



Solar Energy Development in Alberta: Best Practices for Wildlife Conservation

ALBERTA CHAPTER OF THE WILDLIFE SOCIETY CONFERENCE 2018

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GUIDING QUESTIONS

1. What is the anatomy of a utility-scale solar facility? (i.e. key components, project size and footprint, other project considerations)
2. What are the potential environmental impacts of solar electricity generation facilities? How can they be mitigated and/or how can they enhance bio-diversity?



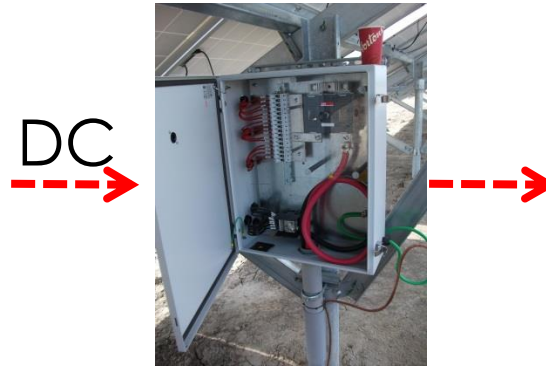
Anatomy of a Solar Facility

Key Components, Size & Footprint & Considerations

1 Key Components



PV Array



Combiner
Box



Inverter-Station

AC



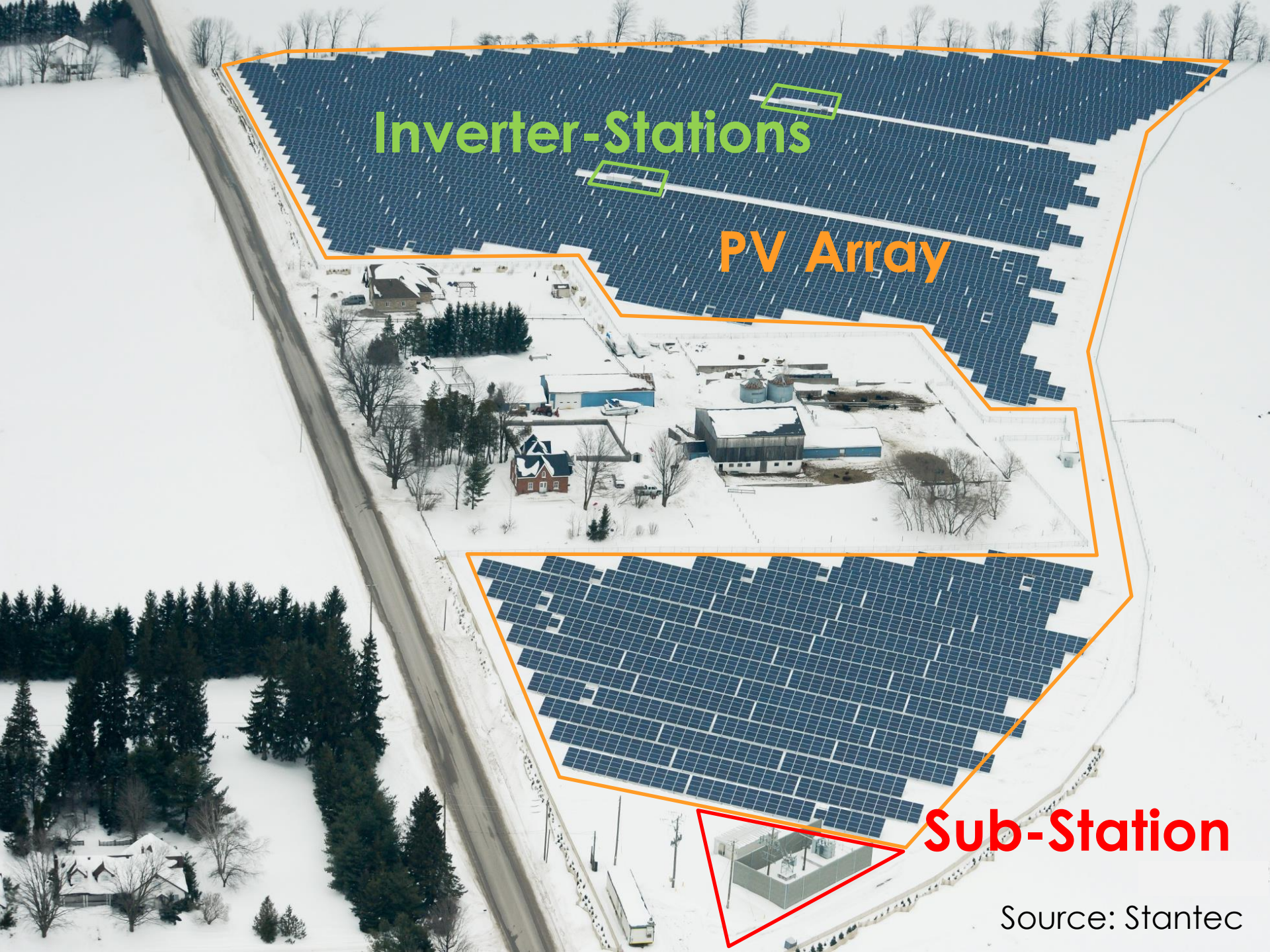

Utility Grid



Meter



Sub-Station



Inverter-Stations

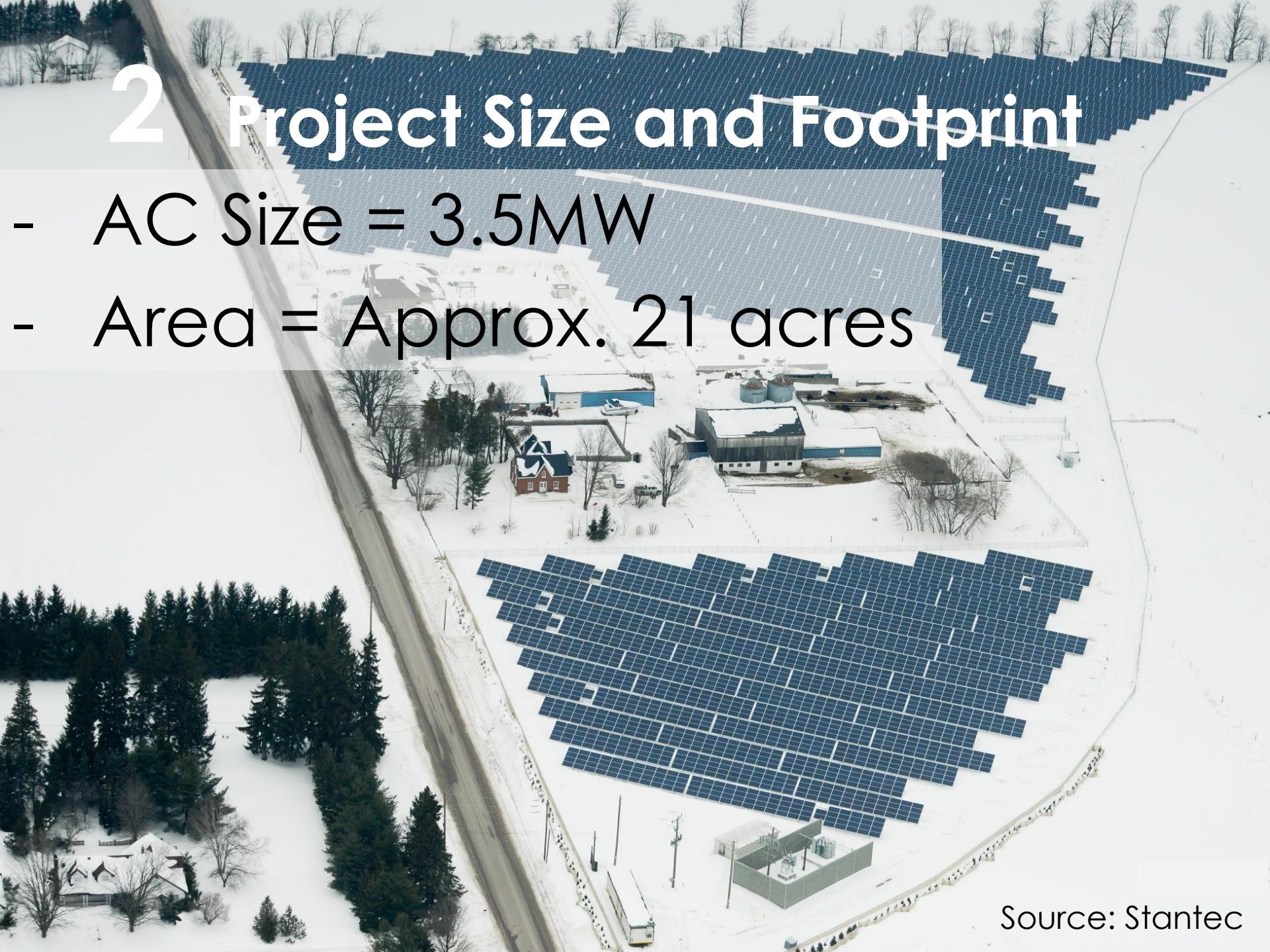
PV Array

Sub-Station

Source: Stantec

2 Project Size and Footprint

- AC Size = 3.5MW
- Area = Approx. 21 acres



Source: Stantec

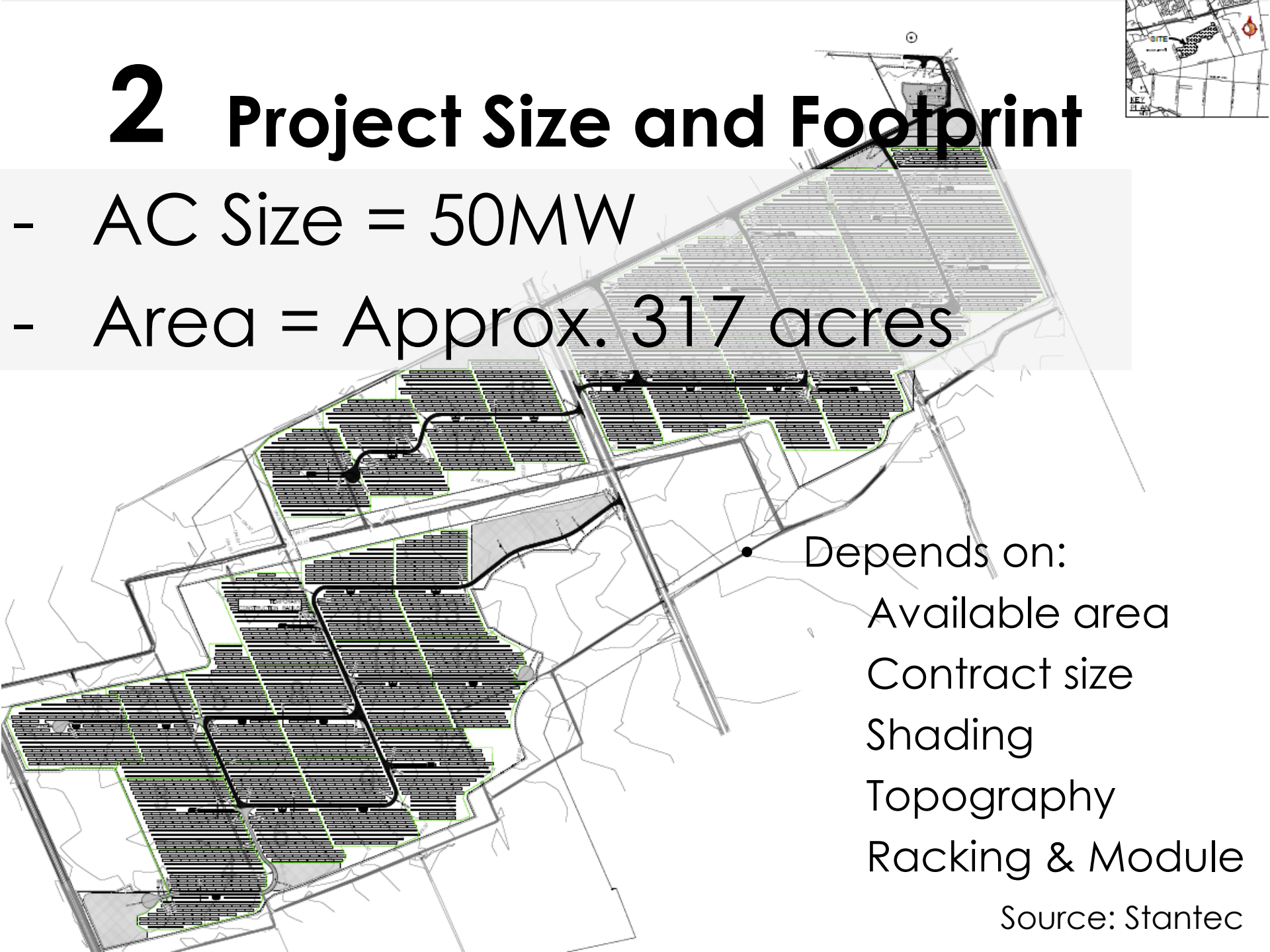
2 Project Size and Footprint

- AC Size = 9MW
- Area = Approx. 61 acres



2 Project Size and Footprint

- AC Size = 50MW
- Area = Approx. 317 acres



• Depends on:

Available area

Contract size

Shading

Topography

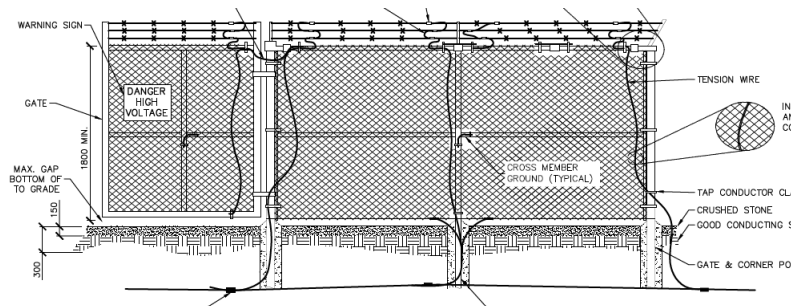
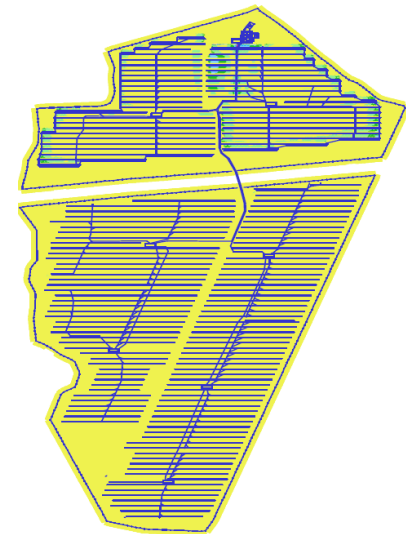
Racking & Module

Source: Stantec

3.1 Project Considerations

Electrical

- Connection Availability
 - Grid infrastructure capacity
 - Feasible point of connection
- Solar Site Grounding
 - Safe ground potential rise
 - Safe step and touch voltage

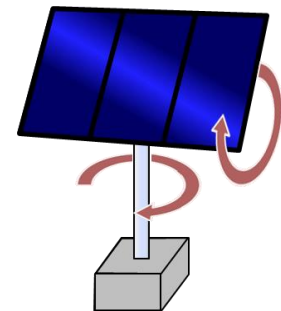
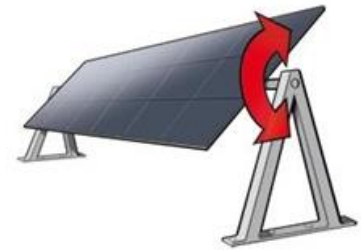


Source: Stantec

3.2 Project Considerations

Fixed Tilt vs. Tracking

- Fixed Tilt
 - Minimum maintenance
- Single Axis
 - 15 to 25% higher performance
 - 3 to 5% more expensive
- Dual Axis
 - 20 to 40% higher performance
 - 12 to 14% more expensive



3.3 Project Considerations

Ground Cover

- Ground Cover
 - Array: Native plants/ grasses
 - Sub Station: Crushed stone
 - Roads: Granular base
- Minimize Grading
- Storm Water Management
 - Erosion and sediment controls



3.4 Project Considerations

Structural Considerations

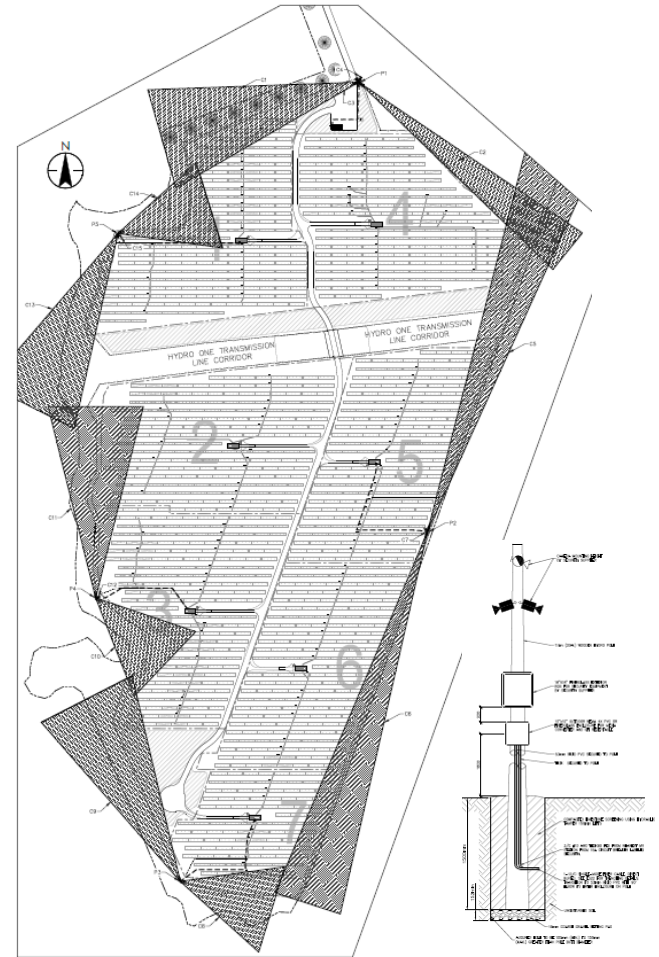
- Geotechnical Study
 - Soil vertical forces
 - Frost depth and heave
- Pile Testing
 - Quality control



3.5 Project Considerations

Security

- SCADA monitoring system
- Perimeter fencing
 - Public & wildlife protection
 - Property protection
- Surveillance camera



Source: Stantec



Source BluEarth Renewables



Wildlife & Habitats

Development & Operation Considerations

WILDLIFE & HABITATS CONSIDERATIONS (1/3)

- Significance of solar's potential environmental impact is proportionate to footprint & quality/function of habitat.
 - Fleet Footprint:
 - Generating ~3% of AB's elec. in 2030 would occupy 32,000 acres.
 - Equivalent to 0.06% of total farm land area or 12% of oil sands.
 - Quality/Function of Habitat:
 - Built-environment could be expected to host >25% of footprint.
 - Remainder (<75%) would be commercial/industrial & agricultural.
- For solar facilities sited outside built-environment, what are the risks? how can they be minimized and/or ecological net-benefit realized?

WILDLIFE & HABITATS CONSIDERATIONS (2/3)

	Siting Concerns	Mitigations
i)	Habitat loss	Avoid sensitive areas e.g. Provincially Significant Wetlands; Compensation for listed species.
ii)	Habitat fragmentation/ degradation	Preserve key habitat areas through project design; Development limits determined by field studies.
iii)	Habitat abandonment/ disturbance	Construction – timing restrictions; Erosion & sediment control; During operations - stormwater management plan to maintain original surface flows; Operations - low disturbance potential due to no moving parts and infrequent activity on site – wildlife species commonly found within and adjacent to facilities.
iv)	Mortality	No project-related mortality observed.

WILDLIFE & HABITATS CONSIDERATIONS (3/3)

- Potential environmental risk of solar facilities can be minimized:
 - Site-Selection: favour sites with existing disturbances.
 - Design: appropriate setbacks and mitigation measures.
- Solar facilities sited in homogenous arable lands (operated under best practices) shown to enhance species diversity & abundance:
 - Re-seeding with species-rich wild flower mixes.
 - More invertebrates where botanical diversity also high.
 - Foraging, cover and perching opportunities for birds.
- “30% by 2030” outcome for environment optimised through:
 - Land-use decisions guided by appropriate policy/regulation.
 - Best practices in site-selection, design and land management.





Source RES Canada



Courtesy of Enbridge Green Energy



Courtesy of Enbridge Green Energy



Courtesy of Enbridge Green Energy



Courtesy of Enbridge Green Energy

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