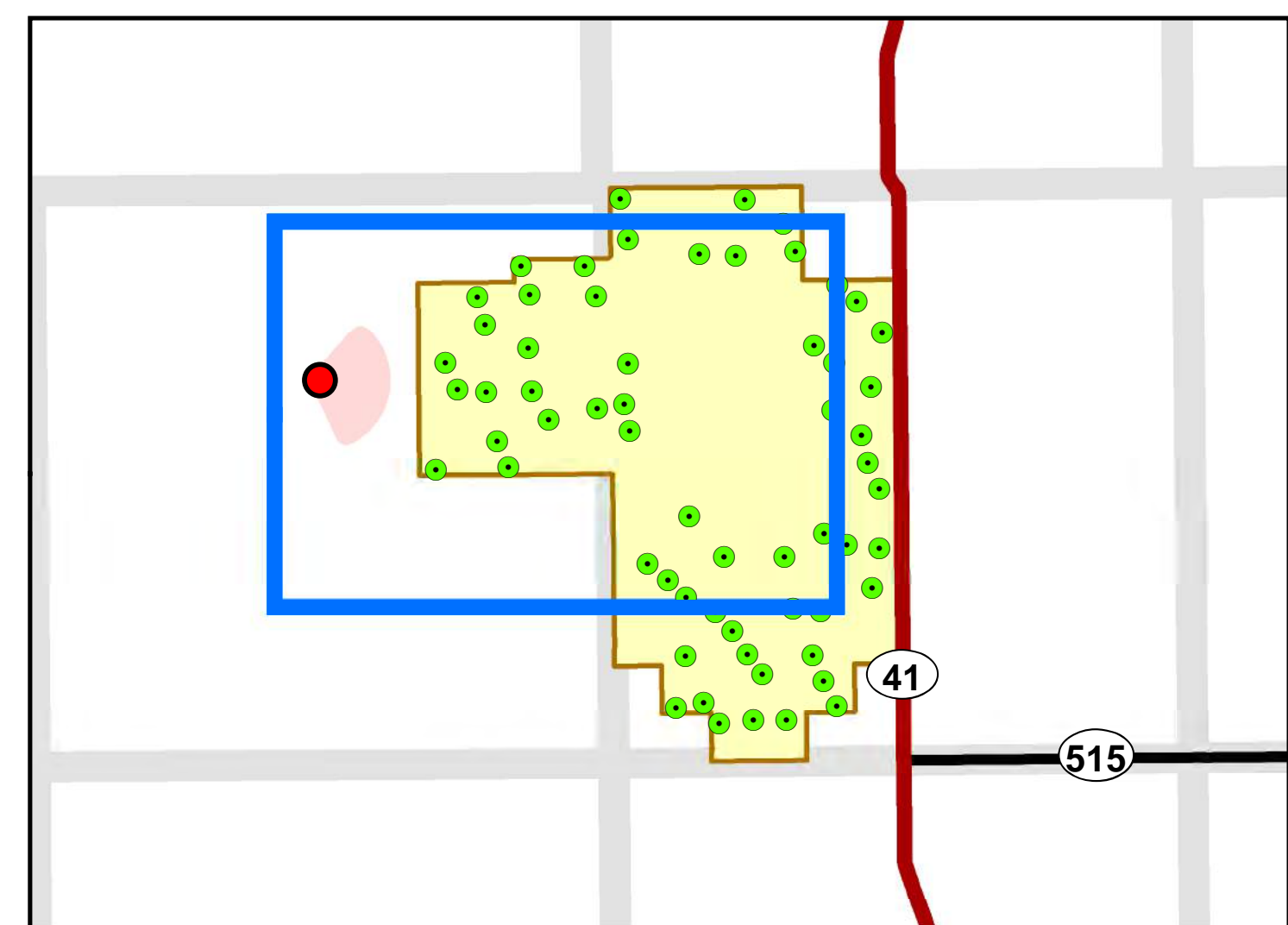
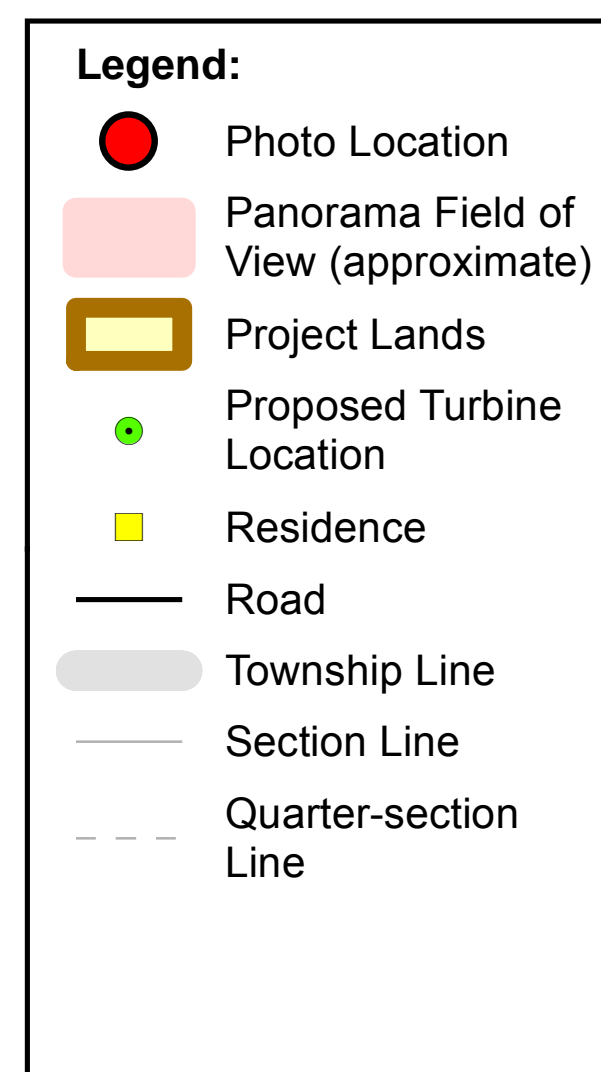
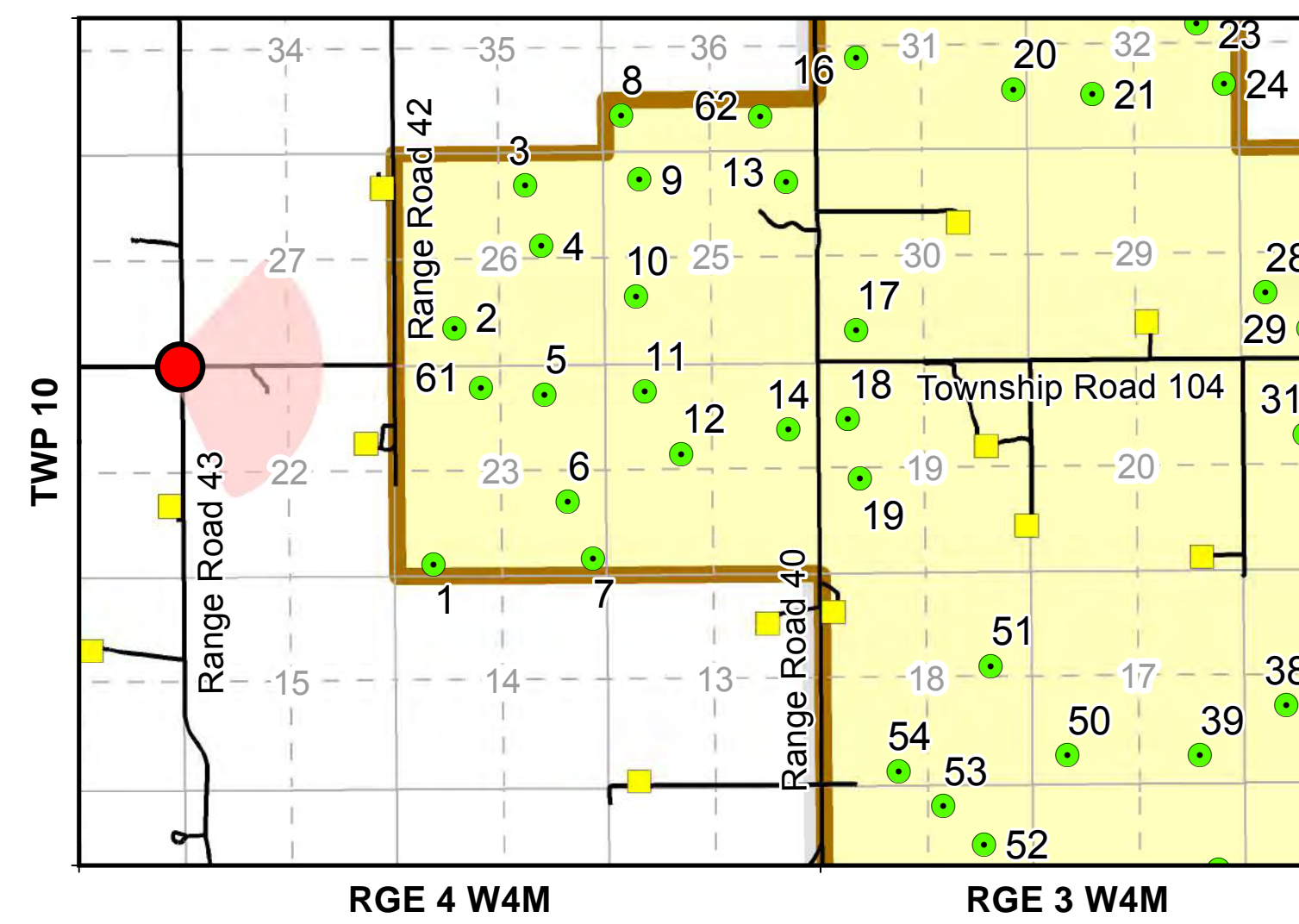
After

<b>Title:</b> Photomontage: Location 3 (G132)	
<b>Client:</b> Cypress Wind Project	
 	<b>Datum:</b> NAD 83 <b>Projection:</b> UTM Zone 12N <b>Scale:</b> N.T.S.
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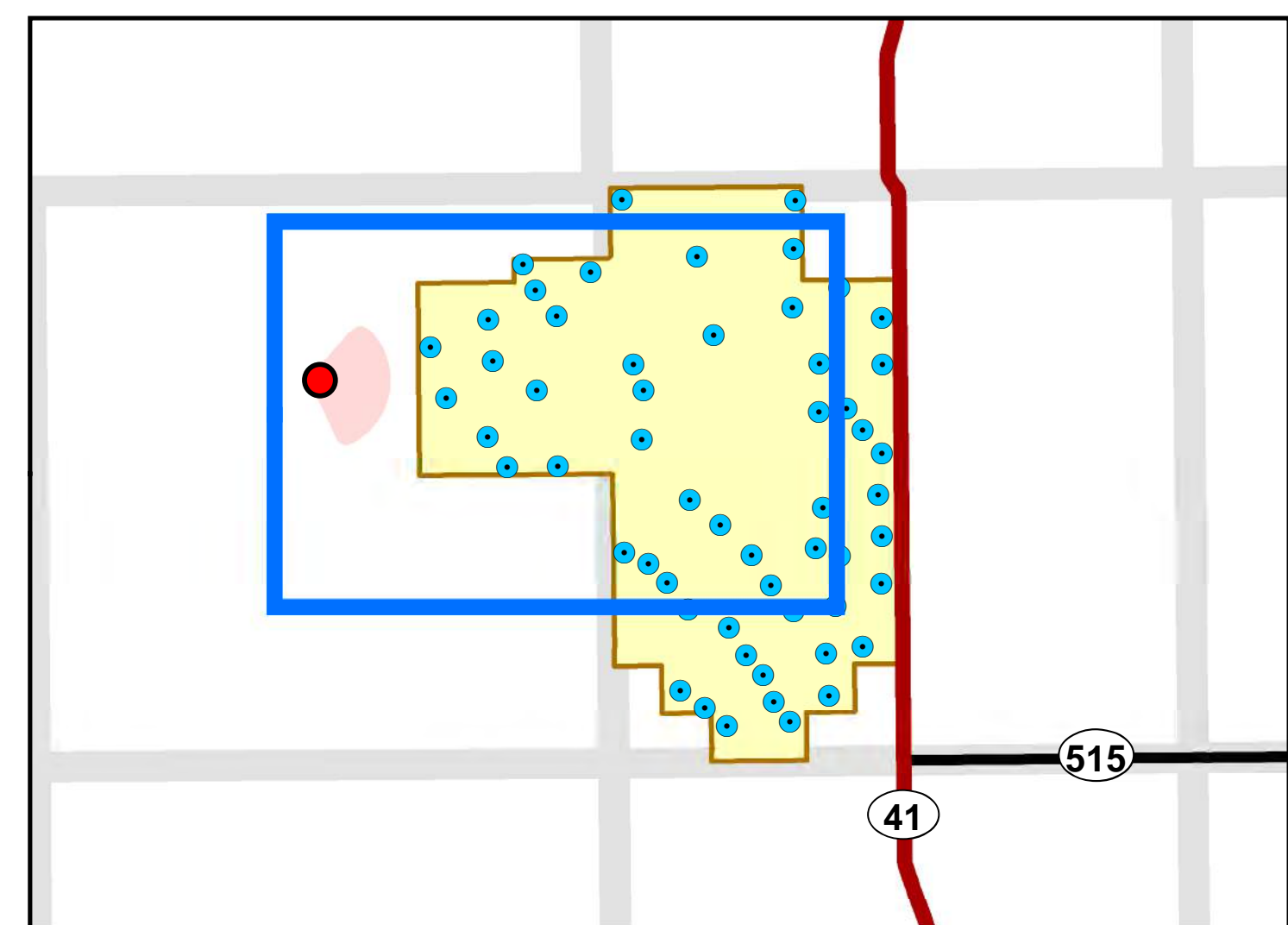
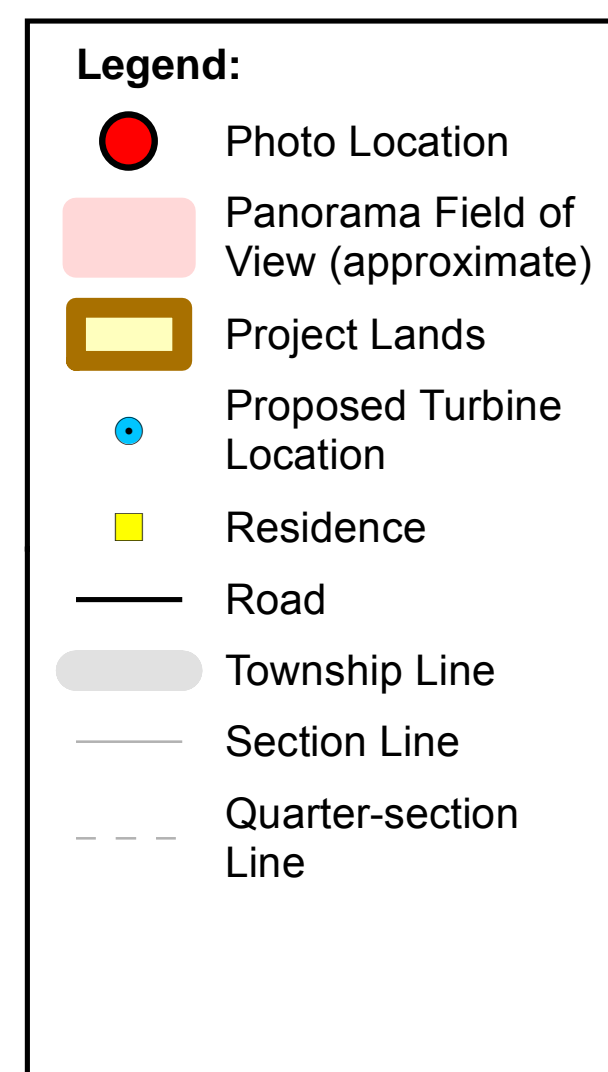
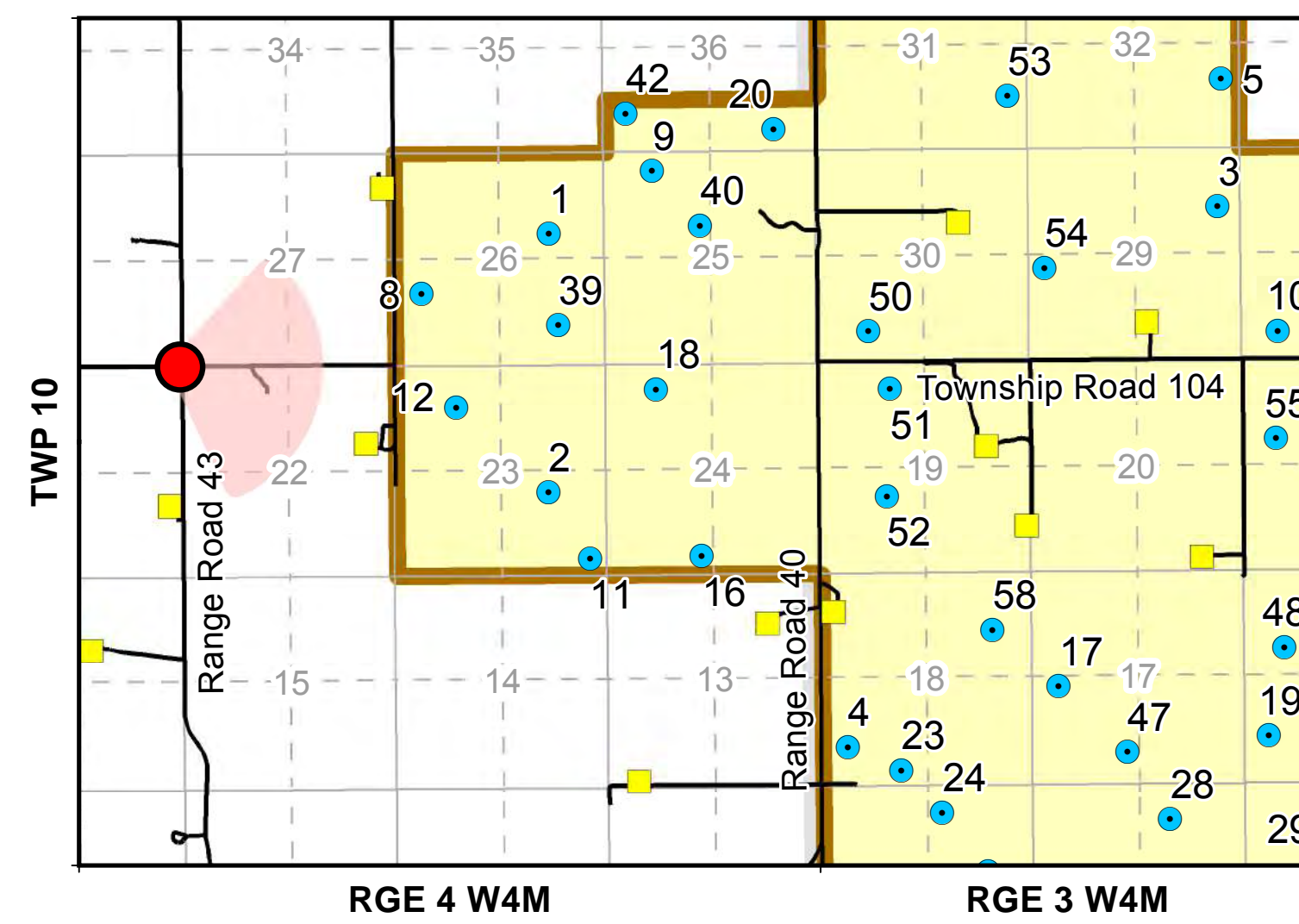
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Before



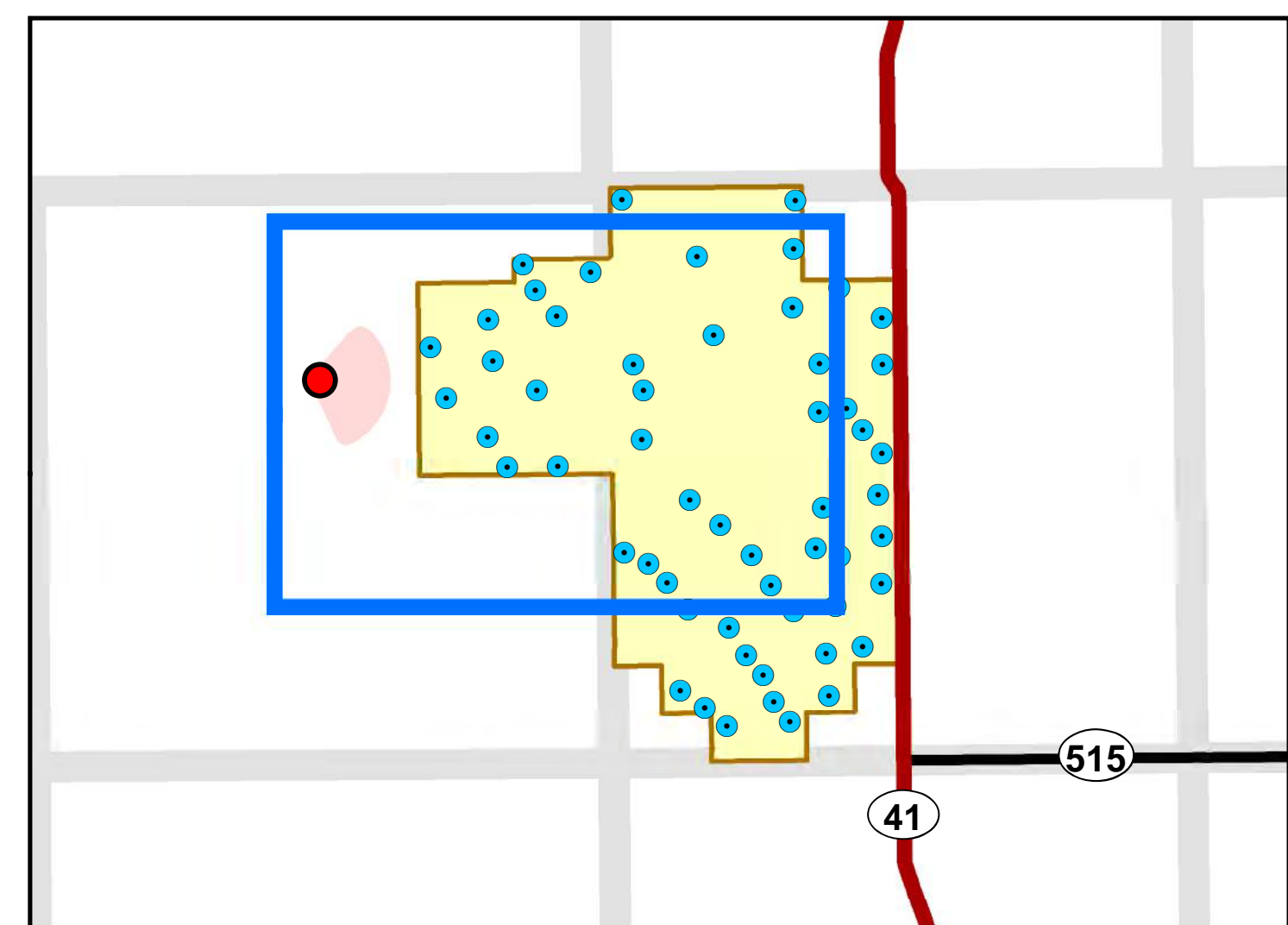
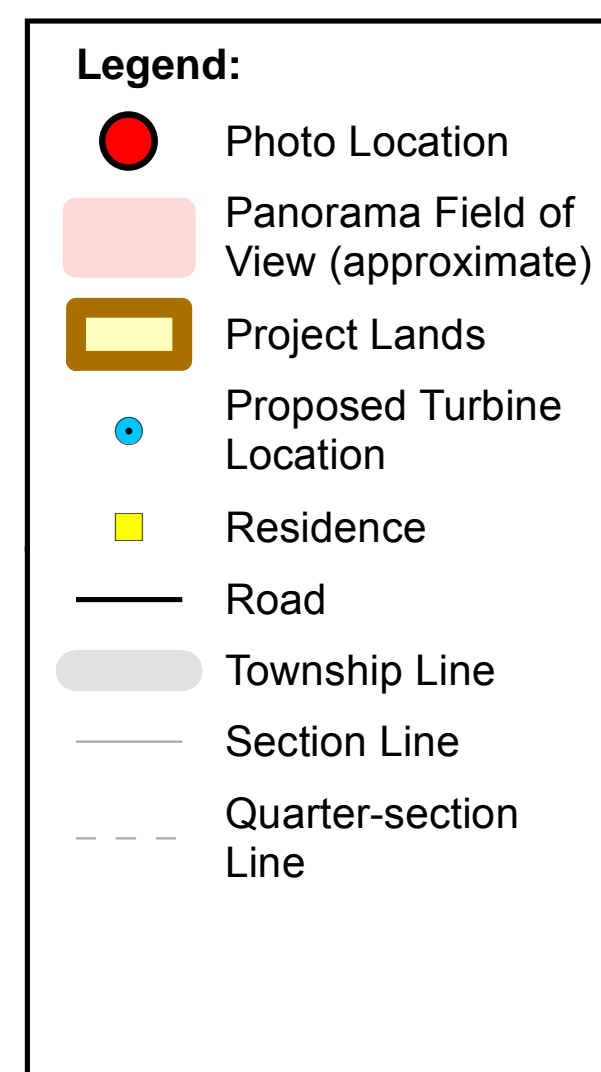
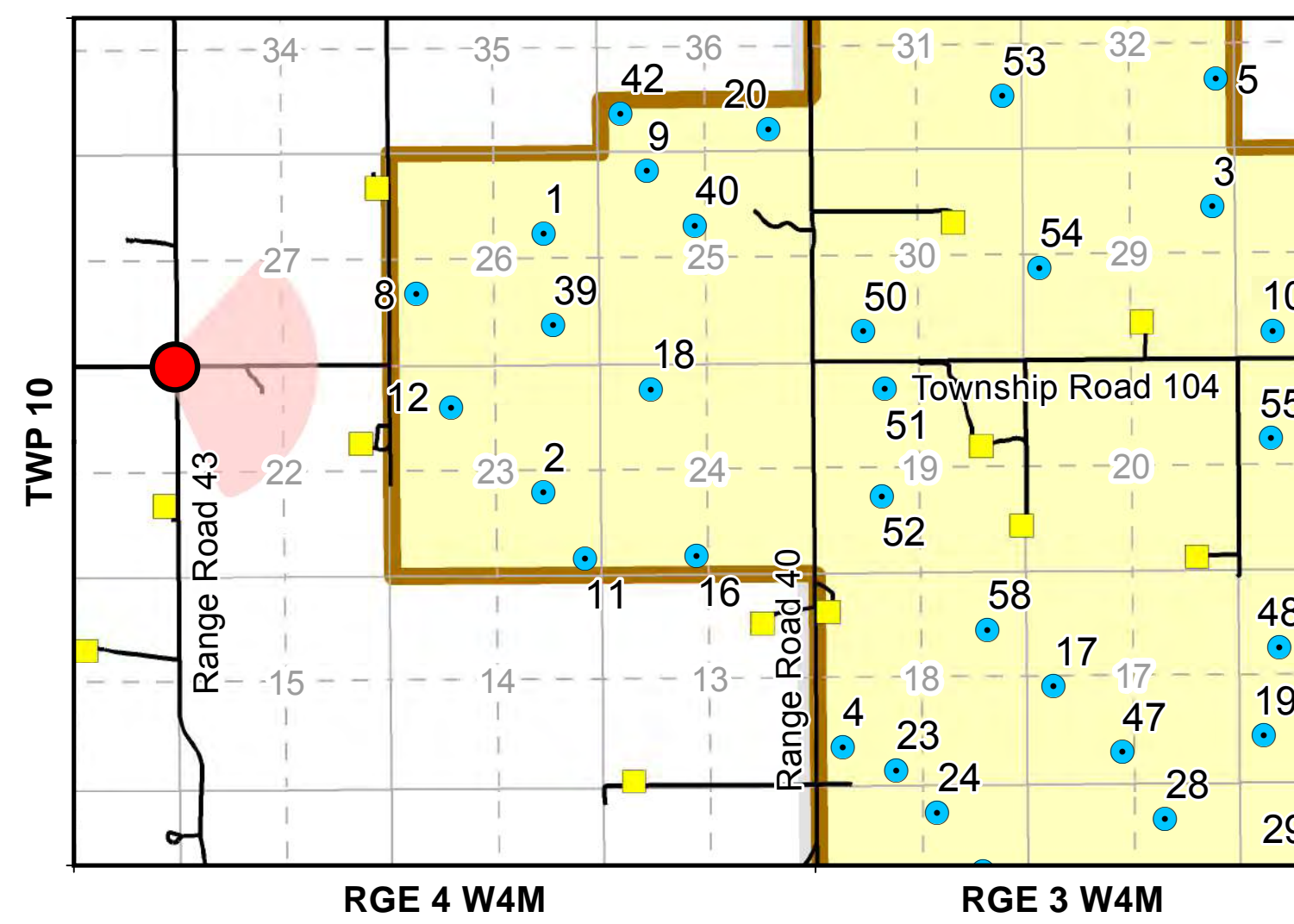
After

<b>Title:</b> Photomontage: Location 3 (V136)	
<b>Client:</b> Cypress Wind Project	
 	<b>Datum:</b> NAD 83 <b>Projection:</b> UTM Zone 12N <b>Scale:</b> N.T.S.
	<b>Date:</b> 2017-11-09 <b>Version:</b> 1 <b>Prepared By:</b> WSP Canada Inc. <b>Author:</b> S. Schnick <b>Reviewed:</b> A. Louro <b>Approved:</b> R. Istchenko

**Notes:**  
 Photographs taken with Canon ESO 5D Mk II camera and Canon EF24-70mm f/2.8L lens set at 50 mm. Panoramic view compiled from multiple individual photographs. Photomontage simulated using Vestas V136 4.2 MW turbine with rotor diameter of 136 m and hub height of 82 m using 56 turbine locations (Layout Lv08).

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Before



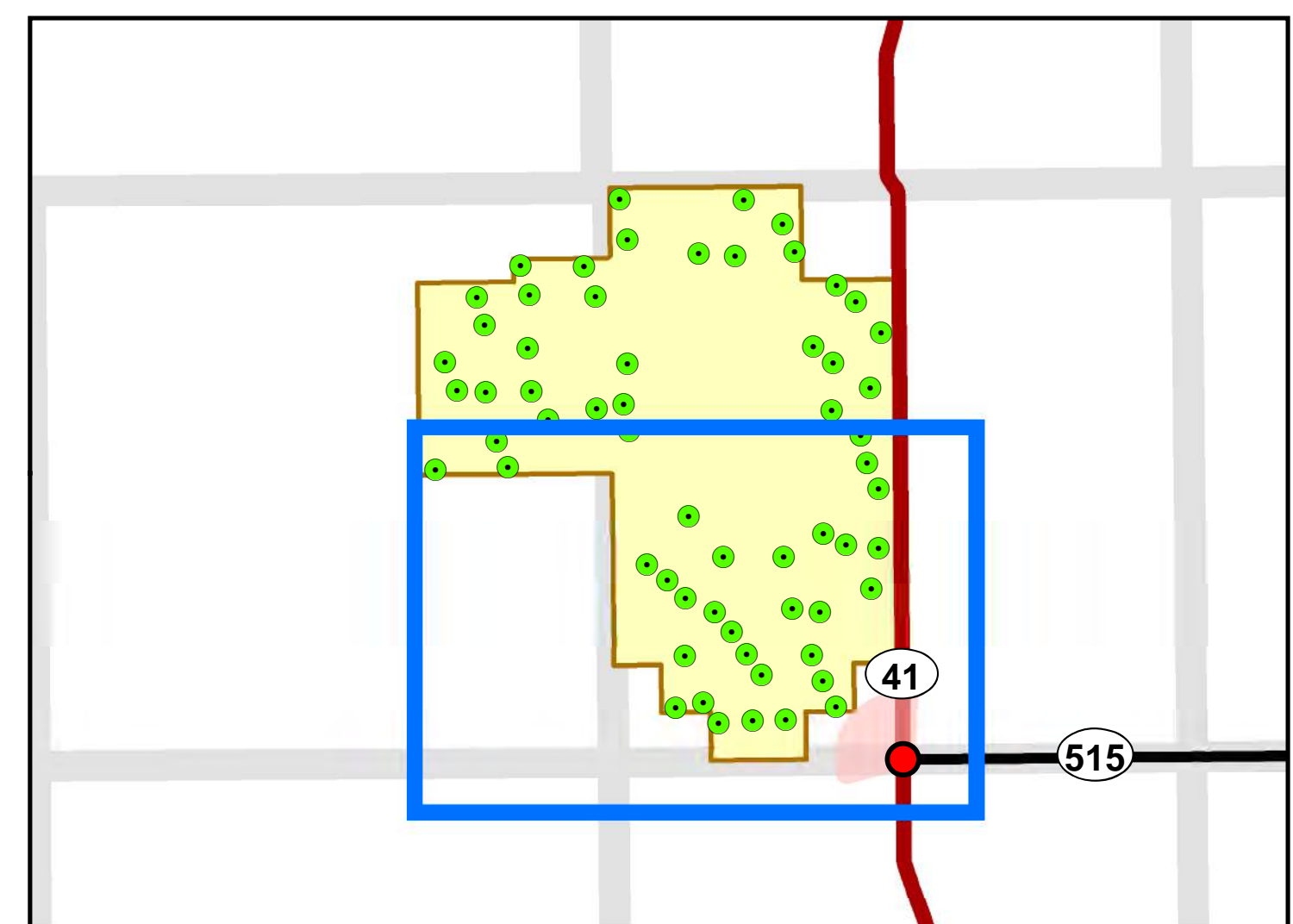
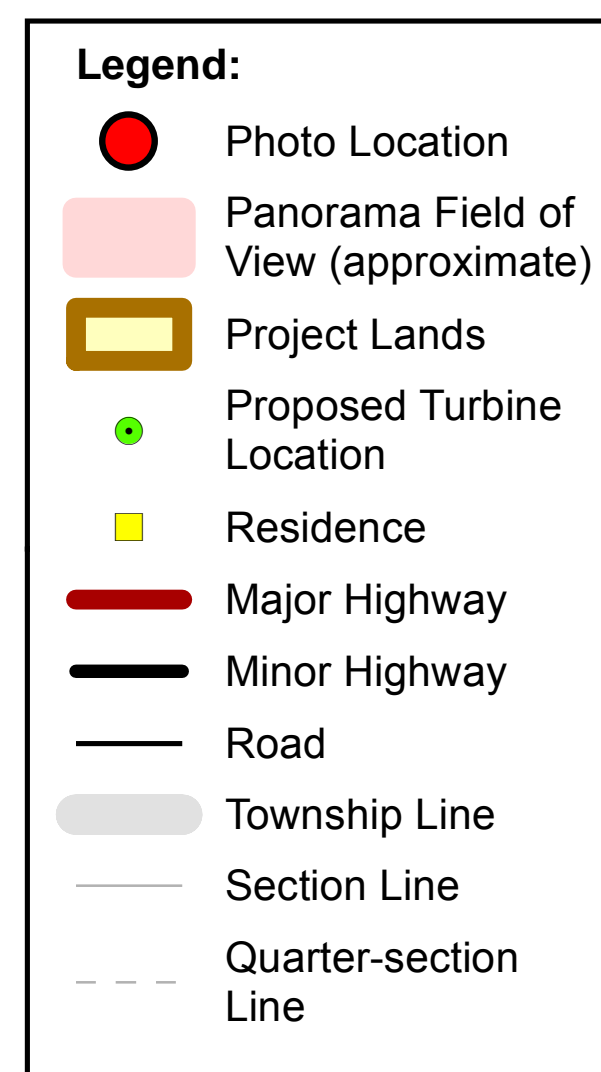
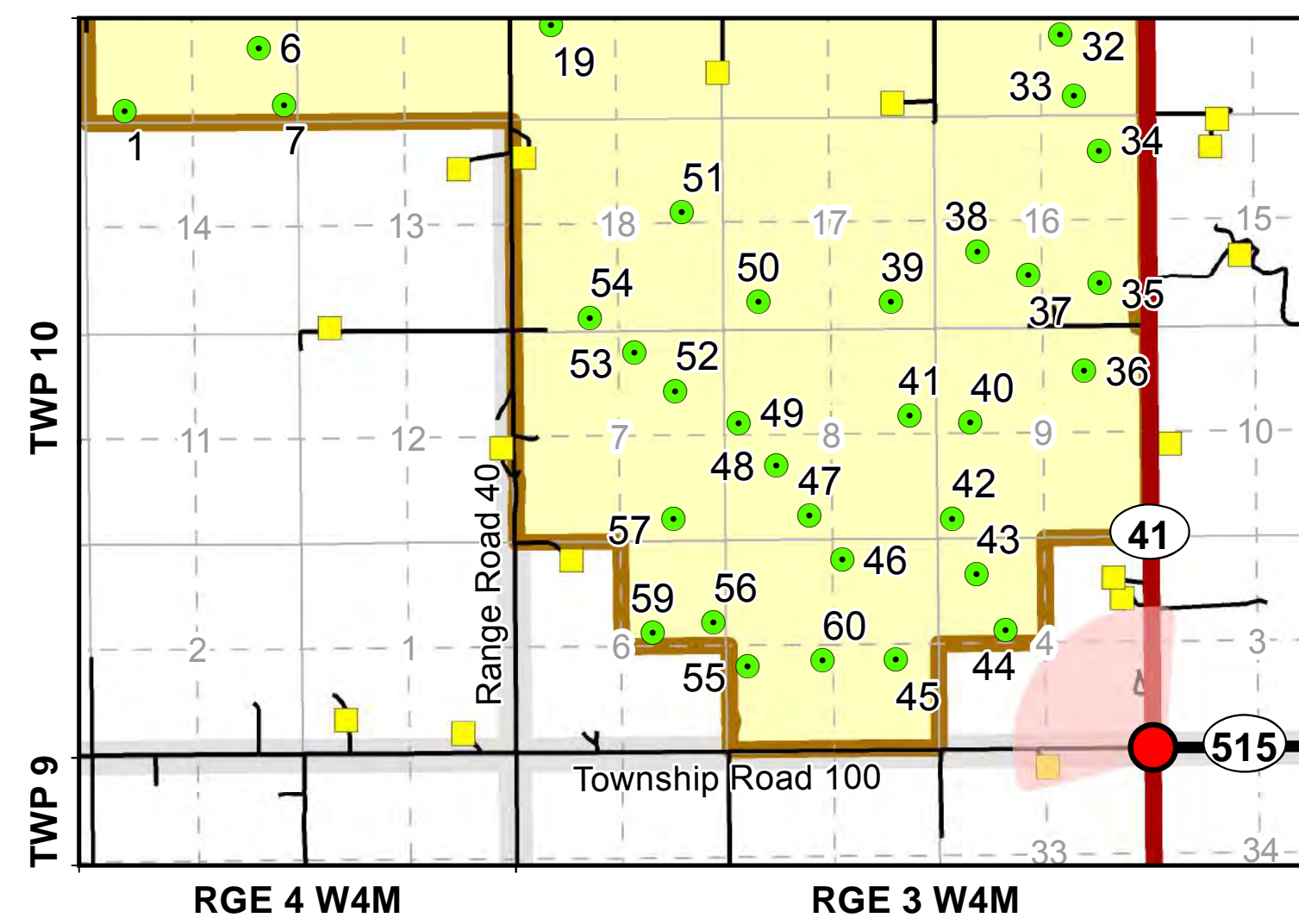
After

<b>Title:</b>	<b>Photomontage: Location 6 (G132)</b>
<b>Client:</b>	<b>Cypress Wind Project</b>
 	<b>Datum:</b> NAD 83 <b>Projection:</b> UTM Zone 12N <b>Scale:</b> N.T.S.
	<b>Date:</b> 2017-11-10 <b>Version:</b> 1 <b>Prepared By:</b> WSP Canada Inc. <b>Author:</b> S. Schnick <b>Reviewed:</b> A. Louro <b>Approved:</b> R. Istchenko

**Notes:**  
 Photographs taken with Canon ESO 5D Mk II camera and Canon EF24-70mm f/2.8L lens set at 50 mm. Panoramic view compiled from multiple individual photographs. Photomontage simulated using Siemens-Gamesa G132 3.465 MW turbine with rotor diameter of 132 m and hub height of 84 m using 61 turbine locations (Layout Lv07).

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Before



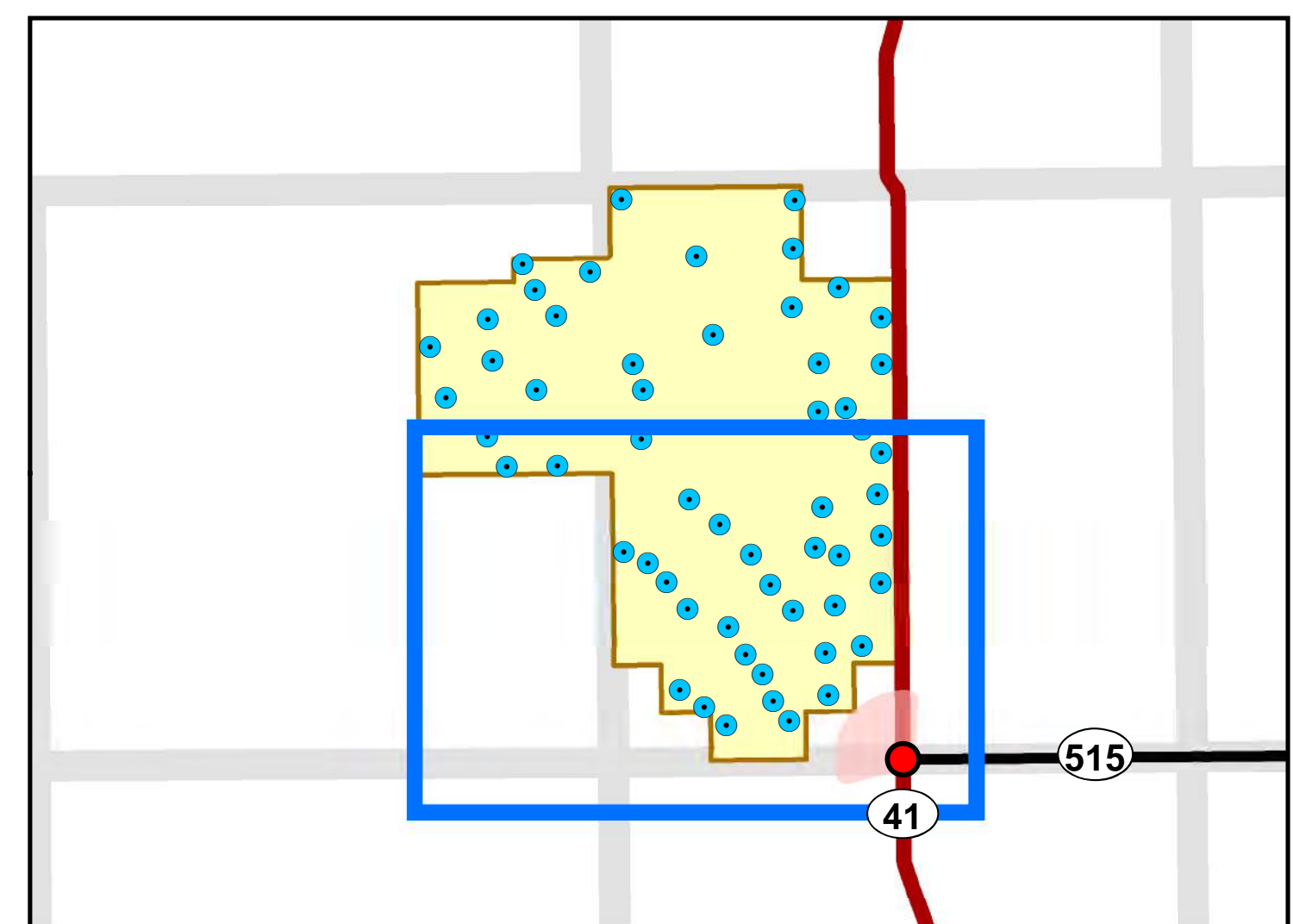
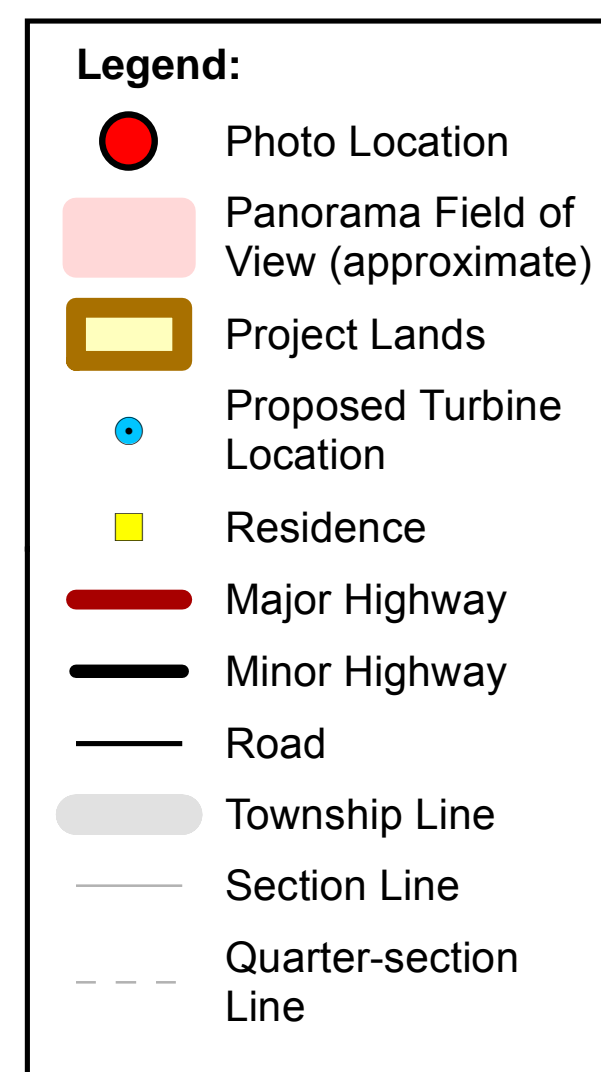
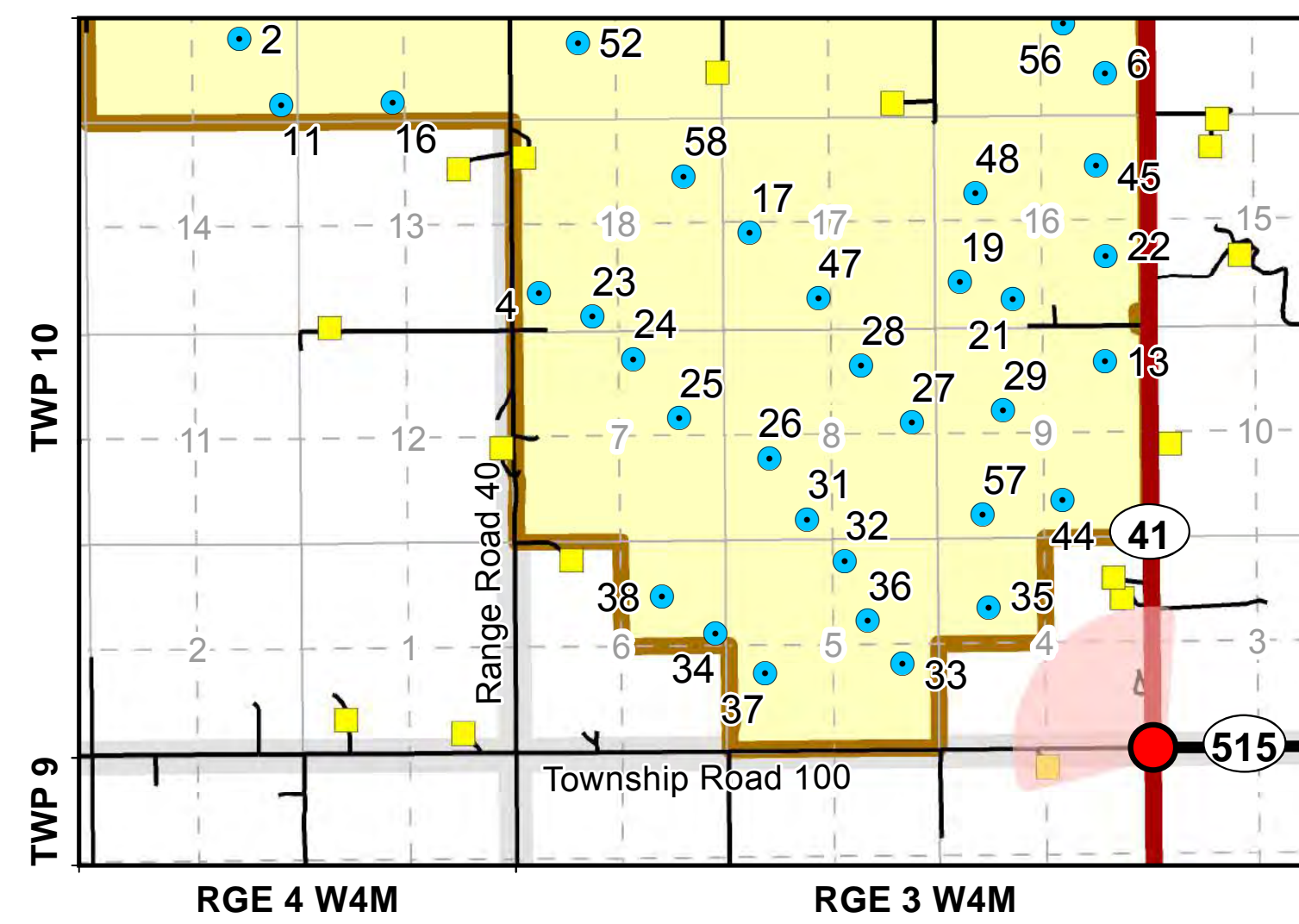
After

<b>Title:</b>	<b>Photomontage: Location 6 (V136)</b>
<b>Client:</b>	<b>Cypress Wind Project</b>
 	<b>Datum:</b> NAD 83 <b>Projection:</b> UTM Zone 12N <b>Scale:</b> N.T.S.
	<b>Date:</b> 2017-11-08 <b>Version:</b> 1 <b>Prepared By:</b> WSP Canada Inc. <b>Author:</b> S. Schnick <b>Reviewed:</b> A. Louro <b>Approved:</b> R. Istchenko

**Notes:**  
 Photographs taken with Canon ESO 5D Mk II camera and Canon EF24-70mm f/2.8L lens set at 50 mm. Panoramic view compiled from multiple individual photographs. Photomontage simulated using Vestas V136 4.2 MW turbine with rotor diameter of 136 m and hub height of 82 m using 56 turbine locations (Layout Lv08).

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Before



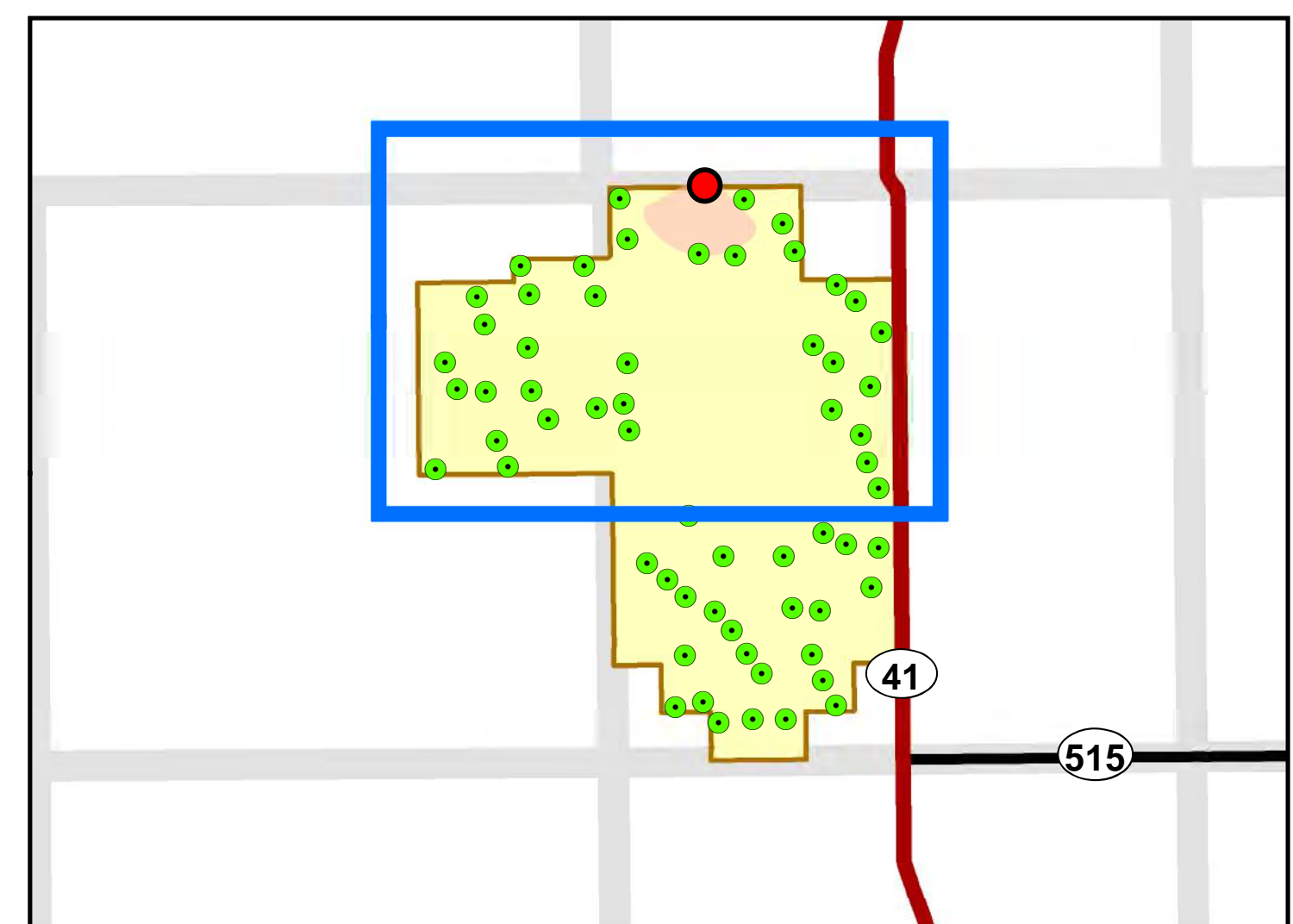
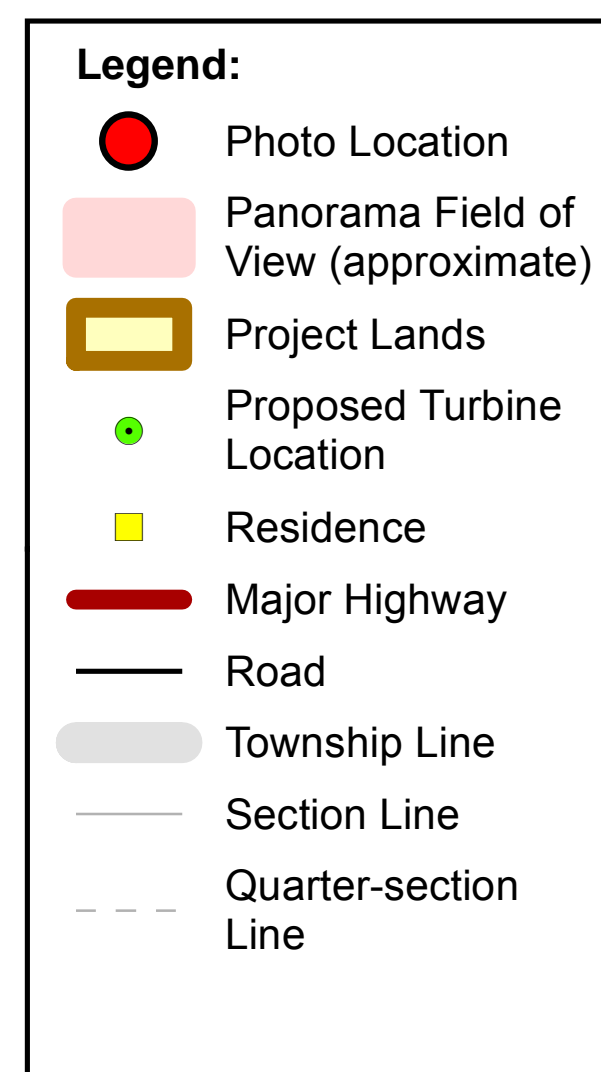
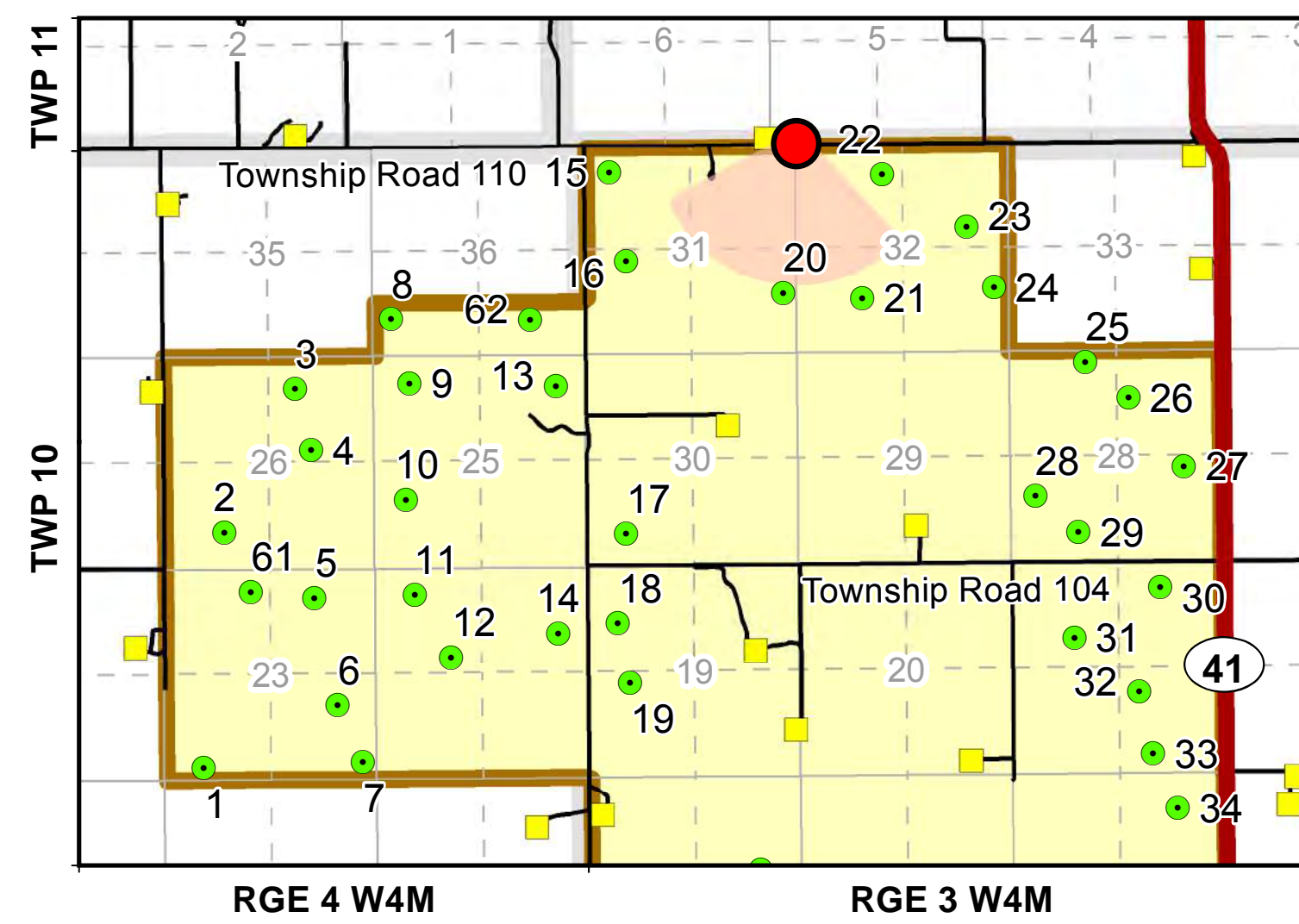
After

<b>Title: Photomontage: Location 7 (G132)</b>	
<b>Client: Cypress Wind Project</b>	
 	<b>Datum:</b> NAD 83 <b>Projection:</b> UTM Zone 12N <b>Scale:</b> N.T.S.
	<b>Date:</b> 2017-11-08 <b>Version:</b> 1 <b>Prepared By:</b> WSP Canada Inc. <b>Author:</b> S. Schnick <b>Reviewed:</b> A. Louro <b>Approved:</b> R. Istchenko

**Notes:**  
 Photographs taken with Canon ESO 5D Mk II camera and Canon EF24-70mm f/2.8L lens set at 50 mm. Panoramic view compiled from multiple individual photographs. Photomontage simulated using Siemens-Gamesa G132 3.465 MW turbine with rotor diameter of 132 m and hub height of 84 m using 61 turbine locations (Layout Lv07).

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Before



After

<b>Title: Photomontage: Location 7 (V136)</b>	
<b>Client: Cypress Wind Project</b>	
 	<b>Datum:</b> NAD 83 <b>Projection:</b> UTM Zone 12N <b>Scale:</b> N.T.S.
	<b>Date:</b> 2017-11-08 <b>Version:</b> 1 <b>Prepared By:</b> WSP Canada Inc. <b>Author:</b> S. Schnick <b>Reviewed:</b> A. Louro <b>Approved:</b> R. Istchenko

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