



**SunAlta Solar PV 1
Environmental Evaluation**

October 23, 2020

Prepared for:

1867559 Alberta Ltd.

Prepared by:

Stantec Consulting Ltd.

Project Number: 123513127

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SUNALTA SOLAR PV 1 ENVIRONMENTAL EVALUATION

This document entitled SunAlta Solar PV 1 Environmental Evaluation was prepared by Stantec Consulting Ltd. ("Stantec") for the account of 1867559 Alberta Ltd. (the "Client") to support the regulatory review process for its Rule 007 Application (the "Application") for the SunAlta Solar PV 1 Project (the "Project"). In connection therewith, this document may be reviewed and used by the Alberta Utilities Commission participating in the review process in the normal course of its duties. Except as set forth in the previous sentence, any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

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Executive Summary

Stantec Consulting Ltd. (Stantec) was retained by 1867559 Alberta Ltd. operating as SunAlta Solar PV 1 (SASPV1), a Joint Venture of SunAlta Power and Irricana Power Generation, to conduct an Environmental Evaluation (EE) for the proposed SunAlta Solar PV 1 Project (the Project). The level of detail provided in this EE is at a level of detail commensurate with the size and type of potential effect(s) of the Project per the Alberta Utilities Commission's (AUC) Rule 007 Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations and Hydro Developments (amended and approved on April 16, 2019 and effective as of August 1, 2019).

The Project is located within Newell County, approximately 14 km southeast of the Town of Bassano, Alberta. The Project is a 9.25 MW, alternating current (AC), photovoltaic (PV) solar generation facility that will connect to the local FortisAlberta distribution system. The Project will be located on approximately 46.4 ha of privately-owned land in NE-17-20-17-W4M.

The Project requires installation of solar panels as well as combiner boxes, collector lines, electrical house (e-house) and Operations and Maintenance buildings. The solar panels will be installed at an angle on ground-mounted fixed-tilt racking systems on pile foundations. The foundation design configuration will be determined during the detailed design stage. The piles typically are galvanized steel and extend to a depth of approximately 4 to 6 m below surface and the panel rows will be situated to minimize shading. Other Project components will include access road, parking lot, temporary laydown yard, detention basins and perimeter fencing (approximately 3 m high, chain-link fence). Construction is scheduled to commence in July 2021, with a targeted completion by December 2021.

The EE focused primarily on potential interactions between Project activities (i.e., construction and operation of the solar facility and associated access roads, collector system, laydown area, operations and maintenance building and e-house building) and ecosystem components. Wildlife and wildlife habitat was the only ecosystem component that was carried through the evaluation to determine the residual effects and significance.

The Project has been sited to avoid all wetlands and waterbodies, as well as environmentally sensitive wildlife habitat (including critical habitat for species at risk) and features, which helps to reduce the potential Project effects on wildlife and wildlife habitat. In addition, with the application of recommended mitigation and environmental protection measures, adverse residual effects on wildlife and wildlife habitat will be further reduced.

Given the siting of the Project on previously disturbed land that avoids environmentally sensitive features, as well as the Project design and implementation of mitigation measures, overall residual effects of the Project are predicted to be not significant.



Abbreviations

%	Percent
AC	alternating current
AEP	Alberta Environment and Parks
AUC	Alberta Utilities Commission
AWA	Alberta <i>Wildlife Act</i>
EE	Environmental Evaluation
EPEA	<i>Environmental Protection and Enhancement Act</i>
ESCC	Alberta Endangered Species Conservation Committee
GHG	greenhouse gas
ha	hectare
km	kilometre
kV	Kilovolt
KW	Kilowatt
LAA	Local Assessment Area
LUF	Land-use Framework
m	metre
MBCA	<i>Migratory Birds Convention Act</i>
MW	Megawatt
NIA	Noise Impact Assessment
PV	Photovoltaic
RAP	Restricted Activity Period
SARA	<i>Species at Risk Act</i>
SASPV1	SunAlta Solar PV 1



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SOMC	Species of Management Concern
SSR	South Saskatchewan Region
SSRP	South Saskatchewan Regional Plan
Stantec	Stantec Consulting Ltd.
the Project	SunAlta Solar PV 1 Project
W	Watt



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Introduction
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1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by 1867559 Alberta Ltd. operating as SunAlta Solar PV 1 (SASPV1), a Joint Venture of SunAlta Power and Irricana Power Generation, to conduct an Environmental Evaluation (EE) for the proposed SunAlta Solar PV 1 Project (the Project). Proponents of solar power plant projects are required to submit an EE at a level of detail commensurate with the size and type of potential effect(s) of the project, per the Alberta Utilities Commission's (AUC) Rule 007 Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations and Hydro Developments (amended and approved on April 16, 2019 and effective as of August 1, 2019).

The Project is located within Newell County, approximately 14 km southeast of the Town of Bassano, Alberta. The Project is a 9.25 MW, alternating current (AC), photovoltaic (PV) solar generation facility that will connect to the local FortisAlberta distribution system. Interconnection of the Project is subject to a separate application to the AUC by FortisAlberta and is not considered further in this EE. The Project will be located on approximately 46.4 ha of privately-owned land in NE-17-20-17-W4M.

The Project requires installation of solar panels as well as combiner boxes, collector lines, electrical house (e-house) and Operations and Maintenance buildings. The solar panels will be installed at an angle on ground-mounted fixed-tilt racking systems on pile foundations. The foundation design configuration will be determined during the detailed design stage. The piles typically are galvanized steel and extend to a depth of approximately 4 to 6 m below surface and the panel rows will be situated to minimize shading. Other Project components will include access road, parking lot, temporary laydown area, detention basins and perimeter fencing (approximately 3 m high, chain-link fence). Construction is scheduled to commence in July 2021, with a targeted completion by December 2021.

The objective of this report is to satisfy the EE requirements outlined in AUC Rule 007 (AUC 2019a). It is organized into four primary sections: project background (Sections 1.0 and 2.0), environmental evaluation scoping and approach (Sections 3.0 through 6.0), and the evaluation of Project interactions with environmental components (Section 7.0).

1.1 APPLICABLE LEGISLATION

1.1.1 Alberta Utilities Commission Rule 007

A Facility Application is being submitted to the AUC by SASPV1 to satisfy the requirements to construct a solar power plant under AUC Rule 007. This EE has been prepared by Stantec as a supplement to SASPV1's Facility Application. The existing conditions information, recommended mitigations, and discussion of effects for each ecosystem component identified in this EE are intended to support the environmental information requirements listed in PP17 of AUC Rule 007 (AUC 2019a) and to evaluate the effects of the proposed Project.



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The level of detail provided in this EE is at a level of detail commensurate with the size and type of potential effect(s) of the Project. Section 3.0 provides the concordance between the EE and PP17 and PP18 requirements. Section 5.0 outlines which ecosystem components from PP17 were included in this EE and provides a rationale for either including or scoping out each component.

1.1.2 Other Applicable Legislation

Refer to Table 1.1 for federal and provincial legislation that is applicable to this Project.

Table 1.1 Applicable Legislation and Policy Guidance

Legislation or Policy Guidance	Requirements or Guidance Provided
Federal	
<i>Species at Risk Act (SARA)</i>	Protects species listed as extirpated, endangered and threatened on federally regulated land or designated critical habitat. Applicable prohibitions include: <ul style="list-style-type: none"> • Section 32 prohibits killing, harming, or taking species at risk • Section 33 prohibits damage or destruction of residences of species at risk
<i>Migratory Birds Convention Act (MBCA) and Migratory Bird Regulations</i>	Protects and conserves migratory bird populations and individuals and their nests in Canada. Section 6 of the Migratory Birds Regulations prohibits the disturbance, destruction, or taking of a nest, egg, nest shelter, eider duck shelter, or duck box of a migratory bird, or possession of a migratory bird, carcass, skin, nest, or egg of a migratory bird without authorization. As there are no authorizations to allow construction-related effects on migratory birds and their nests, best management practices will be followed to comply with the MBCA.
Provincial	
<i>Environmental Protection and Enhancement Act (EPEA)</i>	Approval under EPEA is not required for the Project. However, Project design, routing, construction, and operation must consider Alberta Environment and Parks' (AEP's) guidance provided in its <i>Wildlife Directive for Alberta Solar Energy Projects (GOA 2017a)</i> .
<i>Municipal Government Act</i>	Land use planning on private lands is primarily governed by the <i>Municipal Government Act</i> . Private landowners make decisions regarding how they use and manage their lands consistent with provincial legislation and municipal bylaws. The Project is located within Newell County and its Municipal Development Plan is the main regulatory instrument used to manage land uses within its municipal boundaries.
<i>Alberta Soil Conservation Act</i>	In Alberta, the <i>Soil Conservation Act</i> requires landowners or occupants to prevent soil loss or deterioration from taking place, and to stop any identified the loss or deterioration from continuing.
<i>Alberta Weed Control Act</i>	In Alberta, the <i>Weed Control Act</i> requires landowners or occupants to: <ul style="list-style-type: none"> • Destroy plants listed as prohibited noxious upon discovery • Control populations of plants listed as noxious to prevent their spread



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Table 1.1 Applicable Legislation and Policy Guidance

Legislation or Policy Guidance	Requirements or Guidance Provided
<p><i>Alberta Water Act</i></p>	<p>Development within temporarily or permanently affecting wetlands/ephemeral waterbodies is regulated in Alberta under the provincial <i>Water Act</i>. Specific guidance for permitting of development affecting wetlands/ephemeral waterbodies is provided in the Government of Alberta Wetland Policy implementation directives and tools.</p> <p>In Alberta, works in and around watercourses are regulated under the <i>Alberta Water Act</i> by AEP. Effects on wetlands/ephemeral waterbodies potentially altering topography, hydrology, water quality, vegetation, or aquatic conditions of wetlands require approvals under the <i>Water Act</i> from AEP before construction. Temporary vehicle access or installation of collector lines through wetlands/ephemeral waterbodies may require a notification under the <i>Alberta Water Act</i> Code of Practice.</p> <p>Under the <i>Alberta Water Act</i>, the following codes of practice govern Project activities:</p> <ul style="list-style-type: none"> • Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body • Code of Practice for Watercourse Crossings
<p><i>Alberta Wildlife Act (AWA)</i></p>	<p>In Alberta, wildlife and some plant species are regulated under the AWA and the Alberta Wildlife Regulation. The AWA (section 36[1]) states that “a person shall not willfully molest, disturb or destroy a house, nest or den of a prescribed wildlife or a beaver dam in prescribed areas at prescribed times”. In addition, the AWA protects species listed as endangered or threatened, and the Alberta Wildlife Regulation provides a list of species considered endangered or threatened. Before species are officially listed by the Government of Alberta, the Alberta Endangered Species Conservation Committee (ESCC) and its Scientific Subcommittee provide recommendations to officially designate Alberta species as endangered, threatened, special concern, data deficient, or under recommendation for a status change (GOA 2017b).</p>
<p><i>Alberta Land Stewardship Act</i></p>	<p>In Alberta, land-use planning is guided by the Land-use Framework (LUF). The LUF established seven land use regions and called for the development of a regional plan for each. The <i>Alberta Land Stewardship Act</i> established the legal basis for the development of regional plans under the LUF and the Alberta Land Stewardship Regulation provides the rules for implementing regional plans under the LUF.</p> <p>The Project is within the boundaries of the South Saskatchewan Region (SSR), for which a land use plan has been developed and approved. See Section 2.1.1 for information regarding the South Saskatchewan Regional Plan (SSRP).</p>



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Table 1.1 Applicable Legislation and Policy Guidance

Legislation or Policy Guidance	Requirements or Guidance Provided
Other Guidance/Direction	
Wildlife	<ul style="list-style-type: none">• Wildlife Directive for Alberta Solar Energy Projects (GOA 2017a)• Renewable Energy Project Submission Template (AEP-Wildlife Management 2020)• Conservation and Reclamation Directive for Renewable Energy Operations (GOA 2018a)• Post-Construction Survey Protocols for Wind and Solar Energy Projects (AEP 2020a)• The General Status of Alberta Wild Species (AEP 2017)• Master Schedule of Standards and Conditions (GOA 2018b)



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Project Description
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2.0 PROJECT DESCRIPTION

The proposed Project is a 9.25 MW PV solar generation facility. The development will be located in the County of Newell, approximately 14 km southeast of the Town of Bassano, Alberta and 43 km northwest of the City of Brooks, Alberta, on a parcel of private agricultural land within the NE of Section 17 of Township 20, Range 17, W4M (Figure 2.1). The Project is on privately owned land and is bounded by Range Road 174 to the east, an irrigation canal to the west, and a fence to the south.

2.1 PROJECT LOCATION AND LOCAL LAND USE

The Project is located within the Dry Mixedgrass Natural Subregion of the Grassland Natural Region of Alberta (Natural Regions Committee 2006). This subregion occupies the southeastern corner of Alberta and consists of level to undulating till or lacustrine plains, with some hummocky uplands and sand dunes. The climate during the summer is warm, and this subregion receives the lowest amount of precipitation of all the subregions in Alberta. Winters are cold and dry.

Agriculture is the primary land use in the Dry Mixedgrass Natural Subregion; approximately 55% of the area is used for grazing with an additional 35% used for dry-land farming and 10% used for irrigated crops. The native land cover is dominated by drought-resistant grasses and shrubs. The most common grass species include blue grama (*Bouteloua gracilis*), needle-and-thread (*Hesperostipa comata*), June grass (*Koeleria macrantha*) and western wheat grass (*Pascopyrum smithii*). Shrub communities commonly include buckbrush (*Symphoricarpos occidentalis*), silver sagebrush (*Artemisia cana*), silverberry (*Elaeagnus commutata*) and prickly rose (*Rosa acicularis*). Communities composed of willow (*Salix* spp.), buffaloberry (*Shepherdia argentea*) and plains cottonwood (*Populus deltoides*) develop in valleys. Wetlands represent about 3% of area in this subregion; marshes and shallow open water are the dominant wetland classes. Wetlands in this region are key habitat for nesting waterfowl. Soil in this subregion is mainly Orthic Brown Chernozem with some Solonchic soils present where saline and sodic conditions prevail (Natural Regions Committee 2006).

The Project Boundary encompasses the quarter section where the Project will occur and is bounded on the west by the irrigation canal. The Project Area is 18.9 ha and includes the area within the Project Boundary consisting of temporary and permanent project footprints. This includes a fenced area (housing the panels), inverters, transformers, trailer, Operations and Maintenance building, existing Quonset, detention basins, e-house, collector lines, access roads and temporary laydown area. The Project Area is located entirely within tame grassland and contains oil and gas infrastructure. All wetlands within the Project Area are avoided by a 15 m setback. Spatial boundaries are further defined in Section 6.3.1.



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2.1.1 Regional Land Use Plans

The Project falls within the SSR, one of seven land-use regions defined under Alberta's LUF and reinforced under section 13 of the *Alberta Land Stewardship Act* (GOA 2009). The SSRP identifies strategic directions for the region and establishes a long-term vision, strategic direction, and an implementation plan to achieve defined objectives for the economy, air, biodiversity and ecosystems, water, land-use, recreation and historic resources, aboriginal peoples, and community development to ensure that land-use decisions achieve a common vision for the region.

The region has a natural advantage for the development of renewable energy sources. One of the strategies of the SSRP ensures policies are in place to promote and remove barriers to new investments in renewable energy and supports Alberta's commitment to green energy production. Development of the Project is therefore aligned with the objectives and strategies outlined in the SSRP.

The SSRP delegates responsibility for land-use planning and development to the municipal government. The Project is located entirely on private lands in Newell County and is classed as Agricultural - A. The County is responsible for land-use planning within their jurisdiction.

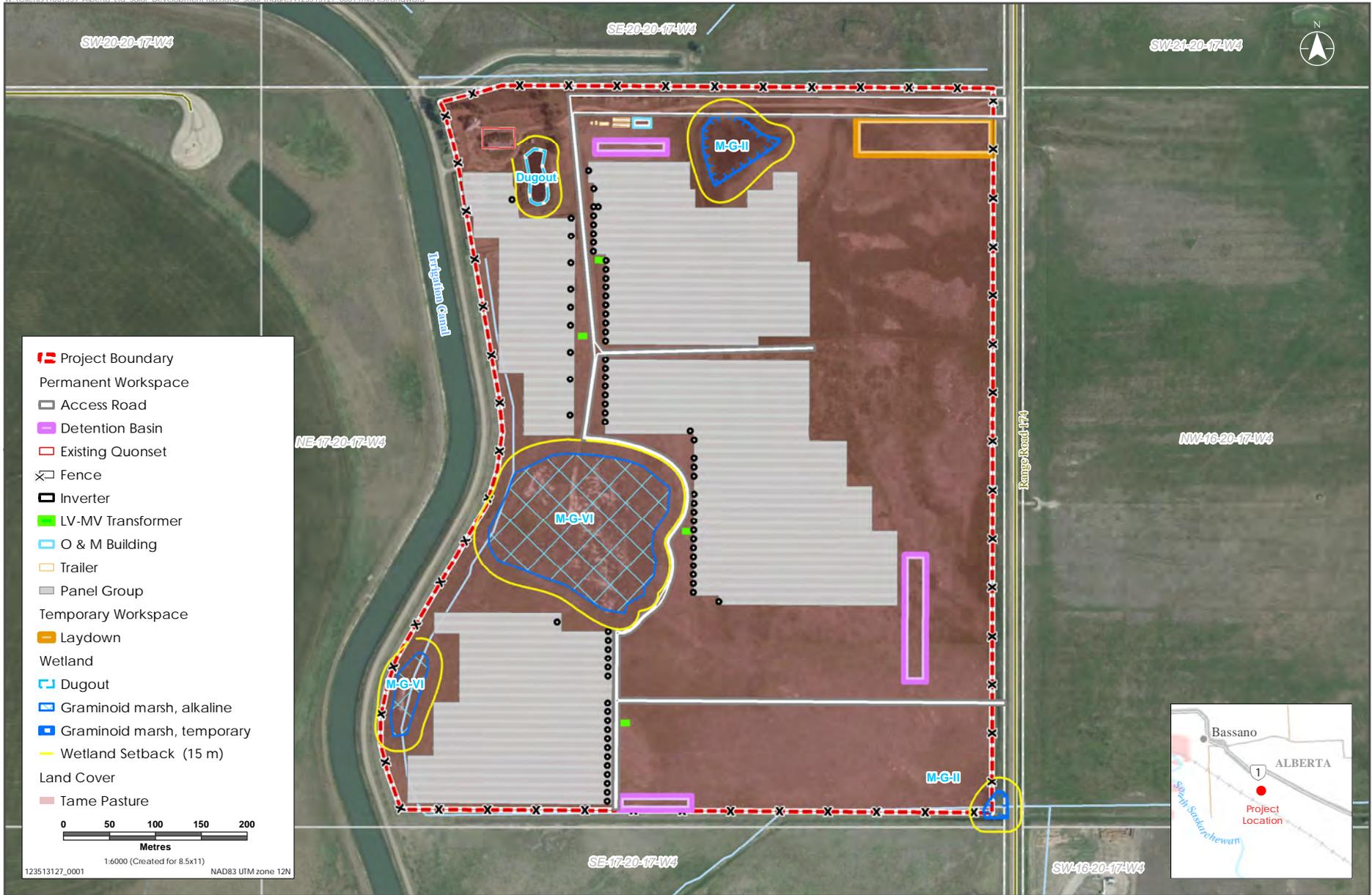
Under the SSRP, conservation areas will be managed to minimize or prevent new land disturbance. The Project is not located within any of the conservation areas or provincial recreation areas established in the SSRP and is therefore aligned with the SSRP's conservation objectives.

The SSRP has two management frameworks in place; the SSR Air Quality Management Framework and the SSR Surface Water Quality Management Framework. The development of a third management framework for biodiversity was identified in the SSRP, but this management framework has not yet been implemented.

One of the main objectives of the SSR Air Quality Management Framework is to manage releases from point and non-point sources to prevent unacceptable air quality. The Project will not have associated air emissions, and emissions from non-point sources during construction (e.g., construction equipment, vehicles) are expected to be negligible. Accordingly, the SSR Air Quality Management Framework is not applicable to the Project.

The Surface Water Quality Management Framework is aimed at protecting current and future water use based on management of surface water quality in the Bow, Oldman, South Saskatchewan and Milk Rivers. This framework is not applicable to the Project as there are no watercourses within the Project Boundary. Best management practices will be employed during construction to minimize any potential surface water effects. The operation of the Project is not expected to affect surface water quality.





Sources: Base Data - CanVec Project Data - 1867559 Alberta Ltd. Solar Development. Imagery - Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Project Overview



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2.2 PROJECT COMPONENTS

2.2.1 Solar Panels

The Project will contain up to 40,000 bifacial solar panels each approximately 1 m x 2 m at a 30-degree tilt. The generator will consist of 74 inverters rated at 125 KW each, for a total of 9.25 MW. The configuration is 2-up portrait, and the Project consists of approximately 590 tables, each 4 m x 28 m.

If the type of solar panels and inverter technology changes through additional engineering and procurement processes, AUC will be notified of these changes.

2.2.2 Collector System

Power collection will be conducted by underground cabling, in addition to a combiner and re-combiner boxes. These cables will be buried in accordance with the Electrical Safety Code. The cables will be laid in an excavated trench, approximately 1 to 1.5 m deep. Trenches will be excavated using a backhoe, or similar equipment. The trench will be backfilled, compacted and levelled to match the existing grade. Electrical cables will run underground from the inverters to the AC transformers and the Point of Interconnection. The layout of the trenches will be such that it will have minimum impact on the existing surface drainage patterns.

2.2.3 Distribution System Point of Interconnection

The Project will be interconnected to the local Fortis distribution system at 24.94 kV. The voltage of the Project collector system will be designed to match the voltage of the Fortis distribution system, so a substation for the Project is not required. The Fortis connection will include a pole mounted disconnect switch operable by SASPV1, surge arresters and metering equipment. This equipment will be contained within the Project Area in the e-house building.

2.2.4 E-House Building

An on-site building will house electrical controls, protection and monitoring systems. In addition, a remote computer-based system will be used to control and monitor the generating equipment. The facility will also contain a battery backup system. The building will house operational data communication equipment used to monitor and operate the facility remotely. If a communication tower is required, it will be mounted on or located in close proximity to the e-house building.

2.2.5 Operations and Maintenance Building

An operations and maintenance building will be located within the Project Area to house spare parts, vehicles and maintenance equipment, as well as to provide office facilities for site staff.



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2.2.6 Perimeter Fencing

A chain link fence will be installed around the perimeter of the facility and the entrance will be gated and locked to restrict access for safety purposes. Fencing will consist of straight lines (i.e., no jagged corners to trap wildlife) and will be approximately 15 centimeters (~6 inches) off the ground to allow for small wildlife passage. Security cameras will be installed for remote site monitoring.

2.2.7 Access Roads

Gravel roads will be installed through the site to allow access to the generating equipment for site maintenance and operations. The access roads will allow a light truck or small work vehicle to maneuver around the site for inspection and repair of the equipment, when required. Design of the access roads will be in accordance with AEP Stormwater management guidelines and local municipal engineering guidelines. Sediment and erosion control measures (e.g., silt fence barriers) will be installed where required per AEP guidelines.

2.2.8 Laydown Area

A laydown area is included in the Project Boundary. This will be used during construction for any of the following: parking, construction office trailer, portable washrooms, first-aid station, construction equipment, material laydown and storage area.

2.3 PROJECT ACTIVITIES

2.3.1 Construction

Grading may be required to prepare (i.e., level) the site for infrastructure installation. Site preparation for the buildings will include topsoil and upper subsoil salvaged from the disturbance footprint and retained in stockpiles for recovery and use during site reclamation. Equipment used during construction includes cranes, semi-trailers, and trucks (such as pick-up trucks, etc.).

The site will be cleaned-up post-construction. Garbage or debris will be removed and disposed of in compliance with local regulations. A gravel surface will be placed over portions of the site where all-season access is required during operations. The remainder of the site will be contoured and revegetated if required.



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2.3.2 Operation

Operations staff will be responsible for monitoring and maintaining the site as required. The solar panels, wiring and electrical connections, along with the collection line and combiner box will be routinely inspected. Any broken or malfunctioning solar panels, electrical cabling or components will be repaired or replaced by qualified staff. Trash, debris and equipment parts replaced during maintenance and repair activities will be collected and properly stored in small waste disposal bins provided on site. Any leaks will be repaired immediately. Spill response equipment will be located on site should leaks be observed. All waste collected during operation of the Project will be removed from the site and managed according to applicable requirements.

The Project Area, including vegetation coverage and drainage systems will be monitored and maintained regularly. It is possible that weeds may require some form of control several times through the summer months. This will be conducted by periodic mowing, or brush cutting, as necessary.

The need to clean the solar panels will be determined according to local weather conditions, such as the quantity and frequency of rain and snow at the Project Area. If cleaning is required, water trucks will bring water to the site to supply the water required for cleaning.

The site will also be visually inspected for any erosion or sedimentation issues and, if necessary, best management practices will be applied.

During the winter, snow is expected to slide off panels due to melting and tilt angle, but in some cases manual snow removal may be performed by maintenance personnel.

2.3.3 Decommissioning

The typical lifespan of a solar project is 25-35 years. SASPV1 will apply to the AUC to decommission the facility at the end of the Project life. Once approval is received from the AUC, SASPV1 will decommission and restore the site to its pre-construction state. Generally, Project components are removed to a depth of 1 m below ground. Construction material, equipment, temporary facilities and waste will be removed from the site. Topsoil will be redistributed where required, followed by finished grading and landscaping to achieve proper drainage.

2.4 PROJECT SCHEDULE

The expected in-service date for the Project is February 1, 2022. Construction will start after all permits and approvals are acquired and is expected to last approximately 6 months. Table 2.1 provides an outline of planned key dates associated with the construction of the Project.



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Table 2.1 Proposed Project Development Schedule

Activity	Date
Piles and Roads	July 2021
Racking and Civil Works	August 2021 – September 2021
Distribution Connection	October 2021
Panel Installation	October 2021
Construction Complete	December 2021
Commissioning	January 2022
In-service Date	February 1, 2022



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3.0 CONCORDANCE WITH AUC RULE 007

This EE focuses on the ecosystem components that the Project has the greatest potential to interact with. Table 3.1 demonstrates concordance of this EE with PP17, and PP18.

Table 3.1 Concordance with Rule 007 Requirements

Rule 007 Subsection	Requirement	Applicability to Project	Report Section
PP17	Existing conditions	The Project setting for the Project is provided in Section 2.1. Existing conditions for the ecosystem components selected to be assessed in detail are provided in their respective ecosystem component sections.	Section 2.1 and Section 7.2
	Project activities and infrastructure	Project activities and infrastructure have been outlined.	Section 2.2 and 2.3
	Ecosystem components: Wildlife and wildlife habitat	Ecosystem components included in this EE are outlined in Table 5.1 and within individual ecosystem component sections.	Section 5.0 and Section 7.0
	Methodology	Methods used to identify, evaluate, and characterize adverse effects are described.	Section 6.0
	Potential adverse effects	Potential adverse effects have been considered and evaluated within individual ecosystem component sections.	Section 7.1
	Mitigation measures	Mitigation measures were examined and summarized within individual ecosystem component sections.	Section 7.4
	Predicted residual effects	Predicted residual effects have been considered and are described within individual ecosystem component sections.	Section 7.5
	Monitoring	Monitoring procedures are summarized within individual ecosystem component sections.	Section 7.7



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Concordance with AUC Rule 007

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Table 3.1 Concordance with Rule 007 Requirements

Rule 007 Subsection	Requirement	Applicability to Project	Report Section
PP18	<p>If the project site occurs within the plan boundaries of a regional land use plan in force:</p> <ol style="list-style-type: none"> 1. Confirm that the proposed project is being developed in accordance with the applicable regional land use plan. 2. Confirm if the proposed project is in a conservation area or provincial recreation area established in the applicable regional land use plan. Provide submissions describing how the activity may be considered incidental to a previously-approved activity. 3. Indicate what, if any, management frameworks in place under the applicable regional land use plan are applicable to the project, the reason why any management frameworks are not applicable to the project, and summarize discussions held with AEP and any other government department required to be consulted under the management frameworks regarding the project and its impacts in terms of the management frameworks. Include details on any actions or mitigation measures recommended as a result of the discussions and describe how these actions or mitigation measures will be incorporated into the project. 	<p>The Project is in the SSRP area. The Project adheres to the objectives and strategies outlined in the SSRP.</p>	Section 2.1.1



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Consultation and Engagement
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4.0 CONSULTATION AND ENGAGEMENT

SASPV1 has developed a Participant Involvement Program to inform potentially affected parties about the Project and to understand concerns or issues that might arise from the proposed development. See the Facility Application for information regarding details on consultation with landowners and other stakeholders.



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Selection of Ecosystem Components
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5.0 SELECTION OF ECOSYSTEM COMPONENTS

The EE focuses on ecosystem components, which are environmental elements of particular value or interest to regulators and other parties and are identified based on the elements outlined in PP17 of AUC Rule 007.

The ecosystem components that were selected:

- represent a broad environmental, ecological, or human environment component that might be affected by the Project,
- are of scientific or historical importance, or
- have been identified as important issues or concerns by stakeholders or in other effects assessments in the region

The rationale for selecting each ecosystem component is explained in Table 5.1 and further detailed in the applicable EE sections (see Section 7.0). Table 5.1 considers the Project's components and physical activities (as listed in Sections 2.2 and 2.3) that have the potential to interact with each ecosystem component during the Project's construction and operation phase.

Wildlife and wildlife habitat is the ecosystem component assessed in this EE. Environmentally sensitive areas are evaluated as part of the wildlife evaluation as appropriate (see Section 7.0).

As noted in Table 5.1, Ecosystem Components identified in PP17 of AUC Rule 007 that are not carried forward in this assessment include:

- surface water bodies and hydrology
- aquatic species and habitat
- air quality
- terrain and soils
- groundwater
- vegetation and wetlands/ephemeral waterbodies



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Selection of Ecosystem Components
 October 23, 2020

Table 5.1 Ecosystem Components

Ecosystem Component	Potential Project Interaction	Ecosystem Component in the EE	Rationale for Inclusion or Exclusion in the EE	Section(s) where addressed in the EE
Terrain and Soils	✓	-	Terrain and soils are excluded because there is little grading and topsoil stripping required for Project construction, and there are no terrain features of note in the Project Area. Construction of solar facilities using panel tables mounted on racks has a minimal disturbance footprint and, therefore, minimal effect on soils and terrain. Disturbance associated with the collector system and laydown area will be temporary and the area will be reclaimed. Erosion and sediment controls and an Environmental Protection Plan will be developed for the Project that will outline soil handling practices designed to reduce and avoid potential effects on terrain and soils. As a result, interactions between the Project and terrain and soils are not predicted. Geotechnical work has been completed for the Project.	Not covered further
Surface Water Bodies and Hydrology	-	-	Surface water is excluded because no major watercourses will be crossed by the Project. The Project Area is bounded to the west by an irrigation canal, however based on the stormwater management plan (see facility application), drainage basins will be created on site to accommodate surface run-off. Terrain in the area is relatively flat, and erosion and sediment controls will be implemented. As a result, interactions between the Project and surface water and hydrology are not predicted.	Not covered further
Groundwater	-	-	Groundwater is excluded because the Project’s construction and operation are not expected to interact with groundwater in the Project Area. Interactions between the Project and groundwater are not predicted.	Not covered further
Vegetation and Wetlands/ Ephemeral Waterbodies	-	-	Land cover within the Project Area consists entirely of tame grassland. No wetlands are present in the Project Area. Two Class II (temporary) wetlands, two Class VI (alkaline) wetlands, and a dugout are within 100 m of the Project Area but are all avoided with a 15 m or greater setback. The Class II and Class VI wetlands have been previously disturbed by oil and gas, pipeline, irrigation activities, and/or cattle grazing. Interactions between the Project and native vegetation and wetlands are not predicted.	Not covered further
Wildlife and Wildlife Habitat	✓	✓	The Project is sited entirely on previously disturbed land and avoids all watercourses, wetlands and wildlife features. However, there is the potential for sensory disturbance during construction that may alter habitat availability for wildlife and wildlife movement. Project construction and operation may also alter the risk of wildlife mortality. Migratory birds and several species at risk and species of management concern (SOMC) were also observed in the Project Area. Potential effects on wildlife and wildlife habitat are included in this assessment.	Wildlife Species and Habitat (Section 7.0)



SUNALTA SOLAR PV 1 ENVIRONMENTAL EVALUATION

Selection of Ecosystem Components
 October 23, 2020

Table 5.1 Ecosystem Components

Ecosystem Component	Potential Project Interaction	Ecosystem Component in the EE	Rationale for Inclusion or Exclusion in the EE	Section(s) where addressed in the EE
Aquatic Species and Habitat	-	-	Aquatic species and habitat are excluded because no major watercourses will be crossed by the Project and no new surface disturbance is planned within 100 m of a watercourse. Terrain in the area is relatively flat, and erosion and sediment controls will be implemented. As a result, interactions between the Project and aquatic species and habitat are not predicted.	Not covered further
Air Quality	✓	-	The Project will not result in notable increases in air contaminants or greenhouse gas (GHG) emissions. Construction activities will be short term in duration, with relatively few vehicles being required. With the application of standard mitigation measures, limited potential for residual effects is predicted. Air emissions, including GHG emissions, are not evaluated further.	Not covered further
Noise	✓	-	A noise impact assessment (NIA) was completed for the Project as part of the Facility Application. The predicted cumulative sound levels at all receptors meet the daytime and nighttime permissible sound levels and low frequency noise effects are not expected at all the receptors. The Project noise levels meet the requirements of AUC Rule 012: Noise Control (AUC 2019b) and is therefore not evaluated further in this assessment. See attachment 9 of the Facility Application for the NIA.	Not covered further
Environmentally Sensitive Areas	✓	-	The Project is not located within any of the conservation areas or provincial recreation areas established in the SSRP. Although not addressed as an ecosystem component, environmentally sensitive areas are discussed in other ecosystem component chapters where they are applicable.	Wildlife and Wildlife Habitat (Section 7.0)
<p>NOTES:</p> <ul style="list-style-type: none"> ✓ Indicates an identified interaction or ecosystem component in the EE – Indicates no identified interaction or ecosystem component in the EE 				



6.0 ENVIRONMENTAL EVALUATION APPROACH

This EE considers the potential effects of construction and operation of the Project on the identified ecosystem component (i.e., wildlife and wildlife habitat). The Project's EE scope was developed in the context of AUC Rule 007 (AUC 2019a) requirements (PP17), Project activities and components, the Project setting, input from regulatory consultation, and results from field studies.

Sections 6.1 through 6.9 outline the methods used in the development of this EE.

6.1 SCOPING THE EVALUATION

The rationale for selecting the ecosystem component is explained in Table 5.1 and each is further detailed in the applicable section (see Section 7.0).

6.2 POTENTIAL EFFECTS, EFFECTS PATHWAYS AND MEASURABLE PARAMETERS

The evaluation of the ecosystem component begins with a description of the pathways whereby specific Project activities could result in an environmental effect (i.e., the effects pathways). For the ecosystem component, the Project's potential effects are identified and assessed in the context of the ecosystem component's existing conditions, as well as its biophysical characteristics and regulatory context, and any input received from the consultation process.

Once effect pathways are identified, one or more measurable parameter(s) are selected to facilitate quantitative (where possible) and qualitative evaluation of residual effects. Measurable parameters provide defensible and acceptable means to characterize change in an ecosystem component attributable to the Project and contribute to the determination of the significance of those effects.



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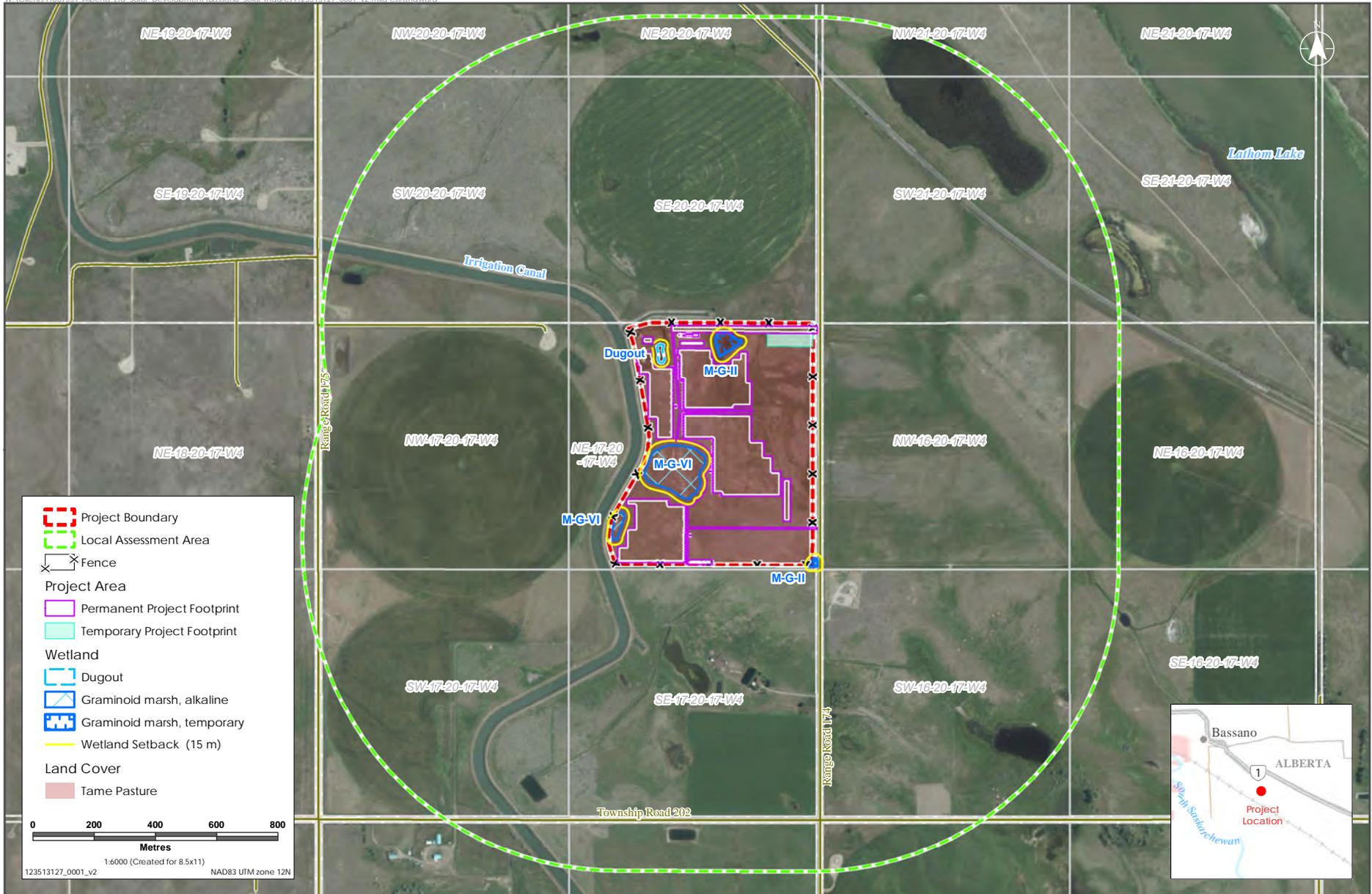
6.3 BOUNDARIES

6.3.1 Spatial Boundaries

Spatial boundaries for assessment of the Project's residual effects include the following (see Figure 6.1):

- **Project Boundary** - this encompasses the quarter section (NE-17-20-17-W4M) where the Project will occur and is bounded on the west by the irrigation canal. The Project Boundary is approximately 46.4 ha.
- **Project Area** - this is within the Project Boundary and consists of the temporary and permanent Project footprints. The Project Area is approximately 18.9 ha in size.
- **Local Assessment Area (LAA)** – encompasses the area in which both: a) project-related effects (direct or indirect) can be predicted or measured with a level of confidence that allows for evaluation; and b) there is a reasonable expectation that those potential effects in the LAA will be a concern. The LAA encompasses a 1 km buffer around the Project Boundary and is 644.0 ha in size.





Sources: Base Data - CanVec Project Data - 1867559 Alberta Ltd. Solar Development. Imagery - Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Spatial Boundaries



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6.3.2 Temporal Boundaries

Temporal boundaries identify when an effect is evaluated in relation to specific Project phases and activities. Temporal boundaries for this evaluation include:

- **Construction:** Project construction is scheduled to last approximately 6 months, beginning in July 2021 and completed in December 2021.
- **Operation:** The Project has an anticipated in-service date of February 1, 2022 and will be operated for at least 20-25 years, depending on the length of the contract for the sale of electricity from the Project.

At the end of the Project's lifecycle, SASPV1 will apply to the AUC to decommission the facility. Future decommissioning and reclamation activities will take place in accordance with applicable legislation and regulations in place at the time. These activities will consist of dismantling and removing Project infrastructure and reclamation as needed. The effects of decommissioning and reclamation are assumed to be similar to those associated with construction. Decommissioning is not part of the current Facility Application.

6.4 EXISTING CONDITIONS

The existing conditions of the ecosystem component are based on data collected during desktop and field programs.

6.5 PROJECT-ECOSYSTEM COMPONENT INTERACTIONS

A table showing Project physical activities that may interact with the ecosystem component and result in adverse environmental effects during each Project phase is presented in each ecosystem component section. Physical activities that do not interact with the ecosystem component will be identified and their designation as such justified.

6.6 MITIGATION OF PROJECT EFFECTS

Measures are identified, as necessary, to mitigate the potential adverse effects of Project construction and operation on the ecosystem component. These measures include site-specific and standard industry practices, compliance with legislation and guidelines, regional land use plan considerations (e.g., SSRP), planning considerations, and other measures applicable to the Project. A discussion of these measures and their links to effects and interactions are identified.

The mitigation measures recommended for the Project are identified in Section 7.0.



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6.7 EVALUATION OF RESIDUAL EFFECTS

For the ecosystem component, the Project’s potential effects are identified and evaluated in the context of the component’s existing conditions. The Project’s potential effects are then discussed in the context of the following:

- **Evaluation of Residual Effects:** Available data are analyzed to identify the residual effects. Residual effects (i.e., the effects that remain after mitigation has been applied) are described, considering how the proposed mitigation will alter or reduce the effect.
- **Characterization of Residual Effects:** Residual effects are then characterized in terms of the direction, magnitude, geographic extent, frequency, duration, reversibility, and ecological or socio-economic context. Where possible, these characteristics are described quantitatively for each residual environmental effect. Where these characteristics cannot be expressed quantitatively, at minimum, they are described using qualitative terms that are defined specifically for the ecosystem component or effect.

Criteria used to characterize residual effects for the ecosystem component included in the evaluation (i.e., wildlife and wildlife habitat) are provided in Table 6.1.

Table 6.1 Characterization of Residual Effects on Wildlife and Wildlife Habitat

Characterization	Definition of Qualitative Categories
Direction	Positive – an effect that moves measurable parameters in a direction beneficial to wildlife species and habitat relative to baseline Adverse – an effect that moves measurable parameters in a direction detrimental to wildlife species and habitat relative to baseline Neutral – no net change in measurable parameters for wildlife species and habitat relative to baseline
Magnitude	Negligible – no measurable change Low - a measurable change in abundance of wildlife in the LAA is unlikely, although temporary local shifts in distributions might occur Moderate – a measurable change in the abundance and distribution of wildlife in the LAA is possible, but a measurable change on the abundance of wildlife outside the LAA is unlikely High – a measurable change in the abundance of wildlife outside LAA is possible
Geographic Extent	Project Area - residual effect is restricted to the Project Area LAA - residual effect extends into the LAA
Duration	Short-term - residual effect is restricted to construction phase Medium-term - residual effect extends through the operation phase Long-term - residual effect extends beyond the operation phase



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Table 6.1 Characterization of Residual Effects on Wildlife and Wildlife Habitat

Characterization	Definition of Qualitative Categories
Frequency	Single event Multiple irregular event—occurs at no set schedule Multiple regular event—occurs at regular intervals Continuous—occurs continuously
Reversibility	Reversible—the effect is likely to be reversed after activity completion and reclamation Irreversible—the effect is unlikely to be reversed

6.8 DETERMINATION OF SIGNIFICANCE

Per the guidance in PP17 of AUC Rule 007 (AUC 2019a), the EE must determine the significance of adverse residual Project effects. Residual Project effects are evaluated in the context of changes relative to existing conditions in the LAA.

The determination of significance involves, where practical, establishing and applying threshold criteria beyond which a residual effect on an ecosystem component would be considered significant. Standards include government or industry regulations or guidelines. Thresholds reflect the limits of a state for a measurable parameter or ecosystem component based on resource management goals, scientific literature, or ecological processes. Where thresholds are not set by guidelines or regulations, the threshold is developed using a combination of input from the consultation process, resource management objectives, scientific literature, and professional judgment.

The criteria for determining the significance of adverse residual effects for the ecosystem component included in the EE are presented in Table 6.2.

Table 6.2 Significance Definitions for Ecosystem Components Included in the Evaluation

Ecosystem Component	Significance Definition
Wildlife and Wildlife Habitat	A significant adverse residual effect on wildlife and wildlife habitat is defined as one that, following the application of avoidance and mitigation measures: <ul style="list-style-type: none"> • threatens the long-term persistence or viability of a wildlife species in the region, or • is inconsistent with the goals, objectives or activities of recovery strategies, action plans, and management plans for any SOMC or species at risk



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6.9 MONITORING

Monitoring programs are identified for the ecosystem component where these programs provide greater certainty regarding mitigation implementation and mitigation effectiveness. During construction, monitoring will be implemented per Table 7.3. After construction, a Post-Construction Monitoring Program will be implemented for the Project (per AEP 2020a) to monitor bird fatality. No other monitoring was identified in the Project's AEP-FWS Renewable Energy Referral Report.



7.0 ASSESSMENT OF POTENTIAL EFFECTS ON WILDLIFE SPECIES AND HABITAT

7.1 SCOPE OF ASSESSMENT

Wildlife and wildlife habitat is selected as an ecosystem component because the Project has the potential to cause changes in wildlife habitat, movement, and mortality risk. These changes could alter wildlife abundance, ecosystem functions and affect the use of natural resources by wildlife.

The assessment of wildlife and wildlife habitat focuses on wildlife species at risk and SOMC for the Project (as defined in Section 7.2.1.1) and their habitats that are known to occur or have the potential to occur in the LAA.

The scope of this assessment has been influenced by:

- provincial and federal regulations and policy guidance (see Section 1.1)
- the nature, scope and extent of the Project and its activities (see Section 2.0), and
- the environmental setting of the Project (see Sections 2.1 and 7.2)

7.1.1 Potential Effects, Effect Pathways and Measurable Parameters

Potential effects, effect pathways, and the measurable parameters used to characterize and assess effects on wildlife and wildlife habitat are provided in Table 7.1.

Table 7.1 Potential Effects, Effect Pathways and Measurable Parameters for Wildlife and Wildlife Habitat

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in habitat	<ul style="list-style-type: none"> • Direct loss or alteration of habitat from vegetation removal and ground disturbance, including habitat and residences for species at risk (e.g., critical habitat) and SOMC • Indirect loss or alteration of habitat effectiveness through sensory disturbance due to construction and operation activities 	<ul style="list-style-type: none"> • Amount (ha) of land cover classes directly disturbed • Habitat loss because of reduced habitat effectiveness (e.g., sensory disturbance) is assessed qualitatively • Number of wildlife habitat features (e.g., nests, dens) observed within the Project Area or recommended setback
Change in movement	<ul style="list-style-type: none"> • Alteration or impediment of wildlife movement due to physical barriers, sensory disturbance, or vegetation clearing (e.g., fencing around infrastructure) 	<ul style="list-style-type: none"> • Effect on change in movement is assessed qualitatively



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Assessment of Potential Effects on Wildlife Species and Habitat
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Table 7.1 Potential Effects, Effect Pathways and Measurable Parameters for Wildlife and Wildlife Habitat

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in mortality risk	<ul style="list-style-type: none"> • Ground disturbance and vegetation clearing during construction resulting in physical destruction of key habitat features (e.g., nests, dens, hibernacula, etc.) • Vehicle and equipment movement and ground disturbance during construction resulting in accidental mortality of small, less mobile species or individuals (e.g., small rodents, amphibians, reptiles, juvenile birds, etc.) • Animal-vehicle collisions during construction activities • Collisions with PV solar panels and other infrastructure during operation 	<ul style="list-style-type: none"> • Estimated change in direct mortality risk (e.g., through destruction of active nest, den, or vehicle/wildlife collisions) or indirect mortality risk (e.g., increased human access) to be assessed qualitatively to estimate the predicted exposure and threats to wildlife that may result in loss of individuals from a population

7.2 EXISTING CONDITIONS FOR WILDLIFE AND WILDLIFE HABITAT

7.2.1 Methods

7.2.1.1 Species at Risk and Species of Management Concern

For this EE, wildlife species at risk in Alberta are defined as federally and provincially legislated species at risk, including species:

- listed under Schedule 1 of the SARA as endangered, threatened, or special concern (GOC 2020), or
- listed in the AWA as endangered or threatened (GOA 2017b)

The evaluation also considers a wider group of SOMC, which includes species of risk, as well as wildlife species identified in federal or provincial tracking lists and activity guidelines, including species:

- listed by Committee on the Status of Endangered Wildlife in Canada as endangered, threatened, or special concern (GOC 2020) but not yet listed under SARA
- listed as special concern or considered data deficient in Alberta by the Alberta ESCC and its Scientific Subcommittee (GOA 2017b)
- listed as at risk, may be at risk, or sensitive according to the General Status of Alberta Wild Species (AEP 2017)

The SunAlta Solar PV 1 Technical Data Report (Appendix A) lists species at risk and SOMC that have the potential to occur in the LAA, which were used to focus the assessment on wildlife and wildlife habitat.



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Assessment of Potential Effects on Wildlife Species and Habitat

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7.2.1.2 Desktop Review

A review of publicly available data sources was completed to gather information about wildlife and wildlife habitat in the LAA, with an emphasis on species at risk and SOMC. Specifically, the following data sources were reviewed:

- Alberta Fish and Wildlife Internet Mapping Tool (AEP 2020b)
- Alberta Wildlife Sensitivity Data Sets, including Key Ranges and Key Wildlife Layers (AEP 2016)
- Important Bird Areas in Canada Online Database (Bird Studies Canada and Nature Canada 2017)
- The Atlas of Breeding Birds of Alberta: A Second Look (FAN 2007)
- The Natural History of Canadian Mammals (Naughton 2012)
- The Amphibians and Reptiles of Alberta (Russell and Bauer 2000)
- Federal and provincial species reports, recovery strategies, critical habitat descriptions, or management plans for species at risk and SOMC with potential to occur in the LAA
- Literature related to the potential effects of solar PV development on wildlife and wildlife habitat (Smit, n.d.; Lovich and Ennen 2011; Ironwood Consulting 2014; Kagan et al. 2014; H.T. Harvey and Associates 2015; NREL 2015)
- Named lakes (NRCAN 2015)
- Aerial imagery (e.g., BING)

7.2.1.3 Field Surveys

Consistent with the Wildlife Directive for Alberta Solar Energy Projects (GOA 2017a), the following wildlife surveys were conducted for the Project between April to October 2019:

- spring and fall bird migration
- sharp-tailed grouse (*Tympanuchus phasianellus*) lek
- burrowing owl (*Athene cunicularia*)
- breeding bird (within the Project Area)
- raptor nest

Detailed information on the survey methods and results are available in the SunAlta Solar PV 1 Technical Data Report (Appendix A).



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Assessment of Potential Effects on Wildlife Species and Habitat
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7.2.2 Overview

The Project is located within the Dry Mixedgrass Natural Subregion of the Grassland Natural Region of Alberta (Natural Regions Committee 2006). Approximately 45% of the subregion has been converted to agriculture. Land cover within the Project Area consists entirely of tame pasture (18.9 ha, 100%), which can provide nesting habitat for breeding birds. The Project Area avoids all wetlands and ephemeral waterbodies by at least 15 m. There are two Class II (temporary) wetlands, two Class VI (alkaline) wetlands, a dugout and irrigation canals within 100 m of the Project Area but are all avoided with a 15 m or greater setback. The landcover in the LAA includes several wetlands, tame pasture, cultivation, shelterbelts of small trees (e.g., planted trees), and anthropogenic disturbances (e.g., oil and gas facilities, roads, residences).

Fifty-eight species at risk and SOMC have ranges overlapping the Project Area and the LAA (Appendix A). Of the 58 species at risk and SOMC with the potential to interact with the Project, 41% (n = 24) are associated with grassland habitat, 21% (n = 12) are associated with woodland habitat, and 38% (n = 22) are associated with wetland habitat.

Two species at risk, long-billed curlew (*Numenius americanus*) and loggerhead shrike (*Lanius ludovicianus*), and five SOMC (American white pelican [*Pelecanus erythrorhynchos*], great blue heron [*Ardea Herodias*], upland sandpiper [*Bartramia longicauda*], eastern kingbird [*Tyrannus tyrannus*], and long-tailed weasel [*Mustela frenata*]) were observed systematically and incidentally during wildlife surveys conducted for the Project in 2019. No sharp-tailed grouse or burrowing owl were observed during targeted surveys for these species.

During the 2019 surveys, ten stick nests were observed within the LAA, including four active Swainson’s hawk (*Buteo swainsoni*) nests, one great-horned owl (*Bubo virginianus*) nest, and five unoccupied stick nests. The great-horned owl nest is located 60 m from the nearest Project infrastructure (i.e., solar array); all other nests are located greater than 100 m from the Project Area.

7.3 PROJECT INTERACTIONS WITH WILDLIFE AND WILDLIFE HABITAT

Table 7.2 identifies the physical activities with potential to result in Project effects on wildlife and wildlife habitat. These interactions are indicated by check marks and are discussed in detail in Section 7.5 in the context of effects pathways, standard and project-specific mitigation, and residual effects. A justification for no interaction (no checkmark) is provided, if applicable.

Table 7.2 Project-Environment Interactions with Wildlife and Wildlife Habitat

Physical Activities	Potential Effects		
	Change in Habitat	Change in Movement	Change in Mortality Risk
Construction	✓	✓	✓
Operation	✓	✓	✓
NOTE: ✓ = Potential interaction			



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Assessment of Potential Effects on Wildlife Species and Habitat
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7.4 MITIGATION

The Project has been sited to avoid all wetlands and waterbodies, as well as environmentally sensitive wildlife habitat (e.g., native grassland), to reduce potential Project effects on wildlife and wildlife habitat. The Project has been sited to avoid wildlife features where possible. Standard industry practices and avoidance measures, along with project-specific mitigation where required, will be implemented during construction and operation to further reduce potential effects on wildlife and wildlife habitat. Key mitigation measures are summarized in Table 7.3.

Table 7.3 Mitigation for Wildlife and Wildlife Habitat

Potential Effect	Effect Pathway	Mitigation Measures
Change in habitat during construction and operation	<ul style="list-style-type: none"> • Direct habitat loss or alteration through vegetation clearing and ground disturbance during construction, including habitat and residences for species at risk and SOMC • Indirect loss or alteration of habitat effectiveness through sensory disturbance due to construction and operation activities 	<ul style="list-style-type: none"> • The Project has been sited to avoid raptor nest setbacks where possible. One great horned owl nest setback does intersect the Project Area, but no construction will occur within 100 m of the nest while it is active (as determined by an experienced wildlife biologist). Should a new raptor nest be observed within 100 m of the Project, AEP will be consulted to determine appropriate mitigation. • Construction will not occur within setbacks of active nests. Nest activity is to be determined by an experienced wildlife biologist. • The Project is sited outside of critical habitat for species at risk. • The Project Area will be minimized to reduce the area of disturbance. • Clearing will be limited to the extent possible during construction. • Silt fencing will be used to prevent 1-in-100-year rainstorms from causing soil or silt to leave the site. • All collection lines will be sited underground. • All wetlands have been avoided by a setback of at least 15 m.



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Assessment of Potential Effects on Wildlife Species and Habitat
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Table 7.3 Mitigation for Wildlife and Wildlife Habitat

Potential Effect	Effect Pathway	Mitigation Measures
<p>Change in movement during construction and operation</p>	<ul style="list-style-type: none"> Alteration or impediment of wildlife movement due to physical barriers, sensory disturbance, or vegetation clearing (e.g., fencing around infrastructure) 	<ul style="list-style-type: none"> Limit activity within Restricted Activity Periods (RAPs) for wildlife and avoid construction activities during the RAPs, where possible. Discuss wildlife issues (e.g., active nests or dens, etc.) that are identified during construction as necessary between the Environmental Monitor, experienced wildlife biologists, and applicable regulatory agencies, as appropriate. Record all visual sightings of sensitive or species at risk and note the location of any observed wildlife features (e.g., nests) to the Environmental Monitor. The sighting(s) will be reported to the applicable regulatory agency and specific protection measures may be implemented. Fencing surrounding the Project will consist of a chain-link fence approximately 3 m high with three strands of barbed wire across the top. Fencing will consist of straight lines (i.e., no jagged corners to trap wildlife) and will be approximately 15 centimetres (~6 inches) off the ground to allow for small wildlife passage (e.g., allowing ducklings to pass through). During the amphibian mitigation period (April 15 – August 15) an Environmental Monitor (under the direction of an experienced wildlife biologist) will conduct inspections within the suitable setbacks of wetlands; move amphibian SOMC to a suitable nearby wetland or an adequate distance away from equipment, as appropriate; and shut down construction in emergence area during periods of high amphibian activities, if necessary. Outside of the amphibian mitigation period, an Environmental Monitor will be present on site to safely monitor for and, where applicable, relocate any amphibian SOMC observed



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Table 7.3 Mitigation for Wildlife and Wildlife Habitat

Potential Effect	Effect Pathway	Mitigation Measures
<p>Change in mortality risk during construction and operation</p>	<ul style="list-style-type: none"> • Ground disturbance and vegetation clearing during construction resulting in physical destruction of key habitat features (e.g., nests, dens, hibernacula, etc.) • Vehicle and equipment movement and ground disturbance during construction resulting in accidental mortality of small, less mobile species or individuals (e.g., small rodents, amphibians, reptiles, juvenile birds, etc.) • Wildlife-vehicle collisions during construction and operation activities • Birds colliding with the solar panels during operation 	<ul style="list-style-type: none"> • Vegetation clearing will be minimized to the extent practical. Should vegetation clearing be scheduled to occur during the Primary Nesting Period (April 1 to August 31; GOA 2017a, ECCC 2018), a nest survey will be completed within 7 days of the initiation of clearing activities. If nests are detected, the required setback (GOA 2017a) will be applied until young fledge. • Limit activity within RAPs for wildlife and avoid construction activities during the RAPs, where possible. If the RAP cannot be avoided, inform AEP when construction activities will occur within March 15 – August 31, as permits may be required for some mitigation activities (e.g., amphibian relocation). • If nests are detected, the required setback (GOA 2017a) will be applied until young fledge. If a nest is found, regular monitoring of the nest to confirm activity or status is not recommended as this is considered a form of disturbance and could lead to nest failure or predation. Nest status can be checked after the anticipated fledging date of nestlings, estimated by an experienced wildlife biologist. • If there is ongoing construction or reclamation work within 100 m of suitable nesting habitat that was initiated prior to March 15, work may continue unless a breeding bird exhibits defensive behavior within 100 m of the disturbance. In this case, a nest survey is recommended to determine if an active nest is present within 100 m of the disturbance and setbacks would apply if a nest is found. • Silt fencing will be installed along 15 m setbacks of wetlands to prevent amphibians from moving into active construction areas during the amphibian mitigation period (April 15 to August 1). Fencing will be inspected daily for amphibians immediately prior to any construction activities. • Discuss wildlife issues (e.g., active nests or dens, etc.) that are identified during construction as necessary between the Environmental Monitor, experienced wildlife biologists, and applicable regulatory agencies, as appropriate. • Record all visual sightings of sensitive or species at risk and note the location of any observed wildlife features (e.g., nests) to the Environmental Monitor. The sighting(s) will be reported to the applicable regulatory agency and specific protection measures may be implemented. Monitor the construction area for wildlife that may become trapped in any open excavation areas (e.g., trenched areas for collector lines). Should any wildlife be identified, construction personnel will contact the Environmental Monitor. • Do not harass or feed wildlife. • No dogs or hunting allowed in the construction area. • Report incidents with wildlife including vehicle collisions, carcasses, or injured animals to the applicable regulatory agency, as appropriate.



7.5 ASSESSMENT OF RESIDUAL EFFECTS ON WILDLIFE AND WILDLIFE HABITAT

This section summarizes the residual effects of the Project on wildlife and wildlife habitat after the application of mitigation measures. As described in Section 7.1, potential effects include change in wildlife habitat, movement, and mortality risk. This evaluation focuses on the effect pathways detailed in Table 7.1.

7.5.1 Change in Habitat

7.5.1.1 Construction

Project construction has the potential to affect wildlife and wildlife habitat through direct habitat loss as well as temporary sensory disturbance (Lovich and Ennen 2011; Pizzo 2011; Turney and Fthenakis 2011). These direct and indirect changes in habitat might result in wildlife displacement and avoidance of the Project Area and surrounding area due to noise and light associated with construction activities (Benitez-Lopez et al. 2010; Francis et al. 2011; Lovich and Ennen 2011). Responses to sensory disturbance will vary depending on species and individuals but might include: habitat avoidance (e.g., Bayne et al. 2008); diminished reproductive success by affecting breeding/pairing communication or increasing stress response (e.g., Habib et al. 2007; Francis et al. 2011); and/or, diminished fitness by affecting the ability to find prey or avoid predation (e.g., Francis et al. 2009; Francis and Barber 2013).

During construction, vegetation removal and grading associated with the Project will result in loss or alteration of 18.9 ha of tame pasture. No wetlands or upland native vegetation will be directly lost or altered as a result of the Project. As such, construction activities will decrease the availability of habitat for generalist wildlife species that occupy disturbed habitats such as tame pasture; however, wildlife species that use native vegetation and wetland habitats (e.g., most SOMC) will not experience a direct loss of habitat. Construction activities also have the potential to result in indirect (sensory) disturbance and reduced habitat effectiveness for wildlife species in adjacent habitat (i.e., wetlands, shrubs, trees within the LAA). However, unlike direct habitat effects, noise and other sensory disturbance associated with construction activities will end immediately following physical activities. Sensory disturbance during panel installation in the spring may temporarily reduce availability of habitat in the LAA for migrating and breeding species, including species at risk and SOMC, while sensory disturbance during Project installation activities may further reduce availability of habitat in the LAA for overwinter species.

Residual effects on wildlife habitat during construction are likely to occur and are predicted to be adverse as there will be direct and indirect effects on habitat (i.e., tame pasture in the Project Area and adjacent habitat within the LAA) from construction activities (Table 7.4). The magnitude of the residual effect is predicted to be low because a measurable change in the distribution of wildlife in the LAA is possible, but a measurable change in wildlife abundance in the LAA is unlikely. Although most changes in habitat will be limited to the Project Area, sensory disturbance will extend into the LAA. Effects on wildlife from direct habitat loss will occur from a single event (i.e., during vegetation removal and construction); however, the duration of the effect will be medium-term. Indirect effects from sensory disturbance during construction



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will be short-term. Overall, the change in habitat is considered reversible because residual loss or alteration of habitat can be reversed through revegetation following decommissioning (Table 7.4).

7.5.1.2 Operation

Residual effects on wildlife habitat during operation are adverse as there will be indirect habitat loss related to sensory disturbance (i.e., maintenance activities) and displacement around panels and associated infrastructure (e.g., access roads, fencing). Indirect effects on habitat from sensory disturbance will extend into the LAA and occur through the operation phase (i.e., medium-term). The magnitude of the residual effect is predicted to be low because a measurable change in abundance of wildlife in the LAA is unlikely. The change in habitat from sensory disturbance will be continuous during operation. However, residual effects on habitat from sensory disturbance are reversible and expected to return to baseline conditions after decommissioning (i.e., sensory disturbance from operation will cease) (Table 7.4).

7.5.2 Change in Movement

7.5.2.1 Construction

The Project has potential to alter wildlife movement by creating physical or sensory barriers during construction through activities associated with the development of solar panels and associated Project infrastructure (e.g., access roads). The Project is sited entirely on previously disturbed lands and is adjacent to anthropogenic disturbances (e.g., oil and gas facilities, roads, residences) in the LAA.

Overall, residual effects on wildlife movement are adverse because construction activities will have potential to alter movement in the LAA. The magnitude of the residual effect is predicted to be low because a measurable change in abundance of wildlife in the LAA is unlikely, although temporary local shifts in distributions might occur. Residual effects will extend to the LAA and occur continuously through the construction phase (short term). Wildlife movement is expected to return to baseline levels following Project decommissioning (i.e., reversible) (Table 7.4).

7.5.2.2 Operation

Operation of the Project has the potential to alter or impede terrestrial wildlife movement for long periods of time due to physical barriers such as fencing or sensory disturbance around the Project Area (Lovich and Ennen 2011; Pizzo 2011; Turney and Fthenakis 2011). Habitat fragmentation and barriers to movement can affect gene flow in wildlife populations (Lovich and Ennen 2011; Pizzo 2011); however, highly mobile and wide-ranging species (e.g., deer, coyote) are less likely to be impacted than less-mobile species (e.g., amphibians) (Hernandez et al. 2014).

Fencing surrounding the Project will consist of a chain-link fence approximately 2.4 m high with three strands of barbed wire across the top. Fencing will consist of straight lines (i.e., no jagged corners to trap wildlife) and will be approximately 15 centimetres (~6 inches) off the ground to allow for small wildlife passage (e.g., allowing ducklings to pass through). Numerous anthropogenic disturbances (e.g., oil and gas facilities, roads, residences) occur in the LAA, which may affect wildlife movement in the LAA.



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Perimeter fencing is not anticipated to increase impediments to movement for small-size wildlife; however local movements for medium to larger-size wildlife may be altered.

Overall, residual effects on wildlife movement are adverse because operation will have potential to alter movement in the LAA. The magnitude of the residual effect is predicted to be low because a measurable change in abundance of wildlife in the LAA is unlikely, although temporary local shifts in distributions might occur. Residual effects will extend to the LAA and occur continuously through the life of the Project (medium term). Wildlife movement is expected to return to baseline levels following Project decommissioning (i.e., reversible) (Table 7.4).

7.5.3 Change in Wildlife Mortality Risk

7.5.3.1 Construction

Vegetation removal and grading of the site during construction, as well as increased human activity (i.e., traffic volume and use of heavy equipment) has potential to result in increased mortality risk to wildlife (Pizzo 2011). Wildlife mortality (e.g., for ground nesting birds or amphibians and reptiles) due to ground disturbance or vegetation clearing might occur during excavation for panel installation, access road and collector line development as well as vehicle and equipment movement. An increase in traffic volume in the LAA (i.e., construction crews driving back and forth from site) can also increase the risk of animal-vehicle collisions on nearby roads.

The Project location on previously disturbed lands and the proximity to anthropogenic disturbances (e.g., oil and gas facilities, roads, residences) in the LAA has helped to reduce the mortality risk to wildlife species. Sensitive wildlife features (e.g., raptor nests) have been avoided where possible; one great horned owl nest setback intersects the Project Area. Adherence to migratory bird and raptor RAPs will reduce mortality risk to birds during construction (Table 7.3). Where this is not possible, pre-construction surveys (i.e., nest searches) will be conducted to reduce mortality risk to birds, reducing the residual effects. During construction, setbacks established for active nests will be avoided.

Overall, residual effects on wildlife mortality risk are adverse because construction activities still have potential to impact wildlife. The magnitude of the residual effect is predicted to be low because a measurable change in abundance of wildlife in the LAA is unlikely, although temporary local shifts in distributions might occur. The increase in mortality risk is largely limited to the Project Area; however, an increase in traffic is expected in the LAA during construction, increasing the risk of animal-vehicle collisions. The duration of the effect is initially short-term because increased mortality risk is limited to the construction phase. Frequency of mortality risk will occur as multiple, irregular events during construction (Table 7.4).



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7.5.3.2 Operation

During operations, the Project has the potential to increase bird mortality risk through direct collision with solar panels or stranding following impact (Kagan et al. 2014; Huso et al. 2016; Walston et al. 2016; GOA 2017a). Mortality from collisions with entrapment under solar panels (resulting in predation) have been documented in arid environments in Southern California at a variety of solar facility types (PV facility, parabolic mirror, and power tower; Kagan et al. 2014). The potential for this effect to occur in Alberta is currently unknown and little information is available.

Mortality of passerine species has also been documented at solar energy facilities, mainly through other sources such as collision with vehicles, fencing, collector lines, and electrocution on power lines (McCrary et al. 1986; Kagan et al. 2014; Huso et al. 2016; GOA 2017a). The Project siting has avoided named lakes and large waterbodies. The nearest waterbody in the area is Lathom Lake, which is 1.3 km northeast of the Project Area. Therefore, the Project siting is consistent with the *Directive*, and thereby reduces the mortality risk to waterbirds.

Post-construction monitoring will be conducted to estimate bird fatality rates and to assess the effectiveness of mitigation. The results of the post-construction monitoring will be submitted to AEP and mitigation options, if necessary, will be explored.

During operation, residual effects related to mortality risk are predicted to be adverse in direction and low in magnitude (i.e., a measurable change in abundance of wildlife in the LAA is unlikely, although temporary local shifts in distributions might occur). Residual effects will largely be limited to the Project Area and occur continuously through the life of the Project (medium term). Mortality risk is expected to return to baseline levels following project decommissioning (i.e., reversible) (Table 7.4).

7.5.4 Summary of Residual Effects

Project residual effects on wildlife and wildlife habitat are summarized in Table 7.4.



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Table 7.4 Residual Effects on Wildlife and Wildlife Habitat

Residual Effect	Residual Effects Characterization					
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility
Change in Habitat						
Construction	A	L	LAA	ST/MT	S	R
Operation	A	L	LAA	MT	C	R
Change in Movement						
Construction	A	L	LAA	ST	C	R
Operation	A	L	LAA	MT	C	R
Change in Mortality Risk						
Construction	A	L	LAA	ST	IR	R
Operation	A	L	LAA	MT	C	R
KEY						
See Table 6.1 for detailed definitions			Geographic Extent		Frequency	
Direction			PA Project Area		S Single event	
P Positive			LAA Local Assessment Area		IR Multiple irregular event	
A Adverse					R Multiple regular event	
N Neutral					C Continuous	
Magnitude			Duration		Reversibility	
N Negligible			ST Short term		R Reversible	
L Low			MT Medium term		I Irreversible	
M Moderate			LT Long term			
H High			N/A Not applicable			

7.6 SIGNIFICANCE DETERMINATION

The Project has been sited to avoid all wetlands and waterbodies, as well as environmentally sensitive wildlife habitat (including critical habitat for species at risk) and features (where possible), which helps to reduce the potential Project effects on wildlife and wildlife habitat. In addition, with the application of recommended mitigation and environmental protection measures, adverse residual effects on wildlife and wildlife habitat will be further reduced. The Project residual effects on wildlife habitat, movement, and mortality risk are unlikely to pose a long-term threat to the persistence or viability of a wildlife species in the region and the Project is not contrary to goals, objectives or activities of recovery strategies, action plans, and management plans for any SOMC or species at risk. As such, residual effects associated with Project are predicted to be not significant. Prediction confidence is considered moderate based on the quality and quantity of available baseline data, as well as the effectiveness of proposed mitigation.



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7.7 MONITORING

Post-construction monitoring surveys will be conducted for a minimum three years following commissioning of the Project, from March 1 to November 15 each year, per the Post-Construction Survey Protocols for Wind and Solar Energy Projects (AEP 2020a).



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8.0 CONCLUSIONS

The EE focused primarily on potential interactions between Project activities (i.e., construction and operation of the solar facility and associated access roads, collector system, laydown area, operations and maintenance building and e-house building) and the ecosystem components. Wildlife and wildlife habitat was the only ecosystem component that was carried through the evaluation to determine the residual effects and significance.

The Project has been sited to avoid all wetlands and waterbodies by at least 15 m, as well as environmentally sensitive wildlife habitat (e.g., native grassland) and features to reduce potential Project effects. Potential adverse effects associated with Project activities can be mitigated using a combination of standard and project-specific mitigation measures, where required.

Given the siting of the Project on previously disturbed land that avoids environmentally sensitive features, as well as the Project design and implementation of mitigation measures, overall residual effects of the Project are predicted to be not significant.



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APPENDICES



**Appendix A SUNALTA SOLAR DEVELOPMENT TECHNICAL
DATA REPORT**





**SunAlta Solar PV 1
Technical Data Report**

July 2020

Prepared for:

1867559 AB Ltd.

Prepared by:

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Project Number: 12351327

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Abbreviations

%	percent
AEP	Alberta Environment and Parks
AEP-WM	Alberta Environment and Parks – Wildlife Management
AESCC	Alberta Endangered Species Conservation Committee
AUC	Alberta Utilities Commission
AWA	Alberta <i>Wildlife Act</i>
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Service
ECCC	Environment and Climate Change Canada
FWMIS	Fish and Wildlife Management Information System
GPS	global positioning system
h	hour
ha	hectares
km/h	kilometers per hour
m	meter
m ²	square meter
MBCA	<i>Migratory Birds Convention Act</i>
mm	millimeter
MW	megawatt
NAD 83	North American Datum of 1983
PCMP	Post-construction Monitoring Plan
PV	Photovoltaic
SARA	<i>Species at Risk Act</i>
SOMC	Species of Management Concern
UTM	Universal Transverse Mercator
W4M	West of the 4th Meridian



SUNALTA SOLAR PV 1 TECHNICAL DATA REPORT

Project Overview
July 2020

Document Layout

This submission template is designed for all renewable energy project submissions to Alberta Environment and Parks–Wildlife Management (AEP-WM) required under the Alberta Utilities Commission (AUC) Rule 007. The information outlined in this submission template is detailed in the AEP-WM policies for renewable energy projects. For wind energy projects the applicable policy is the *Wildlife Directive for Alberta Wind Energy Projects* (GOA 2018a) and for solar energy projects the applicable policy is the *Wildlife Directive for Alberta Solar Energy Projects* (GOA 2017a). Throughout this template, reference will be made to the “Directive” with the intent to reference either the wind or solar energy related Directive document applicable to the project being submitted.

This template provides a list of questions that include all the information and material required in the project submission to AEP-WM. All questions must be answered or indicated as “not applicable” to the project. The submission must be provided in a separate PDF or Microsoft Word document using the same question numbers provided in this template. Proper completion of this template with all identified material constitutes a complete submission as required under the applicable Directive. It is often appropriate to answer a question with one word or number, a list, bullet points or a table, as long as the information is coherently presented and fully addresses the question.

It is the responsibility of the proponent to ensure that all required information and supporting documents, as identified in this template, are included in the submission. There are sections of this template that only apply to either wind or solar energy projects, these sections are clearly identified. Unless otherwise identified, all sections and questions must be completed. Failure to complete a required section will result in automatic rejection from the AEP-WM review process.



SUNALTA SOLAR PV 1 TECHNICAL DATA REPORT

Project Overview
July 2020

PROJECT OVERVIEW

This section asks for a general overview of the project including information about the proponent, project type, location, and infrastructure.

1. What type of project is being proposed (wind, photovoltaic solar or other)?

1867559 Alberta Ltd. is proposing to develop a 9.25 megawatt (MW) solar energy generation facility.

2. What is the name of the project?

SunAlta Solar PV1 Project

3. WIND PROJECTS ONLY: What type of application is being proposed (standard submission, buildable area, preferred and alternate turbine locations, other)?

Not Applicable

4. What is the name of the proponent? Provide a contact name, phone number and email for the proponent.

1867559 Alberta Ltd.
2602-1078 6th Avenue, SW
Calgary, AB T2P 5N6

Tony Smith
Phone: 403-615-7494
Email: ahs.tonymsmith@gmail.com

5. What is the wildlife consultant company name(s) and contact information?

Stantec Consulting Ltd.
200-325 25 Street SE
Calgary AB T2A 7H8

Nathan deBruyn, M.Sc., P.Biol. (Senior Wildlife Biologist)
Email: Nathan.debruyn@stantec.com
Phone: 403-441-5131

Resha Ali, M.Sc., (Environmental Planner)
Email: Resha.ali@stantec.com
Phone: 403-716-1467



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6. What is the project location? Provide the location information in a table with the below headings and using additional rows if needed.

Table 1 Project Location

Quarter	Section	Township	Range	Meridian
NE	17	20	17	4

7. Provide the UTM zone for the project.

12 U; Central UTM coordinates: 406964 E, 5617224 N

8. What is the size of the project construction footprint (include all infrastructure, temporary workspace or other related project related space) in hectares?

The project construction footprint is 20.9 hectares (ha), which includes a fenced area (housing the panels), inverters, transformers, trailer, Operations and Maintenance building, existing quonset, detention ponds, access roads, and temporary laydown area.

9. What is the size of project operation footprint (include all infrastructure and other project related space) in hectares?

The project operation footprint is 20.3 ha, which includes the project construction footprint described above but excludes the temporary lay down area.

10. WIND PROJECTS ONLY: Provide locations of all proposed wind turbines in a table with the following headings, using as many rows as needed. If applicable, indicate if the turbine location is a preferred or alternate location.

Turbine ID	UTM Zone	UTM Easting	UTM Northing	Quarter	Section	Township	Range	Meridian	Land Cover Type	Preferred or Alternate
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

11. WIND PROJECTS ONLY: Provide the below turbine details in a table with the below format.

Specifications	Detail
Manufacture	N/A
Model	N/A
Turbine Capacity (megawatts)	N/A
Tower/Hub Height (meters from the ground)	N/A
Rotor Swept Area (minimum to maximum meters from the ground)	N/A



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Blade Length (meters)	N/A
Number of Blades	N/A
Nacelle Shape	N/A
Cut-in Wind Speed (meters per second)	N/A
Cut-out Wind Speed (meters per second)	N/A
Tower Type (Tubular or Lattice)	N/A

12. SOLAR PROJECTS ONLY: Provide the below solar array details in a table with the below format.

Table 2 Project Infrastructure Information

Specifications	Detail
Manufacture	Panels: Canadian Solar Inverters: Canadian Solar
Model	Panels: Haiku 400W Inverters: CSI 125KTL GS E, rated 125kW
Type of Solar Collection System (ex. Photovoltaic)	PV
Number of panels	30,680 panels
Static or Tracking panels	Static (fixed tilt)
Height of panel (maximum height in meters)	3 m maximum height
Surface area of panel (square meters)	2 m ²
Spacing between panels (meters)	4 m right-of-way
Ground clearance of panels (i.e. minimum height of panel in meters)	1.0 m

13. Provide any general information about the proponent, or the project that may be applicable to the AEP-WM review.

Not Applicable



SUNALTA SOLAR PV 1 TECHNICAL DATA REPORT

Wildlife Habitat Land Cover
July 2020

WILDLIFE HABITAT LAND COVER

This section asks for information about the project siting and general risks to wildlife and wildlife habitat. Ensure setbacks are measured as per the Directive, which states a setback is to be measured from the edge of the feature to the nearest edge of the project footprint (i.e. temporary disturbance and all project related permanent infrastructure).

- 14. Land Cover within the project area: Provide the amount of each type of land cover within the project area, as identified within the project area map (refer to the *Maps and Figures* section below) in a table with the below format. For each habitat type, provide the total number of hectares within the entire project area, the number of hectares that will be disturbed during construction (include all temporary work spaces) and the number of hectares that will be used to support the operation of the proposed facility. Ensure the reported permanent and temporary footprint for all infrastructure (i.e. turbines, solar arrays, access roads, collection lines etc.) aligns with the definition as per the Directive. Additional rows may be added for land cover types not already identified in the below table. If an identified habitat type does not occur in the proposed project area, clearly state that it does not occur in the project footprint.**

Spatial boundaries for the Project include the following (see Figure 1):

- Project Boundary – this encompasses the quarter section (NE-17-20-17-W4M) where the Project will occur and is bounded on the west by the irrigation canal.
- Project Area – this is within the Project Boundary and consists of the temporary and permanent Project Footprints.
- Project Study Area – this encompasses a 1000 m setback on the Project Boundary based on setbacks for species of management concern that are expected to occur in the Project Boundary.

Land cover within the Project Area (Temporary Footprint [laydown area] and Permanent Footprint) consists entirely of tame grassland (Table 3; see Photo A1 in Appendix A). No wetlands are present in the Project Area. Two Class II (temporary) wetlands (see Photo A2), two Class VI (alkaline) wetlands (see Photo A3), and a dugout are within 100 m of the Project Area but are all avoided with a 15 m or greater setback.

The Class II and Class VI wetlands have been previously disturbed by oil and gas, pipeline, irrigation activities, and/or cattle grazing. The saline properties of the Class VI wetlands and the disturbed vegetation and soils in and around the wetland reduce the potential for wildlife habitat, including northern leopard frog. All wetlands appear dry in imagery of the Project Area from 2012, 2014 and 2019 and no water was present in the wetlands at the time of the field survey. There are no Class III (seasonal) or wetter wetlands within 100 m of the Project Area.



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Wildlife Habitat Land Cover
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Planted trees are present along a driveway along the northern edge of the Project Boundary (fence line surrounding the Project Area; see Figure 1 provided for Question 64); however, they do not occur in the Project Area (see Photo A4). An existing quonset structure and several farm buildings are located adjacent to the dugout in the northwest corner of the Project Boundary. Existing irrigation canals (see Photo A5) are present west and north of the Project Boundary within the Project Study Area (lands within 1,000 m of the Project Boundary; see Figure 1 provided for Question 64). Range Road 174 runs north to south, east of the Project Area. Existing oil and gas facilities are present at several locations in the Project Boundary and are being avoided by the temporary and permanent Project footprint.

Table 3 Habitat Types in the Project Area

Habitat Type	Permanent Project Footprint (ha)	Temporary Project Footprint (ha)	Total Project Area (ha)
Native Grassland	0	0	0
Tame Grassland	20.3	0.6	20.9
Hay land	0	0	0
Aspen Forest	0	0	0
Boreal Forest	0	0	0
Montane Forest	0	0	0
Mixed Forest	0	0	0
Cultivation	0	0	0
Wetlands	0	0	0
Lake/Waterbody	0	0	0
River/Watercourse	0	0	0
Other	0	0	0
Total number of hectares	20.3	0.6	20.9

Fifty-eight species of management concern (SOMC) have ranges overlapping the Project Study Area (i.e., lands up to 1,000 m from the Project Boundary) (Appendix B). For this assessment, SOMC includes species:

- Listed as *endangered*, *threatened*, or *special concern* in Schedule 1 of the *Species at Risk Act* (SARA; GOC 2019)
- Assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as *endangered*, *threatened*, or *special concern* (GOC 2019)
- Listed provincially in the *Alberta Wildlife Act* (AWA) as *endangered* or *threatened* or *special concern* by the Alberta Endangered Species Conservation Committee (AESCC) (GOA 2017b)
- Listed as *at risk*, *may be at risk*, or *sensitive* on the General Status of Alberta Wild Species (Alberta Environment and Parks [AEP] 2017)



SUNALTA SOLAR PV 1 TECHNICAL DATA REPORT

Wildlife Habitat Land Cover
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Of the 58 SOMC with the potential to interact with the Project, 41% (n = 24) are associated with grassland habitat, 21% (n = 12) are associated with woodland habitat, and 38% (n = 22) are associated with wetland habitat.

15. As per the Directive, is any part or portion of the project sited in the following habitat types (a yes or no answer will suffice):

a. Native grassland?

No

b. Old growth forests?

No

c. Named waterbodies?

No

d. Valley breaks/coulee breaks?

No

e. Valleys of large watercourse?

No

If the project is sited in the any of the above habitat types, provide the details of the project infrastructure (location, type of infrastructure, and amount of area impacted) in each habitat type and the rationale for siting the project in an area identified as higher risk by AEP-WM policy. Detail any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive. If the proposed project will impact more than one of the identified habitat types, provide the details for each habitat type.

Not Applicable



WILDLIFE ZONES AND CRITICAL HABITAT

16. As per the Directive, is the project sited in the following wildlife zones (a yes or no answer will suffice):

- a. Greater Sage-Grouse Range (inclusive of the area covered by Environment Canada's Emergency Protection Order)?

No

- b. Trumpeter Swan Waterbodies and Watercourses (inclusive of 800 m setback from waterbody and watercourse)?

No

- c. Caribou Zones?

No

- d. Mountain Goat and Sheep Zones?

No

- e. Piping Plover Waterbodies (inclusive of 200 m setback from waterbody)?

No

If the project is sited in the above wildlife zones, provide the details of the project infrastructure (location, type of infrastructure, and amount of area impacted) in each habitat type and the rationale for siting the project in an area identified as higher risk by AEP-WM policy. Detail any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive. If the proposed project will impact more than one of the identified wildlife zones, provide the details for each type of wildlife zone separately.

Not Applicable

17. Is the project sited within federally designated Critical Habitat (*Species at Risk Act*)? If yes, identify the species for which the Critical Habitat is designated, provide the details of the project infrastructure (location, type of infrastructure, and amount of area impacted) in Critical Habitat and rationale for siting the project in an area deemed high risk by AEP-WM policy. If the proposed project will impact more than one of the identified Critical Habitats, provide the details for each species' Critical Habitat that will be impacted.

No



SUNALTA SOLAR PV 1 TECHNICAL DATA REPORT

Wildlife Zones and Critical Habitat
July 2020

- 18. Is the project sited within 100 m of a valley or coulee break? If yes, provide the details of the project infrastructure (location, type of infrastructure, and amount of area impacted) within 100 m of a valley or coulee break and rationale for siting the project in an area deemed higher risk by AEP-WM policy. Detail any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.**

No



LAKES, WETLANDS AND WATERCOURSES

19. Is the project sited within 100 m of any seasonal marshes/seasonal shallow open waterbodies, semi-permanent marsh/semi-permanent shallow open waterbodies, permanent shallow open water or intermittent shallow open water (i.e. Class III, Class IV, Class V and Class VI wetlands) as defined by the Alberta Wetland Classification System (Government of Alberta 2015)? If the project is sited within a wetland setback, provide a summary of the details (location, type of infrastructure, and amount of area impacted) and rationale for the siting decision in a table with the following headings.

Table 4 Class III and Higher Wetlands Present Within the Project Area

Wetland Name/ID Number	Wetland Class	Proposed Infrastructure Type within Setback	Proximity of Infrastructure to the Nearest Edge of the Wetland (m)	Rationale/ Justification for Siting Decision
M-G-VI-WL-1	Class VI	Solar arrays, inverters, substation, access road	15	Saline properties of wetland and disturbed vegetation and soil in and around the wetland reduce the potential for habitat; amphibian mitigation measures to be implemented (see Question 50 – Table 35)
M-G-VI-WL-2	Class VI	Solar array	16	Saline properties of wetland and disturbed vegetation and soil in and around the wetland reduce the potential for habitat; amphibian mitigation measures to be implemented (see Question 50 – Table 35)

Note: Wetland name/ID number must correspond to wetlands on maps submitted to AEP-WM; refer to the *Maps and Figures* section of this submission template.

Provide details of any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.

The saline properties of the two Class VI wetlands and the disturbed vegetation and soils in and around the wetland reduce the potential for wildlife habitat, including northern leopard frog. All wetlands appear dry in imagery of the Project Area from 2012, 2014 and 2019 and no water was present in the wetlands at the time of the field survey. The two Class VI wetlands are being avoided by at least 15 m. Wetland mitigation measures can be found in Question 50 (Table 35).



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Lakes, Wetlands and Watercourses
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20. Is the project sited within 1000 m of a named lake or waterbody? If the project is sited within a waterbody setback, provide the details of the project infrastructure (location, type of infrastructure, and amount of area impacted) within the setback and the rationale for siting the project in an area identified as higher risk by AEP-WM policy. Provide details of any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.

Not Applicable

21. Amphibian Surveys: Were amphibian surveys completed? If no, continue to question 22. Provide details of the amphibian surveys completed including if the established survey protocols within the AEP-WM Sensitive Species Inventory Guidelines were followed, search area, survey duration, time of day, how survey points were chosen, and the number of visits to each survey point.

No amphibian surveys were conducted. The wetlands observed in the Project Boundary provide relatively low suitability habitat for amphibians due to salinity and the limited amount of time temporary wetlands contain open water (i.e., Class II, Class VI wetlands, dugout). In addition, all wetlands have a 15 m setback where no construction activities will occur. The canal along the western boundary of the Project Boundary provides relatively low habitat suitability for sensitive amphibians due to steep banks and flowing water. The canal has a 15 m setback from the edge of the Project Boundary. Amphibian mitigation measures can be found in Question 50 (Table 35).

a. Provide the survey dates.

Not Applicable

b. Provide the number of survey points.

Not Applicable

c. The location of survey points must be provided in a map (refer to the *Maps and Figures* section below); provide the name of this map.

Not Applicable

d. Provide weather conditions during each survey in a table with the following headings.

Table 5 Survey Conditions – Amphibian Surveys

Survey Dates	Survey Time	Weather Conditions	Comments
N/A	N/A	N/A	N/A



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- e. Provide details of the survey conditions (recent rainfall amount and temperature) and confirm if the conditions met the required conditions for Great Plains Toad and Plains Spadefoot surveys, as per the AEP-WM *Sensitive Species Inventory Guidelines*.

Not Applicable

- f. Provide the total survey time (time spent actively conducting survey).

Not Applicable

- g. Results: Were amphibians found?

Not Applicable

- h. If amphibians were found, provide the locations of all wetlands/locations where amphibians were detected and species of amphibian in a table with the following headings.

Table 6 Survey Results - Amphibians

Wetland Name/ID Number	Species of Amphibian	Location (UTM NAD 83)	Is the Required Setback Met (Y/N)	Distance to Nearest Project Related Disturbance (m)	Comments
N/A	N/A	N/A	N/A	N/A	N/A

- i. If a required setback is not being met, provide the details of the project disturbance (location, type of infrastructure, and amount of area impacted), rationale for siting decision and any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.

Not Applicable

- j. Discussion of results—Provide additional information such as habitat characteristics that support or inhibit amphibian presence and any amphibian observations that were not associated with wetlands.

Not Applicable

22. SOLAR PROJECTS ONLY: Is any project infrastructure sited within:

- a. 45 meters from the top of the break of intermittent watercourses or springs?

No

- b. 45 meters from the top of the break of small permanent watercourses?

No.



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Lakes, Wetlands and Watercourses
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- c. 100 meters from the top of the break of large permanent watercourses?

No

If the project is sited in the any of the above setbacks, provide the details of the project infrastructure (location, type of infrastructure, and amount of area impacted) within the setback of a watercourse and rationale for siting the project in an area deemed higher risk by AEP-WM policy. Provide details of any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.

Not Applicable



SUNALTA SOLAR PV 1 TECHNICAL DATA REPORT

Pre-Assessment Wildlife Surveys
July 2020

PRE-ASSESSMENT WILDLIFE SURVEYS

23. Were all wildlife surveys completed by an experienced wildlife biologist as defined by the Directive?

Yes

24. Provide all Research and Collection license numbers that apply to this project.

#19-138

25. Has all pre-assessment wildlife survey data been submitted to AEP-WM in a FWMIS load form? Provide the date(s) of FWMIS Submission to AEP-WM.

The Fish and Wildlife Management Information System (FWMIS) load form will be submitted with this application.



REQUIRED SURVEYS

26. Spring Migration Bird Surveys

- a. *Provide details of survey protocols including the search area, the survey duration, how survey points were chosen, and the number of visits to each survey point. In addition, describe what was considered an incidental observation and if these observations were recorded and reported.*

Consistent with the *Wildlife Directive for Alberta Solar Energy Projects* (GOA 2017a), spring bird migration surveys were conducted between late March and mid-May to align with the survey periods for early, mid, and late season migrants. Surveys were conducted under a variety of weather conditions as weather can greatly influence bird activity, but surveys were postponed if poor visibility or precipitation affected a surveyor's ability to detect birds (see Table 7). Stations were chosen at vantage points that provided coverage of the Project Area and a 1,000 m radius from the stations. At each station there was a 1-hour morning survey, conducted between sunrise and 1100 hours, and a 1-hour mid-day survey, conducted between 1100 hours and 1800 hours. All birds observed within 1,000 m of the survey station were recorded, along with their estimated flight path, behavior (perched, loafing, or flying), and estimated flight height. Incidental observations of SOMC were taken outside of systematic surveys, and any observations greater than 1,000 m from the survey station, were recorded as incidentals.

- b. *Provide the survey dates.*

Surveys were conducted April 3-4, 2019 (early), April 17, 2019 (mid), and May 14, 2019 (late).

- c. *Provide the time of day surveys were conducted.*

Morning surveys were conducted between sunrise and 11:00 hours, and mid-day surveys were conducted between 11:00 hours and 18:00 hours.

- d. *Provide the number of survey points.*

Two survey stations provided coverage of the Project Area and a 1,000 m radius from the stations.

- e. *Provide the total survey time (time spent actively conducting survey).*

Each station was monitored for 60 minutes twice per day for each survey period, resulting in 720 minutes of time spent actively surveying.



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Required Surveys
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- f. *The location of survey points must be provided in a map (refer to the Maps and Figures section below); provide the name of this map.*

Refer to Question 65 (Figure 2: Wildlife Survey Stations and Observations).

- g. *Provide weather conditions during each survey date and time in a table with the following headings.*

Table 7 Weather Conditions – Spring Bird Migration Surveys

Survey Dates	Weather Conditions	Comments
April 3, 2019: 14:38-16:50 April 4, 2019: 07:46-10:08	<ul style="list-style-type: none"> • Temperature ranged from 3 (morning) to 13 degrees (afternoon) Celsius • Winds ranged from calm (<1 km/h) to light breeze (up to 11 km/h) • No precipitation 	<ul style="list-style-type: none"> • Noise levels were light throughout (temporary, not distracting)
April 17, 2019: 08:07-14:58	<ul style="list-style-type: none"> • Temperature ranged from 8 (morning) to 15 degrees (afternoon) Celsius • Wind ranged from light air (up to 5 km/h) to gentle breeze (up to 19 km/h) • No precipitation 	<ul style="list-style-type: none"> • Noise levels were quiet throughout
May 14, 2019: 07:56-15:37	<ul style="list-style-type: none"> • Temperature ranged from 11 (morning) to 21 degrees (afternoon) Celsius • Winds were a gentle breeze throughout (up to 19 km/h) • No precipitation 	<ul style="list-style-type: none"> • Noise levels were quiet throughout

- h. *Describe the habitat type or land use within the surveyed area.*

The survey stations were located to provide coverage of the Project Area and a 1,000 m radius from the stations. This encompassed the tame pasture habitat and Class II and Class VI wetlands and dugout within the Project Boundary, and the surrounding habitat, including the irrigation canal, wetlands and cropland.

- i. *Results: Provide the survey results in tables using the following format. The tables must provide an understanding of the number of observations at each survey location and during each round of surveys, a list of the species observed and a summary of the observations per bird guild. Provide a brief written description of the results.*

Fifty-five per cent of individuals (n = 431) were observed during the first round of surveys (i.e., visit 1) followed by 29.7% (n = 232) during the second visit and 15.1% (n = 118) during the third visit. The majority of observations (86.3%, n = 674) were recorded during the morning surveys. Tables 8, 9 and 10 provide the observations by survey location and time (e.g. Time 1 [visit 1], Time 2 and Time 3), summary of species observed in the Project Area and a 1,000 m radius from the stations, and number of observations recorded per guild including waterfowl (ducks geese, swans), waterbirds (pelican, cormorant, herons, gulls), shorebirds, raptors, grouse and passerines (all landbirds) respectively.



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Required Surveys
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Table 8 Spring Bird Migration: Observations by Survey Location Round: Number of Individuals Detected During Each Survey Round

Survey Location	Time of Day	Visit 1	Visit 2	Visit 3	Total Number of Individuals Detected
Migration 1	Morning	366	103	50	519
	Mid-day	18	10	18	46
Migration 2	Morning	32	87	36	155
	Mid-day	15	32	14	61
Total		431	232	118	781

Table 9 Spring Bird Migration: Observations by Species

Species	Provincial General Status ¹	Number of Individuals	Number of Flocks (greater than 2 birds of the same species)*
Canada Goose	Secure	294	32
Snow Goose	Secure	30	1
Tundra Swan	Secure	85	6
Unknown Swan	---	30	1
Northern Shoveler	Secure	9	3
Northern Pintail	Secure	1	1
Canvasback	Secure	1	1
Common Goldeneye	Secure	2	1
Mallard	Secure	43	20
Unknown Duck	---	2	1
Great Blue Heron	Sensitive	1	1
Upland Sandpiper	Sensitive	1	1
Willet	Secure	2	1
Wilson's Snipe	Secure	1	1
Marbled Godwit	Secure	1	1
Killdeer	Secure	24	7
Ring-billed Gull	Secure	33	7
California Gull	Secure	11	5
Franklin's Gull	Secure	18	5
Unknown Falcon	---	1	1
Northern Harrier	Secure	8	8
Swainson's Hawk	Secure	8	7



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Table 9 Spring Bird Migration: Observations by Species

Species	Provincial General Status ¹	Number of Individuals	Number of Flocks (greater than 2 birds of the same species)*
Red-tailed Hawk	Secure	10	9
Rough-legged Hawk	Secure	1	1
Unknown Hawk	---	2	2
Black-billed Magpie	Secure	5	2
American Crow	Secure	13	9
Common Raven	Secure	3	3
Horned Lark	Secure	52	4
Tree Swallow	Secure	2	2
Cliff Swallow	Secure	2	1
European Starling	Exotic/Alien	11	2
Savannah Sparrow	Secure	1	1
Lapland Longspur	Secure	3	2
Brown-headed Cowbird	Secure	2	1
Brewer's Blackbird	Secure	1	1
Red-winged Blackbird	Secure	5	1
Western Meadowlark	Secure	20	13
Unknown Passerine	---	42	2
SOURCE: ¹ AEP 2017			
NOTE: * Number of separate observations			

Table 10 Spring Bird Migration: Bird Guild Summary Table

Bird Guild	Number of Individuals	Number of Flocks*
Waterfowl	497	67
Waterbirds	1	1
Shorebirds	29	11
Raptors	30	28
Grouse	0	0
Passerines (includes all landbirds)	224	61
NOTE: *Number of separate observations		



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- j. *Provide the total number of individuals observed during the surveys.*

During the spring migration survey, a total of 781 birds (comprised of 168 observations) were observed within the Project Area and a 1,000 m radius from the stations.

- k. *Provide the number of species observed.*

Five guilds comprised of 34 species and five unidentified species groups (e.g. unknown duck) were recorded within the Project Area and a 1,000 m radius from the stations.

- l. *Provide the number of bird observations per minute of survey time.*

Total spring observations: 1.08 bird observations/minute (781 bird observations/720 total minutes of survey time).

- m. *Discussion of results—Provide additional information such as the spatial or temporal trends of bird observations. Other relevant information may include average flight height, notes on behaviour (long distance flight, short distance flights between local features or foraging in area), if there were certain survey points with more bird activity than others or habitat features that may have attracted (or reduced) activity and a summary of incidental observations including total numbers and species.*

Waterfowl and passerines were the most commonly recorded guild, accounting for 63.6% (n = 497) and 28.7% (n = 224), respectively, of all recorded observations. The majority of waterfowl (52.3%, n = 260) were observed at heights above 50 m, with several observations of waterfowl recorded along the canal on the west side of the Project Boundary. Eighty-three per cent of landbirds (n = 186) were recorded at heights below 50 m.

Canada goose (*Branta canadensis*), tundra swan (*Cygnus columbianus*) and mallard (*Anas platyrhynchos*) were the most commonly observed species in the waterfowl guild accounting for 59.2%, 17.1%, and 8.7% of all waterfowl observations, respectively. Canada goose and mallard are local breeders, and some are year-round residents; tundra swans are seasonal migrants and breed in the artic. Horned lark (*Eremophila alpestris*) and unknown passerines were the most commonly recorded landbirds accounting for 23.2% and 4.5% of all landbird observations. Horned larks are year-round residents of the Project Area.

Two SOMC were observed during the spring migration survey including great blue heron (*Ardea herodias*) and upland sandpiper (*Bartramia longicauda*).



SUNALTA SOLAR PV 1 TECHNICAL DATA REPORT

Required Surveys
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27. Fall Migration Bird Surveys

- a. *Provide details of survey protocols including the search area, the survey duration, how survey points were chosen, and the number of visits to each survey point. In addition, describe what was considered an incidental observation and if these observations were recorded and reported.*

Consistent with the *Wildlife Directive for Alberta Solar Energy Projects* (GOA 2017a), fall bird migration surveys were conducted between late August and late October to align with the survey periods for early, mid, and late season migrants. Surveys were conducted under a variety of weather conditions as weather can greatly influence bird activity, but surveys were postponed if poor visibility or precipitation affected a surveyor's ability to detect birds (see Table 11). Stations were chosen at vantage points that provided coverage of the Project Area and a 1,000 m radius from the stations. At each station there was a 1-hour morning survey, conducted between sunrise and 1100 hours, and a 1-hour mid-day survey, conducted between 1100 hours and 1800 hours. All birds observed within 1,000 m of the survey station were recorded, along with their estimated flight path, behavior (perched, loafing, or flying), and estimated flight height. Incidental observations of SOMC were taken outside of systematic surveys, and any observations greater than 1000 m from the survey station, were recorded as incidentals.

- b. *Provide the survey dates.*

August 20, 2019 (early), September 17, 2019 (mid), October 16, 2019 (late)

- c. *Provide the time of day surveys were conducted.*

Morning surveys were conducted between sunrise and 11:00 hours, and mid-day surveys were conducted between 11:00 hours and 18:00 hours.

- d. *Provide the number of survey points.*

Two survey stations provided coverage of the Project Area and a 1,000 m radius from the stations.

- e. *Provide the total survey time (time spent actively conducting survey).*

Each station was monitored for 60 minutes twice per day for each survey period, resulting in 720 minutes of time spent actively surveying.

- f. *Location of survey points must be provided in a reference map (refer to the Maps and Figures section below). Provide name of reference map.*

Refer to Question 65 (Figure 2: Wildlife Survey Stations and Observations).



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- g. Provide weather conditions during each survey date and time in a table with the following headings.

Table 11 Weather Conditions – Fall Bird Migration Surveys

Survey Dates	Weather Conditions	Comments
August 20, 2019: 07:17-13:22	<ul style="list-style-type: none"> • Temperature ranged from 10 (morning) to 23 degrees (afternoon) Celsius • Winds ranged from calm (<1 km/h) to gentle breeze (up to 19 km/h) • No precipitation 	<ul style="list-style-type: none"> • Noise levels ranged from quiet to light (temporary, not distracting)
September 17, 2019: 08:23-15:21	<ul style="list-style-type: none"> • Temperature ranged from 9 (morning) to 16 degrees (afternoon) Celsius • Winds ranged from light air (up to 5 km/h) to moderate breeze (up to 28 km/h) • No precipitation 	<ul style="list-style-type: none"> • Noise levels were light (temporary, not distracting)
October 16, 2019: 07:52-17:42	<ul style="list-style-type: none"> • Temperature ranged from 5 (morning) to 18 degrees (afternoon) Celsius • Winds ranged from calm (<1 km/h) to moderate breeze (up to 28 km/h) • No precipitation 	<ul style="list-style-type: none"> • Noise levels were light (temporary, not distracting)

- h. Provide a description of the habitat type or land use within the surveyed area.

The survey stations were located to provide coverage of the Project Area and a 1,000 m radius from the stations. This encompassed the tame pasture habitat and Class II and Class VI wetlands and dugout within the Project Boundary, and the surrounding habitat, including the irrigation canal, wetlands and cropland.

- i. Results: Provide the survey results in tables using the following format. The tables must provide an understanding of the number of observations at each survey location and during each round of surveys, a list of the species observed and a summary of the observations per bird guild. Provide a brief written description of the results.

Ninety-eight per cent of observations (n = 24,944) were recorded during the third visit, and 97.1% (n = 24,832) of observations were recorded during the morning surveys. Large flocks of snow geese (*Anser caerulescens*) accounted for the high number of observations recorded during the third visit. Tables 12, 13, and 14 provide the observations by survey location and time (e.g., Time 1 [visit 1], Time 2, and Time 3), summary of species observed in the Project Area and a 1,000 m radius from the stations, and the number of observations recorded per guild including waterfowl (ducks, geese, swans), waterbirds (pelican, cormorant, herons, gulls), shorebirds, raptors, grouse, and passerines (all landbirds) respectively.



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Table 12 Fall Bird Migration: Observations by Survey Location and Round Table: Number of Individuals Detected at Each Survey Location during Each Survey Round

Survey Location		Visit 1	Visit 2	Visit 3	Total Number of Individuals Detected
Migration 1	Morning	47	72	23,471	23,590
	Mid-day	5	104	43	152
Migration 2	Morning	65	133	1,044	1,242
	Mid-day	20	180	386	586
Total		137	489	24,944	25,570

Table 13 Fall Bird Migration: Observations by Species Table

Species	Provincial General Status ¹	Number of Individuals	Number of Flocks (greater than 2 birds of the same species)*
Greater White-fronted Goose	Secure	2	1
Snow Goose	Secure	23,559	7
Canada Goose	Secure	265	18
Unidentified Goose	---	1	
Mallard	Secure	68	3
American White Pelican	Sensitive	1	
Double-crested Cormorant	Secure	33	3
Greater Yellowlegs	Secure	1	
Northern Harrier	Secure	10	1
Unidentified Accipiter		1	
Swainson's Hawk	Secure	18	2
Red-tailed Hawk	Secure	3	---
Rough-legged Hawk	Secure	3	---
Unknown Buteo	---	1	---
Merlin	Secure	1	---
Unknown Raptor	---	1	---
Killdeer	Secure	5	2
Great Blue Heron	Sensitive	1	---
Ring-billed Gull	Secure	12	3
California Gull	Secure	1	---
Unknown Gull	---	15	3
Western Kingbird	Secure	5	2



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Table 13 Fall Bird Migration: Observations by Species Table

Species	Provincial General Status¹	Number of Individuals	Number of Flocks (greater than 2 birds of the same species)*
Eastern Kingbird	Sensitive	7	1
Black-billed Magpie	Secure	18	3
American Crow	Secure	51	6
Horned Lark	Secure	11	3
American Robin	Secure	20	1
European Starling	Exotic/Alien	46	7
American Pipit	Secure	69	6
Vesper Sparrow	Secure	2	1
Savannah Sparrow	Secure	15	5
Unknown Sparrow	---	4	1
Lapland Longspur	Secure	1,065	25
Western Meadowlark	Secure	67	7
Yellow-headed Blackbird	Secure	13	3
Brewer's Blackbird	Secure	28	2
Unknown Blackbird	---	1	---
Brown-headed Cowbird	Secure	136	6
House Finch	Secure	4	1
Unknown Passerine	---	6	2
SOURCE: 'AEP 2017			
NOTE: *Number of separate observations			

Table 14 Fall Bird Migration: Bird Guild Summary Table

Bird Guild	Number of Individuals	Number of Flocks
Passerines	1,568	82
Raptors	38	3
Grouse	0	0
Waterfowl	23,895	29
Waterbirds	63	9
Shorebirds	6	2



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- j. *Provide the total number of individuals observed during the surveys.*

During the fall migration survey, a total of 25,570 individuals (comprised of 234 observations) were observed within the Project Area and a 1,000 m radius from the stations.

- k. *Provide the number of species observed.*

Thirty-two species and eight unknown species groups (i.e. unknown passerine, unknown raptor) were observed.

- l. *Provide the number of bird observations per minute of survey time.*

The observation rate during the fall bird migration survey was 35.51 bird observations/minute (25,570 bird observations/720 minutes of survey time).

- m. *Discussion of results—Provide additional information such as the spatial or temporal trends of bird observations. Other relevant information may include average flight height, notes on behaviour (long distance flight, short distance flights between local features or foraging in area), if there were certain survey points with more bird activity than others or habitat features that may have attracted (or detracted) activity and a summary of incidental observations including total numbers and species.*

Waterfowl and passerines were the most commonly recorded guild accounting for 93.4% and 6.1% of observations, respectively. Almost all waterfowl were recorded at heights below 50 m (99.9%; n = 23,869). The high number of waterfowl observed was due to large flocks of snow geese (i.e. flocks of 8,000 and 15,000) flying to and from Lathom Lake which is approximately 1,300 m northeast of the Project Boundary. The large flocks of snow geese flew on a northeast-southwest trajectory to and from Lathom Lake; several flocks passed directly over the Project Area.

Snow geese and Lapland longspur (*Calcarius lapponicus*) were the most commonly observed species accounting for 92.2% (n = 23,559) and 4.2% (n = 1,065) of all observations, respectively. Snow geese were migrating through the area, using Lathom Lake as a stopover. Lapland longspur commonly overwinter in southern Alberta and are regularly observed in the Bassano area (e.g., eBird 2020).

Four SOMC were observed during fall migration surveys, including three bird species, American white pelican (*Pelecanus erythrorhynchos*), great blue heron, and eastern kingbird (*Tyrannus tyrannus*), and long-tailed weasel (*Mustela frenata*).



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28. Breeding Bird Surveys

- a. *Were the established survey protocols within the AEP-WM Sensitive Species Inventory Guidelines followed? Provide details of the survey protocol including the search area, the survey duration, how survey points were chosen, and the number of visits to each survey point. In addition, describe what was considered an incidental observation and if these observations were recorded and reported.*

Two visits to four breeding bird stations were completed during mid- to late-spring, 2019, with dates inclusive of the *Sensitive Species Inventory Guidelines* (ESRD 2013) and the *Directive* (GOA 2017a), to capture early and late breeders. Four stations were selected to provide coverage of habitat within the Project Boundary while maintaining spacing recommendations described in the *Sensitive Species Inventory Guidelines* (ESRD 2013). Two visits were scheduled to account for variability in peak breeding activity among early (May 1 – June 15) and late (June 16 – July 15) breeding species (GOA 2017a). Surveys were conducted using a fixed-radius point count method (Ralph et al. 1993; Bibby et al. 2000). Surveys began at sunrise and continued for approximately three hours. Surveys were conducted under suitable weather conditions (temperature above 0 degrees Celsius, winds less than 20 km/h, and no precipitation; see Table 15).

Upon arrival at the station, the experienced wildlife biologist remained silent for two minutes to allow the effects of arrival disturbance to subside. This time was used to record location, weather, and habitat data. Each survey consisted of a 10-minute period where the surveyor recorded all bird observation data including species, distance and direction from the surveyor within a 100 m radius. All species observed were recorded; observations greater than 100 m were recorded as incidentals, and not included in the analysis. All incidental observations of SOMC and wildlife habitat features (e.g., nests) were also recorded.

- b. *Provide the survey dates.*

Surveys were conducted on June 4 and June 26, 2019.

- c. *Provide the time of day surveys were conducted.*

On June 4, surveys were conducted between 08:51 and 09:53 hours. On June 26, surveys were conducted between 06:29 and 08:14 hours.

- d. *Provide the number of survey points.*

Four point-count stations were surveyed in the Project Boundary.

- e. *Provide the total survey time (time spent actively conducting survey).*

Four stations were monitored for ten minutes over two visits resulting in a total of 80 minutes of time spent actively surveying. This does not include the time spent travelling between stations.



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- f. *Location of survey points must be provided in a reference map (refer to the Maps and Figures section below). Provide name of reference map.*

Refer to Question 65 (Figure 2: Wildlife Survey Stations and Observations).

- g. *Provide weather conditions during each survey date and time in a table with the following headings.*

Table 15 Breeding Bird Survey Weather Conditions

Survey Dates	Weather Conditions	Comments
June 4, 2019: 08:51-09:53	<ul style="list-style-type: none"> • Temperature ranged from 16-19°C • Winds were a gentle breeze (up to 19 km/h) throughout • No precipitation 	<ul style="list-style-type: none"> • Noise levels ranged from light (temporary, not distracting), to moderate (constant, not overwhelming)
June 26, 2019: 06:29-08:14	<ul style="list-style-type: none"> • Temperature ranged from 9-12°C • Winds ranged from calm (<1 km/h) to light air (up to 5 km/h) • No precipitation 	<ul style="list-style-type: none"> • Noise levels were light (temporary, not distracting) throughout

- h. *Provide a description of the habitat type or land use within the surveyed area.*

Surveys encompassed all habitat within the Project Boundary, which consists of tame pasture, Class II and Class VI wetlands, and a dugout.

- i. *Results: Provide the survey results in tables using the following format. Provide a brief written description of the results.*

A total of 22 breeding bird species (including 3 unidentified species groups [e.g. unidentified gull]) comprising 69 bird observations were recorded during the survey (43 during the first visit and 26 during the second visit; see Tables 16 and 17). Savannah sparrow (*Passerculus sandwichensis*) was the most commonly recorded species, accounting for 24.6% (n = 17) of individuals detected, followed by western meadowlark (*Sturnella neglecta*), accounting for 11.6% (n = 8) of individuals observed. Twenty species (including 3 unidentified species groups [e.g. unidentified gull]) comprising 54 individuals were observed outside of the 100 m radius and recorded as incidentals (Table 18).



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Table 16 Breeding Bird Survey Location and Round Summary Table: Number of Individuals Detected at each Survey Location During each Round

Survey Location	Visit 1	Visit 2	Total Number of Individuals Detected
BBS 1	8	3	11
BBS 2	9	5	14
BBS 3	13	10	23
BBS 4	13	8	21
Total	43	26	69

Table 17 Breeding Bird Survey Observations by Species Table

Species	Provincial General Status ¹	Number of Individuals
Canada Goose	Secure	1
Mallard	Secure	2
Northern Shoveler	Secure	4
Killdeer	Secure	2
Willet	Secure	1
Wilson's Snipe	Secure	1
Unidentified Gull	---	3
Northern Harrier	Secure	1
Swainson's Hawk	Secure	1
Red-Tailed Hawk	Secure	1
Horned Lark	Secure	3
Cliff Swallow	Secure	1
Unidentified Swallow	---	1
European Starling	Exotic	7
Vesper Sparrow	Secure	5
Savannah Sparrow	Secure	17
Clay-colored Sparrow	Secure	2
Yellow-headed Blackbird	Secure	1
Western Meadowlark	Secure	8
Brewer's Blackbird	Secure	4
Brown-headed Cowbird	Secure	2
Unidentified Passerine	---	1
Total		69
NOTES:		
¹ AEP 2017		



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Table 18 Observations of Incidentals by Species Table

Species	Provincial General Status ¹	Number of Individuals
Mallard	Secure	2
Upland Sandpiper	Sensitive	1
Spotted Sandpiper	Secure	2
Unidentified Sandpiper	---	1
Killdeer	Secure	1
Willet	Secure	1
Marbled Godwit	Secure	1
Wilson's Snipe	Secure	1
Unidentified Gull	---	1
Eastern Kingbird	Sensitive	4
House Wren	Secure	1
American Crow	Secure	1
Black-billed Magpie	Secure	1
Unidentified Swallow	---	7
European Starling	Exotic	10
Vesper Sparrow	Secure	3
Clay-colored Sparrow	Secure	1
Yellow-headed Blackbird	Secure	1
Western Meadowlark	Secure	10
Brewer's Blackbird	Secure	4
Total		54
NOTES:		
¹ AEP 2017		

j. Provide of the total number of individuals observed during the surveys.

A total of 123 individuals were recorded during the breeding bird surveys. This includes 69 individuals observed within the 100 m survey radius, and an additional 54 birds recorded incidentally (i.e., outside of the 100 m radius).

k. Provide the number of species observed.

The total number of species observed (including systematic and incidental observations) was 29 (including four unidentified species groups: unidentified gull, unidentified sandpiper, unidentified swallow and unidentified passerine).



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- i. *Provide the number of bird observations per minute of survey time.*

The observation rate during the breeding bird survey was 0.86 bird observations/minute of survey time (69 bird observations/80 minutes of survey time).

- m. *Discussion of results—Provide additional information such as the spatial or temporal trends of bird observations. Other relevant information may include if there were certain survey points with more bird activity than others or habitat features that may have attracted or detracted activity and a summary of incidental observations including total numbers and species.*

Species richness was relatively evenly spread across each survey location, with most species (n =10) observed at station 4. Most observations (33.3%, n = 23) occurred at station 3. Savannah sparrow, vesper sparrow (*Pooecetes gramineus*), and western meadowlark were observed at all stations. Most observations occurred during the first visit (62.3%, n = 43). No habitat features appeared to attract or detract bird activity during the survey.

Three SOMC were incidentally observed outside of the systematic survey: upland sandpiper (*Bartramia longicauda*), long-billed curlew (*Numenius americanus*), and eastern kingbird.

- n. *If the project is sited within native habitats, such as native grassland or parkland, identify if construction activities will avoid the restricted activity period for breeding birds (April 1st-July 15th)? If no, detail any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.*

The Project Area is not located within native grassland habitat. Tame pasture, which also provides nesting habitat for breeding birds, is present (see Question #14 for land use description and Question #64 for Land Use map). The nests of most birds are protected federally under the Migratory Birds Convention Act, 1994 (MBCA), and provincially under the AWA, 2000. Vegetation clearing will be minimized and avoid the Primary Nesting Period (April 1 to August 31; GOA 2017a, ECCC 2018) to the extent practical. If vegetation clearing activities overlap the Primary Nesting Period a nest search will be conducted no longer than 7 days prior to commencement of vegetation clearing occurring within the Primary Nesting Period. If nests are detected, a species-specific setback (GOA 2017a) will be applied until young fledge. If a nest is found, regular monitoring of the nest to confirm activity or status is not recommended as this is considered a form of disturbance and could lead to nest failure or predation. Nest status will be checked after the anticipated end date (i.e. when the young have fledged), estimated by an experienced wildlife biologist. If there is ongoing construction or reclamation work within 100 m (or at the discretion of an experienced wildlife biologist) of suitable nesting habitat that was initiated prior to April 1, work may continue unless a breeding bird exhibits defensive behavior within 100 m of the disturbance. In this case, a nest sweep will occur to determine if an active nest is present within 100 m of the disturbance and setbacks would apply if a nest is found. Recommended mitigations are primarily based on ECCC guidance to avoid risk of incidental take of migratory birds (ECCC 2018).



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29. Raptor nest surveys: *Raptor nest surveys must be conducted for the entire project area plus 1000m from the edge of the project boundary.*

a. *Were the established survey protocols within the AEP-WM Sensitive Species Inventory Guidelines followed? Provide details of the survey protocol including the search area, the survey duration, time of day and search method.*

Raptor nest surveys were conducted in spring and summer 2019, consistent with the Sensitive Species Inventory Guidelines (ESRD 2013). Due to variation in breeding periods among raptor species and the potential for different species to occupy a given nest during the same year, the surveys were conducted during each site visit (e.g., during spring bird migration visits) to confirm nest activity and species. Surveyors searched for raptor nests within 1,000 m of the Project Boundary (i.e., Project Study Area) and recorded any stick nest and individual raptor observations. Efforts were concentrated in areas with potential nesting habitat (e.g. shelterbelts, scattered large trees).

b. *Provide the survey dates.*

Raptor nest surveys were conducted concurrently with spring bird migration surveys on April 3, April 4, April 17, and May 14, 2019. A raptor nest survey was conducted concurrently with the first fall migration survey on August 20, 2019.

c. *Provide weather conditions during each survey in a table using the following format.*

See Table 19 for the weather conditions during the raptor nest surveys.

Table 19 Raptor Nest Survey Weather Conditions

Survey Dates	Weather Conditions	Comments
April 3, 2019: 14:38-16:47 April 4, 2019: 07:46-10:05	<ul style="list-style-type: none"> Temperature ranged from 3 (morning) to 13 degrees (afternoon) Celsius Winds ranged from calm (<1 km/h) to light breeze (up to 11 km/h) No precipitation 	<ul style="list-style-type: none"> Noise levels were light throughout (temporary, not distracting)
April 17, 2019: 08:07-14:55	<ul style="list-style-type: none"> Temperature ranged from 8 (morning) to 15 degrees (afternoon) Celsius Wind ranged from light air (up to 5 km/h) to gentle breeze (up to 19 km/h) No precipitation 	<ul style="list-style-type: none"> Noise levels were quiet throughout
May 14, 2019: 07:56-15:35	<ul style="list-style-type: none"> Temperature ranged from 11 (morning) to 21 degrees (afternoon) Celsius Winds were a gentle breeze throughout (up to 19 km/h) No precipitation 	<ul style="list-style-type: none"> Noise levels were quiet throughout



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Table 19 Raptor Nest Survey Weather Conditions

Survey Dates	Weather Conditions	Comments
August 20, 2019: 07:17-13:22	<ul style="list-style-type: none"> • Temperature ranged from 10 (morning) to 23 degrees (afternoon) Celsius • Winds ranged from calm (<1 km/h) to gentle breeze (up to 19 km/h) • No precipitation 	<ul style="list-style-type: none"> • Noise levels ranged from quiet to light (temporary, not distracting)

d. *Survey Results: Were raptor nests found?*

Ten stick nests were observed within Project Study Area during the 2019 raptor nest surveys, including four active Swainson’s hawk nests, one active great-horned owl nest, and five unoccupied stick nests (Table 20).

e. *If raptor nests were found, provide locations of all raptor nests detected in a table using the following format. Identify if the required setback is met and the distance in meters from the edge of the nest to the nearest edge of project related disturbance.*

Table 20 Raptor Nest Survey Results – Nest Locations

Nest ID	Species	Location of Nest (UTM NAD 83 Zone 12 N)		Is the Required Setback is Met (Y/N)	Distance to Nearest Project Related Disturbance (m)
		Easting	Northing		
SWHA_N	Swainson’s hawk	407394	5617268	Y	255
SWHA_N	Swainson’s hawk	406401	5617783	Y	375
SWHA_N	Swainson’s hawk	407301	5616402	Y	550
SWHA_N	Swainson’s hawk	406879	5616047	Y	796
GHOW_N	Great-horned owl	406667	5617598	N	60
UNOC_N	Unoccupied	406548	5617735	Y	239
UNOC_N	Unoccupied	406375	5617786	Y	398
UNOC_N	Unoccupied	407344	5618370	Y	758
UNOC_N	Unoccupied	407361	5618413	Y	802
UNOC_N	Unoccupied	407541	5618455	Y	879

f. *Nest locations and associated setbacks must be provided in a map (refer to the Maps and Figures section below). Provide name of reference map.*

Refer to Question 65 (Figure 2: Wildlife Survey Stations and Observations).



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- g. *If a required setback is not being met, provide the details (location, type of infrastructure, and amount of area impacted), rationale for siting decision and any proposed alternative mitigations identified. For the purpose of AEP-WM review, infringement from any temporary workspace must be included.*

The great-horned owl (*Bubo virginianus*) nest is located 60 m from the closest new Project infrastructure (i.e., the solar array) (Figure 2). An existing settlement is located 5 m to the east of the nest and between the nest and the new Project infrastructure. An existing quonset is located 46 m east of the nest and will be used as part of the Project's permanent infrastructure (Figure 2). The nest has a setback of 100 m which will be infringed upon; however, the quonset is an existing structure which did not impede nest activity in 2019. Additionally, the settled area includes a shelterbelt of trees which prevents a direct line of sight between the nest and the new solar array. As there is no direct line of sight, sensory disturbance to the nest will be considered low for construction activities related to the solar panels and construction on the solar panels can proceed without mitigations. Construction activities occurring within 100 m of the nest (e.g. fence construction) will only occur when the nest is confirmed inactive by an experienced wildlife biologist.

- h. *Discussion of results—Provide additional information such as a description of the habitat/ land use that may attract or detract raptor activity in the area and a summary of incidental observations of raptors including total numbers, behaviour and species.*

A total of 87 raptors were recorded during 2019 surveys. These observations included seven species and four unidentified species groups: northern harrier (*Circus cyaneus*), Swainson's hawk (*Buteo swainsoni*), red-tailed hawk (*Buteo jamaincensis*), rough-legged hawk (*Buteo lagopus*), ferruginous hawk (*Bureo regalis*), great horned owl, merlin (*Falco columbaris*), unidentified accipiter, unidentified hawk, unidentified falcon, and unidentified raptor. Of the 87 raptors recorded, 20.7% (n = 18) were observed during migration surveys at heights above 50 m indicating they were flying through the area. Seventeen per cent (n = 15) of raptors were associated with nests within 1,000 m of the Project Boundary. Shrub and treed habitat (Photo A6) is present in farmyards, windrows, and sporadically to the north, east and south of the Project Boundary; raptor observations were associated with this habitat. Some raptor observations were associated with utility poles and wires around the Project Boundary.

30. Acoustic Bat Surveys: **WIND PROJECTS ONLY**

- a. Were the established AEP-WM survey protocols followed? Provide details of survey protocols including the detector locations, the detector deployment duration, how detector locations were chosen, and a brief description of the analysis of the audio files.

Not Applicable

- b. Surveys Dates, provide the acoustic survey period for both the spring and fall surveys.

Not Applicable



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- c. Provide the total number of detectors during spring and fall surveys.
Not Applicable
- d. Provide the number of raised detectors (30 m) during spring and fall surveys.
Not Applicable
- e. Provide the total number of detector nights (i.e. excluding nights that a detector malfunctioned) during spring and fall surveys.
Not Applicable
- f. Provide location of survey points in a map (refer to the *Maps and Figures* section below). Detector location must be included and the detector height must be identified. Provide name of reference map.
Not Applicable
- g. Describe the habitat type or land use near each detector location.
Not Applicable
- h. Identify any issues encountered during the survey or analysis that impacted the results.
Not Applicable
- i. Survey Results: Provide details of the survey results in tables using the following format.

Spring Bat Acoustic Survey Results Table: Summary of bat activity by detector location.

Detector ID	Surrounding Habitat Where Detector was Placed	Total Bat Passes/ Detector Night	Migratory Bat Passes/ Detector Night	Detector Total
Mean number of bat passes/ detector night	N/A	N/A	N/A	N/A

Fall Bat Acoustic Survey Results Table: Summary of bat activity by detector location.

Detector ID	Surrounding Habitat Where Detector was Placed	Total Bat Passes/ Detector Night	Migratory Bat Passes/ Detector Night	Detector Total
Mean number of bat passes/ detector night	N/A	N/A	N/A	N/A



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- j. Results Graphs: Provide a bar or line graph of bat activity by night with the date on the x-axis and mean number of bat passes on the y-axis. Data must include all bat passes per detector night and migratory bat passes per detector night.

Not Applicable

- k. Results Summary: Provide a brief written summary of the results including, total bat passes, mean bat passes per detector night, a subset of the migratory bat passes per detector night and a list of species that were detected. Provide other relevant information such as the spatial or temporal trends of bat activity or if there were certain survey points with more bat activity than others or habitat features that may have attracted or reduced activity.

Not Applicable

- l. Provide a summary of the survey results in a table using the following format.

Season	Bat Passes/Detector Night	Migratory Bat Passes/ Detector Night
Spring (year fill in the blank)	N/A	N/A
Fall (year fill in the blank)	N/A	N/A

- m. Based on the risk of bat mortality, as per AEP-WM policy, is pre-emptive mitigation being applied to the project? If yes, provide the details of any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.

Not Applicable

- n. Discussion of results—Provide additional information such as a description of the habitat/ land use that may attract or reduce bat activity in the area, interpretation of the data collected or general information on bat activity and the proposed project.

Not Applicable

Refer to the *Post-Construction Monitoring and Mitigation* section to provide details on post-construction monitoring, analysis and general results based on mitigation needs.



SITE SPECIFIC WILDLIFE SURVEYS

The following section asks for information for the surveys conducted if the project is sited within an identified wildlife range or wildlife layer, as defined in the applicable Directive. If the project was not sited within the identified wildlife range or wildlife layer and surveys were not completed, indicate as such in part “a” of the question and then skip to the next question.

31. Burrowing Owl

- a. *Is any part or portion of the project within Burrowing owl range?*

Yes, the Project Boundary is entirely within Burrowing Owl range (AEP 2016).

- b. *If yes, were surveys conducted following the established survey protocols within the AEP-WM Sensitive Species Inventory Guidelines? Provide details of the burrowing owl surveys completed including search area, survey duration, time of day, how survey points were chosen, and the number of visits to each survey point.*

A burrowing owl ground survey was undertaken on October 16, 2019 outside of the recommended ground search dates (May 15 – August 31; ESRD 2013) The survey was conducted midday and the search area encompassed the Project Boundary.

Surveys were conducted along transects spaced 100 m apart following breaks within the Project Boundary (i.e. fence lines). Any burrows spotted during the search were closely investigated to determine size of the burrow, and indication of burrowing owl use (i.e. whitewash, tracks, pellets, feathers, prey, and their parts). Data collected for potential or active burrowing owl burrows included global positioning system (GPS) coordinates, number of adults and young, and how the nest was deemed to be active (e.g. whitewash, feathers). The survey was conducted under suitable weather conditions (no precipitation, winds under 20 km/h, no snow cover).

A call playback survey was conducted following the *Sensitive Species Inventory Guidelines* (ESRD 2013) and the Directive (AEP 2017) on June 21, 2020. Four stations were selected to provide coverage of the Project Area and surrounding 500 m in all habitat types while maintaining spacing recommendations described in the *Sensitive Species Inventory Guidelines* (ESRD 2013a). Stations were situated at a high vantage to maximize visibility. Call playback surveys were conducted between sunrise and 1000 h. Upon arrival at the station, the surveyor remained silent for two minutes to let effects of disturbance subside, and used this time to record location, weather, and habitat data.

The survey consisted of a 3-minute scan of the surrounding landscape for burrowing owls. If no burrowing owls were detected during this scan, call playback was broadcast for another 3 minutes, followed by an additional 1-minute of silence and scanning the landscape. Surveys were conducted under ideal weather conditions (temperature above 0 degrees Celsius, winds



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less than 20 km/h, and no precipitation). All observations of SOMC and wildlife habitat features (e.g., nests) were also recorded.

c. *Provide the survey dates.*

October 16, 2019 and June 21, 2020.

d. *Provide the time of day each survey was conducted.*

The ground survey was conducted between 11:20 h and 14:10 h. The call playback survey was conducted between 05:14 h and 06:04 h.

e. *Provide the number of survey points.*

Four stations were sited to provide coverage of the Project Area and surrounding 500 m.

f. *Provide the total survey time (time spent actively conducting survey).*

The ground search was conducted for a total of 170 minutes. The call playback survey was conducted for 7 minutes at each station for a total of 28 minutes of time actively conducting the survey.

g. *The location of survey points must be provided in a map (refer to the Maps and Figures section below); provide the name of this map.*

Refer to Question 65 (Figure 2: Wildlife Survey Stations and Observations).

h. *Provide weather conditions during each survey date and time in a table using the following format.*

See Table 21 for weather conditions during the burrowing owl survey.

Table 21 Burrowing Owl Survey Weather Conditions

Survey Dates	Weather Conditions	Comments
October 16, 2019: 11:20 – 14:10	<ul style="list-style-type: none"> • Temperature ranged from 10-14 degrees Celsius • Winds were a light breeze (up to 11 km/h) • No precipitation 	<ul style="list-style-type: none"> • Noise levels were light (temporary, not distracting)
June 21, 2020	<ul style="list-style-type: none"> • Temperature ranged from 12-14 degrees Celsius • Winds were a light breeze (up to 11 km/h) • No precipitation 	<ul style="list-style-type: none"> • Noise levels were quiet, light (temporary, not distracting) and moderate (constant, not overwhelming)

i. *Describe the habitat type or land use within the surveyed area.*

The survey encompassed the entire Project Boundary which consists of tame pasture, Class II and Class VI wetlands and a dugout.



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j. Survey Results: Was there burrowing owl activity—nests or individuals present?

No burrowing owls or nesting burrows were observed.

k. If burrowing owl nests were found, provide locations of all burrowing owl nests detected in a table using the following format. Identify if the required setback is met and the distance in meters from the edge of the nest to the nearest edge of project related disturbance.

Not Applicable

Table 22 Burrowing Owl Nest Survey Results

Burrowing Owl Nest ID Number	Location of Nest (UTM NAD 83)	Is the Required Setback is Met (Y/N)	Distance to Nearest Project Related Disturbance (m)	Comments
N/A	N/A	N/A	N/A	N/A

l. Nest locations and associated setbacks must be provided in a map (refer to the Maps and Figures section below). Provide name of reference map.

Not Applicable

m. If a required setback is not being met, provide a summary of the project disturbance details (location, type of infrastructure, and amount of area impacted), rationale for siting decision and details of any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.

Not Applicable

n. Discussion of results including any burrowing owl observations that were not associated with a nest or any potential nest sites (i.e. any burrows/holes 10cm or larger).

Fifteen burrows equal to or greater than 10 cm were identified within the Project Boundary during the search on October 16, 2019. At two burrows, old (>1 year), clean, white bones belonging to small mammals or birds were present, but the bones were inconclusive as to whether the burrows were associated with burrowing owls. At the other 13 burrows, no sign of burrowing owls were present. During the call playback survey on June 21, 2020, no burrowing owls or nesting burrows were identified.

32. Sharp-tailed Grouse

a. Is any part or portion of the project within Sharp-tailed Grouse range?

Yes, the Project Boundary is entirely within Sharp-tailed Grouse range (AEP 2016).



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- b. *If the project is proposed in the Sharp-tailed Grouse range, were Sharp-tailed Grouse lek surveys conducted? If surveys were not conducted, provide justification and rationale for why surveys were not conducted.*

Sharp-tailed grouse lek surveys were conducted.

- c. *If Sharp-tailed Grouse lek surveys were conducted, were surveys conducted following the established survey protocols within the AEP-WM Sensitive Species Inventory Guidelines? Provide details of the surveys completed including search area, survey duration, time of day, how survey points were chosen, and the number of visits to each survey point.*

A sharp-tailed grouse lek survey was conducted following the Sensitive Species Inventory Guidelines (ESRD 2013). Surveys were conducted at four stations on April 4 and revisited on April 17, 2019. Surveys were conducted between half an hour before sunrise and two hours after sunrise. Upon arrival at the station, the surveyor remained silent for two minutes to let effects of arrival disturbance subside, and used this time to record location, weather, and habitat data.

Survey stations were chosen at locations that provided as comprehensive as possible a view of the surrounding landscape to adequately cover the Project Boundary and the surrounding lands up to 500 m. Each survey consisted of a 5-minute period where the surveyor listened for grouse and scanned the landscape in all directions. If any grouse were detected they were counted, identifying males and females when possible, and distance and bearing from the survey station was estimated. Surveys were conducted under suitable weather conditions (e.g., cool conditions [range of 3 to 8 degrees Celsius], winds under 5 km/h, and no precipitation).

- d. *Provide the survey dates.*

The initial survey was April 4, 2019, and a revisit survey occurred April 17, 2019.

- e. *Provide the time of day surveys were conducted.*

On April 4, 2019, surveys were conducted between 07:12 h and 07:48 h, and on April 17, 2019, surveys were conducted from 07:41 h to 8:17 h.

- f. *Provide the number of survey points.*

Four stations were chosen to target potential habitat within the Project Boundary and the surrounding 500 m.

- g. *Provide the total survey time (time spent actively conducting survey).*

Four stations were visited twice for a 5-minute listening period resulting in a total of 40 minutes of time spent actively surveying. Additionally, spring migration surveys were conducted at appropriate times for observing sharp-tailed grouse, and all birds observed during these surveys were recorded, including sharp-tailed grouse, if detected.



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- h. The location of survey points must be provided in a map (refer to the Maps and Figures section below); provide the name of this map.*

Refer to Question 65 (Figure 2: Wildlife Survey Stations and Observations).

- i. Provide weather conditions during each survey date and time in a table using the following format.*

See Table 23 for weather conditions during the sharp-tailed grouse lek survey.

Table 23 Sharp-tailed Grouse Lek Survey Weather Conditions

Survey Dates	Weather Conditions	Comments
April 4, 2019: 07:12 - 07:41	<ul style="list-style-type: none"> • Temperature was 3 degrees Celsius • Wind was calm (<1 km/h) • No precipitation 	<ul style="list-style-type: none"> • Noise level was light (temporary, not distracting)
April 17, 2019: 07:41 - 08:17	<ul style="list-style-type: none"> • Temperature was 8 degrees Celsius • Wind was light air (2-5 km/h) • No precipitation 	<ul style="list-style-type: none"> • Noise level ranged from quiet to light (temporary, not distracting)

- j. Describe the habitat type or land use within the surveyed area.*

Surveys encompassed all habitat within the Project Boundary, which consists of tame pasture, Class II and Class VI wetlands, and a dugout.

- k. Survey Results: Were sharp-tailed grouse leks found?*

No sharp-tailed grouse or leks were detected during surveys.

- l. If sharp-tailed grouse leks were found, provide the locations of leks detected in a table using the following headings. Identify if the required setback is met and the distance in meters from the edge of the nest to the nearest edge of project related disturbance.*

Table 24 Sharp-tailed Grouse Lek Survey Results

Sharp-tailed Grouse Lek ID Number	Location of Nest (UTM NAD 83)	Is the Required Setback is Met (Y/N)	Distance to Nearest Project Related Disturbance (m)	Comments
N/A	N/A	N/A	N/A	N/A

- m. Lek locations and associated setbacks must be provided in a map (refer to the Maps and Figures section below). Provide name of reference map.*

Not Applicable



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- n. *If a setback is being infringed upon, provide the details (location, type of infrastructure, and amount of area impacted), rationale for siting decision and details of any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.*

Not Applicable

- o. *Discussion of results including any incidental sharp-tail grouse observations that were not associated with a lek.*

One SOMC was observed during the survey: loggerhead shrike (*Lanius ludovicianus*).

33. Eastern Short-horned Lizard

- a. Is any part or portion of the project within 200m of Eastern Short-horned Lizard range?

No

- b. If the project is proposed in the Eastern short horned lizard range, were Eastern Short-horned Lizard surveys conducted? If surveys were not conducted, provide justification and rationale for why surveys were not conducted.

Not Applicable

- c. If Eastern Short-horned Lizard surveys were conducted, were the established survey protocols within the AEP-WM *Sensitive Species Inventory Guidelines* followed? Provide details of the surveys completed including search area, survey duration, time of day, how survey points were chosen, and the number of visits to each survey point.

Not Applicable

- d. Provide the survey dates.

Not Applicable

- e. Provide the time of day surveys were conducted.

Not Applicable

- f. Provide the number of survey points.

Not Applicable

- g. Provide the total survey time (time spent actively conducting survey).

Not Applicable



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- h. The location of survey transects/area(s) must be provided in a map (refer to the *Maps and Figures* section below); provide the name of this map.

Not Applicable

- i. Provide weather conditions during each survey date and time in a table using the following format.

Table 25 Eastern Short-horned Lizard Survey Weather Conditions

Survey Dates	Weather Conditions	Comments
N/A	N/A	N/A

- j. Survey Results: Were Eastern Short-horned Lizards found?

Not Applicable

- k. If Eastern Short-horned Lizards were found, provide the locations of all lizards detected.

Not Applicable

- l. If any temporary or permanent project related disturbance infringes on the 200m setback, provide the details (location, type of infrastructure, and amount of area impacted), rationale for siting decision and details of any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.

Not Applicable

- m. Discussion of results including description of habitat (soil characteristics, slope, direction of exposure, and vegetation details).

Not Applicable

34. Sensitive Snakes

- a. Is any part or portion of the project sited within 500m of sensitive snake range?

No

- b. If yes, were surveys conducted following the established survey protocols within the AEP-WM *Sensitive Species Inventory Guidelines*? Provide details of the surveys completed including search area, survey duration, time of day, how survey points were chosen, and the number of visits to each survey point.

Not Applicable



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- c. Provide the survey dates.
Not Applicable
- d. Provide the time of day surveys were conducted.
Not Applicable
- e. Provide the number of survey points.
Not Applicable
- f. Provide the total survey time (time spent actively conducting survey).
Not Applicable
- g. The location of survey transects/area(s) must be provided in a map (refer to the *Maps and Figures* section below); provide the name of this map.
Not Applicable
- h. Provide weather conditions during each survey date and time in a table using the following format.

Table 26 Snake Survey Weather Conditions

Survey Dates	Weather Conditions	Comments
N/A	N/A	N/A

- i. Describe the habitat type or land use within the surveyed area.
Not Applicable
- j. Survey Results: Was a snake hibernaculum found?
Not Applicable
- k. If a snake hibernaculum was found, provide the locations of all hibernacula detected in a table using the following format. Identify if the required setback is met and the distance in meters from the edge of the nest to the nearest edge of project related disturbance.

Table 27 Snake Survey Results

Species and Hibernacula	Location of Nest (UTM NAD 83)	Is the Required Setback is Met (Y/N)	Distance to Nearest Project Related Disturbance (m)	Comments
N/A	N/A	N/A	N/A	N/A



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- l. Hibernaculum locations and associated setbacks must be provided in a map (refer to the *Maps and Figures* section below). Provide name of reference map.

Not Applicable

- m. If a required setback is not being met, provide the details (location, type of infrastructure, and amount of area impacted), rationale for siting decision and details of any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.

Not Applicable

- n. Discussion of results including description of habitat (soil characteristics, slope, direction of exposure, and vegetation details).

Not Applicable

35. Ord's Kangaroo Rat

- a. Is any part or portion of the project within 250m of Ord's Kangaroo Rat range?

No

- b. If yes, were surveys conducted following the established survey protocols within the AEP-WM *Sensitive Species Inventory Guidelines*? Provide details of the surveys completed including search area, survey duration, time of day, how survey points were chosen, and the number of visits to each survey point.

Not Applicable

- c. Provide the survey dates.

Not Applicable

- d. Provide the time of day or night surveys were conducted.

Not Applicable

- e. Provide the number of survey points.

Not Applicable

- f. Provide the total survey time (time spent actively conducting survey).

Not Applicable

- g. The location of survey points must be provided in a map (refer to the *Maps and Figures* section below); provide the name of this map.

Not Applicable



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- h. Provide weather conditions during each survey date and time in a table using the following format.

Table 28 Ord’s Kangaroo Rat Survey Weather Conditions

Survey Dates	Weather Conditions	Comments
N/A	N/A	N/A

- i. Describe the habitat type or land use within the surveyed area.
Not Applicable
- j. Survey Results: Were Ord’s Kangaroo Rats found?
Not Applicable
- k. If Ord’s Kangaroo Rats were found, provide the locations of all Ord’s Kangaroo Rats detected.
Not Applicable
- l. If any temporary or permanent project related disturbance is within 250m of identified Ord’s Kangaroo Rat range, provide the details (location, type of infrastructure, and amount of area impacted), rationale for siting decision and details of any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.
Not Applicable
- m. Discussion of results including description of habitat (soil characteristics, slope, and vegetation details) and any sign of Ord’s Kangaroo Rat (burrows, runways, feces, footprints, etc.).
Not Applicable

36. Swift Fox

- a. Is any part or portion of the project within Swift Fox range?
No
- b. If yes, were surveys conducted following the established survey protocols within the AEP-WM *Sensitive Species Inventory Guidelines*? Provide details of the surveys completed including search area, survey duration, time of day, how survey points were chosen, and the number of visits to each survey point.
Not Applicable



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- c. Provide the survey dates.
Not Applicable
- d. Provide the time of day surveys were conducted.
Not Applicable
- e. Provide the number of survey points.
Not Applicable
- f. Provide the total survey time (time spent actively conducting survey).
Not Applicable
- g. The location of survey points must be provided in a map (refer to the *Maps and Figures* section below); provide the name of this map.
Not Applicable
- h. Provide weather conditions during each survey date and time in a table using the following format.

Table 29 Swift Fox Survey Weather Conditions

Survey Dates	Weather Conditions	Comments
N/A	N/A	N/A

- i. Describe the habitat type or land use within the surveyed area.
Not Applicable
- j. Survey Results: Was there swift fox activity—dens or individuals present?
Not Applicable
- k. If swift fox dens were identified, provide the locations of all swift fox dens detected in a table using the following format. Identify if the required setback is met and the distance in meters from the edge of the nest to the nearest edge of project related disturbance.

Table 30 Swift Fox Survey Results

Swift Fox Den Location ID	Location of Nest (UTM NAD 83)	Is the Required Setback is Met (Y/N)	Distance to Nearest Project Related Disturbance (m)	Comments
N/A	N/A	N/A	N/A	N/A



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- l. Den locations and associated setbacks must be provided in a map (refer to the *Maps and Figures* section below). Provide name of reference map.

Not Applicable

- m. If a required setback is not being met, provide the details (location, type of infrastructure, and amount of area impacted), rationale for siting decision and details of any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.

Not Applicable

- n. Discussion of results including any swift fox observations that were not associated with a den or any potential den sites.

Not Applicable

37. Endangered and Threatened Plants

- a. Is any part or portion of the project within Endangered and Threatened Plant range?

No

- b. If yes, were surveys conducted following the established survey protocols within the AEP-WM *Sensitive Species Inventory Guidelines*? Provide details of the surveys completed including target species, search area, survey duration, how survey points were chosen, and the number of visits to each survey point.

Not Applicable

- c. Provide the survey dates.

Not Applicable

- d. Describe the search area or distance between transects.

Not Applicable

- e. Provide the total survey time (time spent actively conducting survey).

Not Applicable

- f. The location of survey transects/area(s) must be provided in a map (refer to the *Maps and Figures* section below); provide the name of this map.

Not Applicable



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- g. Provide weather conditions during each survey date and time in a table using the following format.

Table 31 Rare Plant Survey Weather Conditions

Survey Dates	Weather Conditions	Comments
N/A	N/A	N/A

- h. Describe the habitat type or land use within the surveyed area.
Not Applicable
- i. Survey Results: Were any Endangered or Threatened plant populations identified?
Not Applicable
- j. If any Endangered or Threatened plant populations were identified, provide the locations, population extents and species of all Endangered and Threatened plants detected in a table using the following format. Identify if the required setback is met and the distance in meters from the edge of the nest to the nearest edge of project related disturbance.

Table 32 Rare Plant Survey Results

Observation ID	Species	Location (UTM NAD 83)	Population Extent and Reference on Associated Maps	Is the Required Setback Met (Y/N)	Distance to Nearest Project Related Disturbance (m)	Comments
N/A	N/A	N/A	N/A	N/A	N/A	N/A

- k. Plant population locations and associated setbacks must be provided in a map (refer to the *Maps and Figures* section below). Provide name of reference map.
Not Applicable
- l. If a required setback is not being met, provide the details (location, type of infrastructure, and amount of area impacted), rationale for siting decision and details of any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.
Not Applicable
- m. Discussion of results including description of habitat (soil characteristics, slope, and vegetation details).
Not Applicable



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38. The proponent must commit to ensuring that wildlife data is kept current as per the *Directive*. Confirm that the following surveys will be repeated at a minimum once every two years until the project is commissioned by indicating yes, no, or not applicable by each:

- a. Burrowing owl – yes
- b. Sensitive raptors – yes
- c. Sharp-tailed grouse – yes
- d. Swift fox – not applicable
- e. Ord's kangaroo rat – not applicable
- f. Grizzly bear den surveys – not applicable
- g. Endangered and Threatened Plants – not applicable

Provide details of the proposed surveys and what process will be followed if a new wildlife site is identified and how it will be mitigated.

All wildlife surveys applicable to the Project (sensitive raptors, burrowing owl and sharp-tailed grouse) will be conducted following the Sensitive Species Inventory Guidelines (ESRD 2013) every two years until the Project is commissioned. Should conditions change (i.e., a new wildlife feature is observed) 1867559 Alberta Ltd. will consult with AEP to determine appropriate mitigation measures.

39. Projects for which construction has not begun within 5 years of the completion of the AEP-WM Renewable Energy Referral Report must repeat all surveys and a new AEP-WM Renewable Energy Referral Report will be completed. Confirm this process will be followed.

Confirmed



CONSTRUCTION AND OPERATION WITHIN OTHER KEY WILDLIFE ZONES

40. As per the Directive is the project sited in any of these wildlife zones:

- a. Special Access Zones?

No

- b. Key Wildlife and Biodiversity Zones?

No

- c. Grizzly Bear Zones?

No

If yes, will the project meet the required standards identified in the Directives for the associated zone? Provide details of the proposed standard or alternative mitigations if proposed.

Not Applicable

41. If the proposed project is sited within the Grizzly Bear Zones, do the project related access roads in addition to the existing roads in the area meet with the open road thresholds defined within the Alberta Grizzly Bear Recovery Plan? If no has been selected, provide a summary of the details (location, type of access roads, and amount of area impacted), rationale for siting decision and any proposed alternative mitigation to meet the intent of the *Directive*.

Not Applicable



MINIMIZING IMPACTS ON WILDLIFE AND WILDLIFE HABITAT

42. Have guy wires been designed to meet the requirements outlined in the *Directive*. Provide details of mitigation that is proposed.

One electrical pole in the northwest of the Project Area by the existing quonset will be secured with guy wires. The guy wires will be equipped with markers to prevent bird collisions and will not be located on permanent communication and meteorological towers.

43. Are all collection lines sited underground? Provide details of construction techniques and how impacts to wildlife and wildlife habitat will be minimized.

All collection lines will be sited underground. The following will be implemented to minimize impacts to wildlife and wildlife habitat:

- The project footprint will be minimized to reduce the area of disturbance
- The topsoil disturbance during construction will be minimized by limiting vegetation clearing
- Any topsoil removed will be covered and stored for replacement
- Detention basins and silt fencing will be used to prevent 1 in 100 year rainstorms from causing soil or silt to leave the site
- On the racking, cable troughs will be used rather than trenching where possible

44. Provide details on any other wildlife or wildlife habitat risk identified by the proponent and proposed mitigations to reduce this risk. This may include mitigations for the reduction of noise and light pollution, prevention of predator nests on anthropogenic features, minimization of collision risk or other project associated wildlife risks.

Vegetation clearing will be minimized and avoid the Primary Nesting Period (April 1 to August 31; GOA 2017a, ECCC 2018) to the extent practical. A nest search will be conducted no longer than 7 days prior to commencement of vegetation clearing occurring within the Primary Nesting Period (April 1 to August 31; GOA 2017a, ECCC 2018). If nests are detected, a species-specific setback (GOA 2017) will be applied until young fledge. If a nest is found, regular monitoring of the nest to confirm activity or status is not recommended as this is considered a form of disturbance and could lead to nest failure or predation. Nest status will be checked after the anticipated end date (i.e., when the young have fledged), estimated by an experienced wildlife biologist. If there is ongoing construction or reclamation work within 100 m (or at the discretion of an experienced wildlife biologist) of suitable nesting habitat that was initiated prior to April 1, work may continue unless a breeding bird exhibits defensive behavior within 100 m of the disturbance. In this case, a nest sweep will be conducted to determine if an active nest is present within 100 m of the disturbance and setbacks would apply if a nest is found.



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- 45. SOLAR PROJECTS ONLY:** Provide details of the proposed fence including type, shape, height, ground clearance and layout. Provide any wildlife mitigations that are proposed as per the requirements in the Directive. Refer to *Maps and Figures* for information on required map submissions.

Fencing surrounding the Project will consist of a chain-link fence approximately 2.4 m high with three strands of barbed wire across the top. Fencing will consist of straight lines (i.e., no jagged corners to trap wildlife) and will be approximately 15 centimeters (~6 inches) off the ground to allow for small wildlife passage.



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CONSTRUCTION AND OPERATION MITIGATION PLAN

The following section asks for information about methods that will be implemented to reduce negative impacts on wildlife and wildlife habitat during construction and operation.

- 46. For projects sited in the Sensitive Snake Range or in close proximity of the range, provide details of the project's Snake Protection Plan to protect snakes and on-site worker safety. This is a requirement for solar projects, but is strongly recommended for wind projects as well.**

Not Applicable – Project is not sited in or near Sensitive Snake Range (AEP 2016).

- 47. Provide details about how injured or dead wildlife observed by on-site workers during construction or operation will be reported.**

All injured or dead wildlife observed on site will be reported to the Environmental Inspector(s) and AEP-WM.

- 48. Provide details of the proposed reclamation of the project area, both temporary and long term disturbances that will occur. Include information of the amount of area that will be reclaimed or restored following construction, methods that will be used and details of seed mixes if working in areas of native grasslands. Will an approved native seed mix be used to revegetation disturbed native habitats?**

Reclamation of the Project Area will be in accordance with the Conservation and Reclamation Directive for Renewable Energy Operations (GOA 2018b).

The objectives of the post-construction clean-up and remediation environmental protection measures are to:

- Effectively use reclamation techniques that prevent topsoil loss from wind and water erosion;
- Establish a vegetative cover compatible with surrounding land uses;
- Comply with approval conditions, including permits;
- Re-establish the construction footprint to a stable condition acceptable for operational requirements; and
- Maintain equivalent land capability on lands within the construction footprint (excluding aboveground facilities), ensuring the ability of the land to support various land uses similar to the uses that existed before construction, but not necessarily identical.

A vegetative cover will be established and maintained for operations on all lands within the Project Area, except where areas will be graveled for operations (e.g., access roads).

Table 33 describes mitigation for the re-establishment of vegetative cover, where applicable:



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Table 33 Reclamation Mitigation Measures

Activity/Concern	Mitigation Measures
Clean-Up Schedule	<ul style="list-style-type: none"> Machine clean-up activities will follow completion of construction activities as closely as feasible.
Level of Clean-up	<ul style="list-style-type: none"> The level of clean-up on all lands will be at an appropriate level to maintain land capability.
Staking	<ul style="list-style-type: none"> Remove all flagging and signage from the Project Area and dispose of it appropriately following the completion of construction.
Matting	<ul style="list-style-type: none"> Remove all matting and geotextile and other materials from all locations on the construction footprint following clean-up, once site conditions are deemed stable.
Grade Replacement	<ul style="list-style-type: none"> Re-establish surface drainage patterns; install drainage and erosion control measures, where warranted.
Compacted Subsoils	<ul style="list-style-type: none"> The Environmental Inspector(s) or designate(s) will determine the locations where subsoil compaction is an issue. Prior to topsoil replacement, rip compacted subsoils on the construction footprint with a multi-shank ripper or breaking disc to a depth of 30 cm or the depth of compaction, whichever is deeper. If soils are moist, postpone ripping of subsoils until soils dry to ensure that the soils fracture when ripped. In areas where the topsoil is in place, use special equipment such as a paratiller to relieve compaction with reduced potential for admixing at the discretion of the Environmental Inspector(s) or designate(s) in consultation with the Construction Manager.
Subsoil Preparation	<ul style="list-style-type: none"> Re-grade areas with vehicle ruts or erosion gullies. Smooth and level the ripped subsoil surface to prevent admixing of subsoil and topsoil during replacement.
Topsoil Replacement	<ul style="list-style-type: none"> Replace topsoil to a uniform depth, on all portions of the construction footprint that were stripped. Match topsoil depth to the unstripped edges of the construction footprint. Postpone replacement of topsoil during wet weather or high winds to prevent erosion and/or damage to the soil structure.
Cover Crop	<ul style="list-style-type: none"> Use a cover crop to assist in weed and erosion control where warranted.
Seeding and Re-vegetation	<ul style="list-style-type: none"> Use only Certified No. 1 seed, unless Certified No. 1 is not available for select reclamation seed species. Seeding will follow as close as feasible to final clean-up and topsoil replacement pending seasonal or weather conditions. Final seed mix will be based on input from the landowner and the availability of seed at the time of reclamation.
Sedimentation / Erosion Control	<ul style="list-style-type: none"> Remove unnecessary silt fence or other temporary erosion control measures not required, as specified by the Environmental Inspector(s) or designate(s). Install sedimentation and erosion control measures, where required. The Environmental Inspector(s) or designate(s) will determine the location of sedimentation and erosion control measures. Biodegradable materials shall be utilized for installation of permanent sedimentation and erosion control measures, unless other specified.



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49. Provide the proposed construction schedule for the project.

The proposed construction schedule for the Project is provided in Table 34.

Table 34 Proposed Project Construction Schedule

Project Activity	Date
Public Meetings	November 2019
AEP Submission	February 2020
AEP Approval Received	August 2020
Newell County DP application	January 2020
AUC Approval	December 2020
Development Permit Approval	March 2021
Piles and Roads	April 2021
Racking and Civil Works	May 2021 - August 2021
Distribution Connection	July 2021
Panel installation	September 2021 – January 2022
Construction Complete	February 2022
Commissioning	March 2022
In-service Date	April 2022

50. Provide details of any construction and operation mitigations or methods to reduce the impact to wildlife or wildlife habitat not identified in an above section.

Table 35 describes additional construction and operation mitigations or methods to reduce the impact to wildlife or wildlife habitat not identified in an above section.



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Table 35 Mitigation Measures for Potential Impacts to Wildlife and Wildlife Habitat

Activity/Concern	Mitigation Measures
Wildlife	<ul style="list-style-type: none"> • Unanticipated wildlife issues encountered during construction will be discussed and resolved by the Environmental Inspector(s) or designate(s), experienced Wildlife Biologist(s), and the responsible regulatory agencies, if necessary. • Report all visual sightings of species at risk and note location of any observed wildlife feature (e.g., nests) to the Environmental Inspector. • If wildlife are discovered in association with any construction activity or facility, report to the Environmental Inspector(s) or designate(s) who will contact the responsible regulatory agencies, as required. Specific protection measure may be implemented, if required. • Project personnel are prohibited from hunting or fishing on the construction footprint, and from harassing, feeding, collecting or possessing wildlife species. • Do not harass or feed wildlife or livestock. Do not permit construction personnel to have pets on the construction footprint. Firearms are not permitted in Project vehicles or on the construction footprint, or at associated Project facilities. The recreational use of all-terrain vehicles or snowmobiles by construction personnel on the construction footprint is prohibited. • Report any incidents with wildlife to the Environmental Inspector or designate(s) immediately, including vehicular collisions or injured animals
Schedule – Migratory Birds	<ul style="list-style-type: none"> • A nest search survey will be completed within 7 days of the commencement of vegetation clearing occurring within the Primary Nesting Period. • In the event an active nest is found, it will be subject to site-specific mitigation measures (i.e., clearly marked species-specific protective buffer around the nest). • If a nest is found, regular monitoring of the nest to confirm activity or status is not recommended as this is considered a form of disturbance and could lead to nest failure or predation. Nest status will be checked after the anticipated end date (i.e. when the young have fledged)), estimated by an experienced wildlife biologist. • If there is ongoing construction or reclamation work within 100 m (or at the discretion of an experienced wildlife biologist) of suitable nesting habitat that was initiated prior to April 1, work may continue unless a breeding bird exhibits defensive behavior within 100 m of the disturbance (as determined by the onsite Environmental Monitor). In this case, a nest search will occur to determine if an active nest is present within 100 m of the disturbance and setbacks would apply if a nest is found.
Great-horned Owl Nest	<ul style="list-style-type: none"> • No ground disturbance activities requiring the use of heavy equipment (i.e., topsoil handling, grading, installation of screw piles) will be conducted within 100 m of nests during the active nesting period (March 15 – July 15; ESRD 2013), end of active use to be confirmed by and experienced wildlife biologist). • Other construction activities will be scheduled to avoid work within the 100 m setback while the nest is active. In the event avoidance of other construction activities within the 100 m setback during the active nesting period (March 15-July 15; ESRD 2013) is not practical, an experienced wildlife biologist will monitor the nest for potential sensory disturbance. • Activity at the nest will be confirmed prior to any construction activities within 100 m.



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Table 35 Mitigation Measures for Potential Impacts to Wildlife and Wildlife Habitat

Activity/Concern	Mitigation Measures
Amphibians	<ul style="list-style-type: none"> • Based on the location of the Project, the proposed amphibian mitigation period for the Project is from April 15 to August 15. • During the mitigation period, install silt fencing along the 15 m setback from the wetlands to prevent amphibians from moving into active construction areas. Fencing will be inspected daily (more frequently during cold and/or hot weather events) for amphibians immediately prior to any construction activities. • Immediately before installation of the silt fencing, Environmental Monitors (under the direction of an experienced wildlife biologist) will conduct an amphibian sweep to remove any amphibian SOMC that may be in the path of the silt fence installer. All amphibian SOMC that are observed will be salvaged and moved to a nearby wetland or to an adequate distance away from equipment. • An Environmental Monitor (under the direction of an experienced wildlife biologist) will conduct inspections as required during construction within the setbacks of suitable wetlands; move amphibians to a suitable nearby wetland or an adequate distance away from equipment, as appropriate; shut down construction in emergence area during periods of high amphibian activities, if necessary. • Although the amphibian mitigation period for the Project has been defined as April 15 to August 15 potential exists for amphibian SOMC to be observed outside this period when individuals are returning to hibernation sites. Construction activities conducted outside this period will still require the presence of an Environmental Monitor on site to safely monitor for and, where applicable, relocate any amphibian SOMC observed within the construction footprint
Noise	<ul style="list-style-type: none"> • A Noise Impact Assessment will be completed for the Project, per AUC Rules 007 and 012. • Take reasonable measures to control construction related noise, to the extent practical.
Lighting	<ul style="list-style-type: none"> • Minimize lighting to the extent safe and practical. Lighting for permanent on-ground infrastructure will be down-shielded and controlled by proximity sensors to the extent practical.
Wetlands	<ul style="list-style-type: none"> • The Class II and VI wetlands within the Project Boundary will be avoided by at least 15 m by the temporary and permanent Project Footprint. • Work will be completed under dry or frozen conditions, where possible, or with the use of special equipment (e.g., low ground pressure equipment, rig mats). Silt fencing will be installed along the 15 m setback from the wetlands to control erosion and prevent amphibians from moving into active construction areas.
Weeds	<ul style="list-style-type: none"> • Noxious and Prohibited Noxious weeds will be controlled during construction and operation of the Project, if present.
Use of Herbicides	<ul style="list-style-type: none"> • Herbicides will be applied only to control Noxious and Prohibited Noxious weeds by a provincially licensed pesticide applicator.

SOLAR PROJECTS ONLY: Questions 52 to 55 are specific to solar energy projects only.

51. Will pilings be used to install the solar panels? Provide details of the type of pilings that will be used and installation techniques.

It is anticipated that each of the 590 tables in the Project will be supported by duo pole driven I beam design piles. The I beam design is 163 mm x 155 mm and a minimum driven depth of 4.0 m.



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These piles are expected to be installed during non-frozen conditions, typically using earthmoving equipment as shown in Photo 1 below.



Photo 1 Equipment Used for Piling Installation

52. Will there be levelling or grading of the project site? If yes, provide details.

Minimal grading will be required at select locations to facilitate a safe, level surface for the installation of Project infrastructure. Prior to grading, vegetation will be cleared and topsoil will be salvaged and stored. See Question #54 below for additional details.

53. Will the ground under solar panels be stripped or vegetation removed? If yes, provide details of the methods, wildlife mitigations and if areas will be revegetated, including type of seed mix.

The clearing of vegetation and topsoil salvaging will be minimized to the extent practical. Activities that may require vegetation clearing and topsoil salvage may include, but may not be limited to, grading, trenched installation of collector lines, installation of transformer and inverter components, and construction of access roads within the proposed facility. When vegetation clearing occurs within the Primary Nesting Period, a nest survey will be completed within 7 days of the initiation of clearing activities. Topsoil salvaged from areas of temporary disturbance will be stockpiled and re-used for site reclamation. Where topsoil is stripped from the area that will become the permanent footprint of the facility, it will be salvaged and conserved. The topsoil will be stockpiled in a designated location, in a manner that will not cause erosion or sedimentation.

Machine clean-up activities will follow completion of construction activities as closely as feasible. Topsoil will be replaced to a uniform depth on all portions of the construction footprint that were stripped. Seeding of disturbed areas on the construction footprint will follow as closely as possible to the final clean-up and topsoil replacement, depending on seasonal or weather conditions. Final seed mix, where needed, will be low growing species and based on input from the landowner and the availability of seed at the time of reclamation.



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- 54. If there is vegetation under the panels, provide details about how and when it will be maintained. Detail all mitigation measures that will be used during vegetation maintenance to protect wildlife and wildlife habitat (e.g. survey sweeps for ground nesting birds).**

Vegetation clearing under the panels for maintenance purposes will be minimized. Vegetation clearing, if required, will be scheduled outside the Primary Nesting Period (April 1 to August 31). If vegetation clearing occurs during the Primary Nesting Period a pre-clearing nest sweep will be conducted. Any active nests will be subject to site-specific mitigation measures (e.g., species specific timing restrictions and a clearly marked species-specific protective buffer around the nest and/or non-intrusive monitoring).



POST-CONSTRUCTION MONITORING AND MITIGATION PLAN

The following section asks for information about the monitoring and, if required, the mitigation methods that the proponent commits to implementing during operation.

55. Provide the details of the proposed post-construction monitoring plan, as per the Directive:

- a. *Provide the duration of the post-construction mortality monitoring (number of years).*

Post-construction monitoring surveys will be conducted for a minimum three years following commissioning of the Project, from March 1 to November 15 each year, per the Directive.

- b. *Provide details of the general methods that will be followed for the carcass monitoring surveys. Including but not limited to general survey methods, selection of areas for surveys, search area, vegetation maintenance, visibility classification, seasonality, analysis methods and if any required AEP-WM protocols will be followed.*

The post-construction monitoring plan (PCMP) will be conducted in accordance with the Post-construction Survey Protocols for Wind and Solar Energy Projects (AEP 2020). The PCMP incorporates methods to sample all sources of potential wildlife mortality to assess the effectiveness of pre-construction mitigation (e.g., siting) and determine where operational mitigation or avoidance efforts would be most effective should mortality rates require operational mitigation. There are four primary sources of potential mortality that may be observed at a solar Photovoltaic (PV) facility: 1) the collector field (i.e., solar panels); 2) linear features (e.g., collector lines and perimeter fences); 3) buildings (e.g., inverters); and 4) background sources (i.e., natural mortality sources such as predation). Collector lines will be buried and chain-link fences will be installed. Given the low risk associated with this type of design, these components are not considered a source of potential mortality for the Project during operations. This PCMP assumes an equivalent potential for mortality for the remaining sources of mortality across the Project footprint.

The primary goal of the Project's PCMP is to evaluate the mortality risk to wildlife using empirical data collected during the monitoring program to identify risks and estimate mortality rates. This PCMP is designed with consideration of the monitoring methods used at PV facilities in the Southwestern U.S. (Huso et al. 2012). Secondary objectives of the proposed PCMP are to: 1) evaluate spatial or temporal/seasonal patterns of wildlife mortality; and 2) evaluate which species and taxonomic groups are at risk of mortality. Details of the PCMP are summarized in Table 35. Although the mortality assessments focus largely on the potential bird mortality, all observed injuries and fatalities will be recorded.



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Table 36 Post-Construction Monitoring Plan Details

Plan Component	Proposed Execution	Comments
Carcass Searches		
Duration	Three years	Annual reports will be submitted to AEP for review.
Timing	March 1 to November 15	Encompassing the spring and fall bird migrations, as well as the breeding bird period within the Grassland and Parkland Natural Regions.
Frequency	Every week during the migration periods; bi-weekly during the summer breeding period	Weekly from March 1 to May 15 and August 15 to November 15; bi-weekly from May 15 to August 15
Extent (Sample Size)	100% of the Project Footprint	The Project will produce 9.25 MW; therefore, the entire Project Footprint will be monitored (GOA 2017a).
Searcher Efficiency Trials	Three trials, one per season (spring [March 1 to May 15], summer [May 16 to August 15] and fall [August 16 to November 15])	Additional trial to be conducted if staff changes (searchers) occur. A minimum of 20 carcasses per trial.
Carcass Persistence Trials	Three trials, one per season (spring, summer and fall; as described above)	A minimum of 20 carcasses per trial.

Prior to the commencement of the carcass search, the following site conditions will be recorded:

- Weather conditions including wind speed and precipitation
- Date and time
- The search area of each transect (e.g., panel row) will be assigned a visibility class as defined in Table 36 below
- The percent (%) of the area that is searchable (search area may vary between searches due to vegetation heights [if search areas aren't consistently mowed], presence of maintenance vehicles, etc.)
- Photos of the search area

Table 37 Visibility Classes for Carcass Searches

Visibility Class	% Vegetation Cover	Vegetation Height
Class 1 (Easy)	≥90% bare ground	<15 cm tall
Class 2 (Moderate)	≥25 to <90% bare ground	15 – 30 cm tall
Class 3 (Difficult)	<25% bare ground	>30 cm tall



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Carcass searches typically comprise parallel transects, designed to obtain full coverage of the area to be surveyed with adjustments made in the field as required by topography or access limitations. Surveys will be conducted at a slow and steady pace (e.g., 2-4 km/h) while making frequent references to a compass, map, and GPS as necessary. Searchers will walk down all rows to achieve the 100% sample size proposed in Table 37 above. Searches for incidental carcasses will also be conducted along adjacent portions of fencing.

All specimens found during the carcass searches will be recorded in the field, including spatial data (collected by a GPS or comparable device). Carcasses will then be labeled, bagged and frozen for further analysis by an experienced or trained wildlife biologist. Following analysis of carcasses collected, all specimens will be re-frozen and submitted to AEP (O. S. Longman Building) unless they are needed for searcher efficiency or carcass persistence trials. Complete data records for all specimens will be submitted to AEP-WM in the appropriate format for uploading into the FWMIS database.

Carcasses found incidentally (i.e., in non-survey sampling units) on the Project Footprint will also be collected. All observations of wildlife mortality will be recorded, and the carcasses will be collected and provided to AEP, unless required for use in persistence or searcher efficiency trials. Incidental carcass finds will also be included in FWMIS data submissions.

Likely cause of death will be determined for all carcasses found. For each carcass found, searchers will record signs of injury, likely source of mortality, and confidence in determination. Searchers will consider the location of the carcass and nearby signs of wildlife activity and mortality events (e.g., tracks, stains, or feathers) in determining the likely cause of death. This includes examining signs to infer if the nearest potential mortality source to the carcass is the likely cause, if the animal was injured or stranded elsewhere and sought shelter, or if the source is background mortality (e.g., predation) (Huso et al. 2016).

Areas within the search radius with particularly tall and dense vegetation (>30 cm vegetation height with no bare ground visible) should not be searched. Searchers can use professional judgement to determine if an area with tall vegetation is searchable (e.g., tall, sparse cultivation) and the search visibility in such areas will likely be considered difficult. Areas not searched should be documented on an individual site or station basis and are accounted for in calculations of mortality rate. Where possible, the Project will maintain vegetation cover at a low level in order to facilitate more accurate mortality estimates.

Results of each year's investigations will be provided to AEP-WM in a summary report. The report will include a detailed summary of methods, analysis, and results. The following items will be included as part of data analysis and reporting:

- Raw data, which will be submitted to FWMIS
- Quantification of search effort, search area, searcher efficiency rate and carcass persistence rate
- Uncorrected mortality rate for birds expressed as number of mortalities/MW/year



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- Corrected mortality rates per Huso (2011), and applicable updates (Huso et al. 2012) or acceptable alternative
- Summary of species killed including location, condition, and likely cause of death
- Evaluation of spatial or temporal/seasonal patterns of bird mortality
- Results of pre-construction wildlife surveys
- A statement of compliance with the Directive

Results of the first year of monitoring will inform the design and execution of a second year's program, if any changes are deemed necessary through consultation with AEP-WM. Any planned modifications to the monitoring plan will be determined in consultation with AEP-WM and approved in writing.

To facilitate timely decision making and to allow the results of the first year's monitoring to influence the second year's program, plan results will be submitted to AEP-WM by January 31 of the year following data collection.

- c. *Provide survey extent (wind: number of turbines, solar: number of hectares). If known at this time, clearly identify the areas selected for monitoring.*

The objective of a sample is to provide an estimate of a parameter (e.g., mortality) that can be used to provide inference about a target population. Although a PV energy project can be largely contiguous (compared to individual wind turbines at a wind energy project), a sampling design can be developed where the solar project is divided into sampling units similar to sampling unique wind turbines. Because the Project will produce under 10 MW (~9.25 MW), carcass searches will be conducted throughout the entire solar array (GOA 2017a). Given the homogenous distribution of available wildlife habitat (i.e. tame pasture) in the Project footprint, sampling units will be randomly selected to sample the Project footprint.

- d. WIND PROJECTS ONLY: Provide the survey area that will be searched around each turbine (meters).

Not Applicable

- e. *Provide the frequency for when surveys will be completed.*

Carcass searches will be conducted weekly during the migration periods (March 1 to May 15 and August 16 to November 15) and bi-weekly (every two weeks) during the summer period (May 16 to August 15), per the Directive.

- f. *Provide seasonality (survey dates) for when post-construction carcass monitoring surveys will be conducted during each year of monitoring.*

Carcass searches will be conducted weekly during the migration periods (March 1 to May 15 and August 16 to November 15) and bi-weekly (every two weeks) during the summer period (May 16 to August 15), per the Directive.



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- g. Identify how carcass persistence will be determined by evaluating the carcass removal rate by scavengers and other means of removal. Include details of the number of trials/ season, definition of seasons including season dates and number of test carcasses used per trial, size classes of test carcasses, and schedule of test carcass checks.*

Carcass persistence trials will be conducted to correct for carcasses that may be missed during carcass searches due to scavenger removal or carcass decomposition. As part of the carcass persistence trial, a minimum of 20 carcasses will be laid out per season per year in the search area, georeferenced by GPS, and either monitored by remote camera or checked daily to determine carcass persistence rates. Where possible, carcass persistence trial inspections will be completed in conjunction with carcass surveys.

Three carcass persistence trials will be conducted, one per season in spring (March 1 to May 15, summer (May 16 to August 15) and fall (August 16 to November 15). If insufficient carcasses are collected on-site to complete the carcass persistence trials, AEP-WM should be contacted to supply additional carcasses, where possible. If AEP-WM is unable to supply additional carcasses, the proponent will be required to obtain suitable alternatives of similar size and colour to native birds for the purposes of carcass persistence trials.

- h. Identify how the searcher efficiency of each surveyor will be determined. Include details of the number of trials/season, definition of seasons including season dates and number of test carcasses used per trial, and size classes of test carcasses.*

Searcher efficiency trials will test every individual involved in searching for carcasses, using a subset of sampling units and visibility types. Searcher efficiency trials involve the distribution of marked carcasses within the search area without searchers being aware of the locations. The frequency for which carcasses are detected is used to correct detection probability to reflect the efficiency of carcass detection by each searcher. A minimum of three searcher efficiency trials, incorporating at least 20 carcasses per searcher, per season (as defined above), will be conducted. The trials will be timed randomly and in various visibility types (e.g., easy, moderate and difficult) depending on what is available in the search area. Carcasses used for the trials depend on availability; however, as the objective of the searcher efficiency trial is to test the searcher's ability to detect carcasses it is preferable to use only small sized carcasses.

The trials are intended to determine detection probability under varying vegetation conditions and the potential for birds to hide if injured (indirect mortality; individuals that survive a collision but are unable to take flight). All carcasses kept for searcher efficiency trials will be submitted to AEP-WM at the end of each year, except those removed by scavengers. If insufficient carcasses are collected on-site to complete the searcher efficiency trials, AEP-WM should be contacted to supply additional carcasses, where possible. If AEP-WM is unable to supply additional carcasses, the proponent will contract the wildlife biologist to obtain suitable alternatives of similar size and colour (e.g., brown chicks) to native birds for the purposes of searcher efficiency trials.



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- i. *Provide details of the methods to be used for estimating carcass persistence, search efficiency and overall mortality rate, including the fatality estimator to be used.*

All mortality estimates will be calculated using the Huso (2011) estimator considering relevant updates (Huso et al. 2012), revisions (e.g., bleed-through) or modifications (if necessary to accommodate the distance-sampling based estimate of searcher efficiency in the solar arrays), as well as 90% confidence using bootstrapping (Manly 1997). The use of the Huso (2011) estimator is consistent with the standard for mortality rate calculation in Alberta (GOA 2017a). The Huso (2011) estimator uses a binomial model to estimate the probability of carcass detection. The binomial carcass detection model could be used to calculate mortalities at Project linear features (fence, overhead lines) or during conventional transect surveys of panel rows.

Bootstrapping is a computer simulation technique that uses resampling methods to calculate variances and confidence intervals for parameter estimates when distributional assumptions might not be met (Manly 1997). Bootstrapping is used to generate estimates of variance for each variable, including searcher efficiency, probability of a carcass persisting to the next search, adjusted search interval and observed mortalities from a sample of the facility. From these bootstrap samples, the probability of available and detected carcasses will be calculated and applied to the bootstrapped found fatalities. The lower 5th and upper 95th percentiles of the bootstrap replicates provide estimates of the lower limit and upper limit of an approximate 90% confidence interval on all parameter estimates.

The estimator or statistical method may be substituted at the time of analysis, concordant with the field methods used, should an alternate analysis be determined to provide a more accurate or effective mortality estimate compared to the methods described in Huso et al. (2012).

56. Provide details of any site specific wildlife surveys (i.e. acoustic bat, sensitive raptor, etc.) that will be conducted in conjunction with the post-construction mortality monitoring, including methods and objective of the survey.

No additional post-construction site-specific wildlife surveys are proposed given the results of the pre-construction surveys.

57. Will all post-construction surveys be completed by an experienced wildlife biologist(s), as defined by the Directive?

All surveys will be conducted by qualified personnel who are considered experienced wildlife biologists as defined by the Directive and those who are in the process of becoming experienced wildlife biologists through hands-on training overseen by an experienced wildlife biologist on how to search and collect carcasses.



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58. Outline the actions that will be taken if injured wildlife are observed or identified within the facility.

All injured wildlife observed within the facility will be counted as a fatality in the fatality estimate.

Should injured wildlife be observed, AEP-WM or a Wildlife Resource Specialist will be contacted, where required, for direction.

Injured wildlife may be encountered while conducting carcass searches. All injured wildlife will be recorded as a fatality; however, injured wildlife will be treated differently than carcasses. Injured wildlife observed during the carcass searches will be handled by only the experienced or trained wildlife biologist with the following considerations:

- Wear leather gloves when handling any live animals, to protect against bites and scratches.
- Normally, injured animals should be taken to the local AEP-WM office or a shelter, but it is possible that certain wildlife will be refused. In this case, take the injured wildlife to a nearby tree (or suitable cover) so that it has a chance of surviving.

59. Identify the annual submission date that all post-construction survey data will be submitted to AEP-WM (report and FWMIS load form).

Annual reports and the FWMIS load form will be submitted to AEP-WM by January 31 of the year following the surveys (i.e., for surveys completed in 2021, data will be submitted to AEP January 31, 2022).

60. If mortality is deemed higher than acceptable by AEP-WM, the proponent will be required to mitigate the mortality to acceptable levels as per AEP-WM policy. Identify the proposed mitigation methods that will be implemented by the proponent if mortality is determined to be high.

Mitigation measures will be developed in consultation with AEP-WM. However, potential mitigation measures that may be implemented include, but are not limited to, the following:

- Use of bird deterrents
- Adding white edges to solar panels

61. The proponent acknowledges that if mitigation is mandatory, two additional years of post-construction monitoring will be required, as per the Directive.

The proponent recognizes this requirement, per Standard 100.4.10 of the Directive (GOA 2017a).



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62. Provide details on how AEP – WM be notified if an unusually high mortality event occurs or if a Species of Management Concern carcass is found. Identify the types of situations where AEP-WM will be notified of a mortality event.

The proponent will notify AEP-WM should a high mortality event occur (i.e., greater than 5 fatalities observed during a single visit, dependent on AEP-WM's bird fatality threshold) or if a wildlife species at risk fatality is observed.

63. If there is any additional information in regards to the post-construction monitoring that the proponent would like to include in the submission, provide the information here.

The PCMP will be conducted under a valid Permit and Collection Licence, to be acquired from AEP-WM by the consultant conducting the surveys. Further, a Canadian Wildlife Service (CWS) Scientific Migratory Bird Take Permit, for the collection and possession of dead migratory birds, will be required from ECCC.

Surveys are to be overseen by an experienced wildlife biologist who has previously conducted carcass searches and is familiar with the search protocol and required data collection. Searchers must have a strong understanding of the data collection requirements, including proper search techniques, the recommended photos to take to confirm species identification, and proper handling/storage of dead and injured wildlife.

Non-species at risk carcasses found during the carcass surveys will be collected and stored for use in carcass persistence and/or searcher efficiency trials, assuming they are in reasonable condition. Following completion of the surveys, all carcasses will be submitted to AEP-Wildlife Lab (attn: Wildlife Disease Specialist, O.S. Longman Building, Seventh Floor, 6909-116 Street, Edmonton, Alberta, T6H 4P2).

Carcasses observed by site personnel should be left in place to prevent bias with searches or trials. Carcasses found incidentally (i.e., outside the search area) while traveling within the Project Boundary will be collected and recorded; however, will be excluded from the corrected fatality estimate.



MAPS AND FIGURES

Maps and figures are important to help AEP-WM understand the proposed project. The following maps and figures are required by AEP-WM in all renewable submissions. Additional maps/ figures may be submitted at the discretion of the proponent.

- 64. Map of the overall project area: map must include project boundary line, photo imagery, boundary line for the 1000 m setback of the project boundary, identification of all wildlife habitat types as identified in this submission (i.e. native grassland, cultivation, etc.). Provide the name of file(s).**

Figure 1: Project Area

- 65. Map of survey locations: Map must include project boundary line, photo imagery, and each wildlife survey point for all required surveys. To enable AEP-WM review, if the map is cluttered it is recommended that multiple maps be used with files labelled appropriately. Depending on the size of the project, it may improve clarity of information by providing a separate map for the survey locations of each type of survey conducted. Provide the name of file(s).**

Figure 2: Wildlife Survey Stations and Wildlife Observations

- 66. Map of the project layout: Map must include project boundary line, photo imagery, infrastructure locations including but not limited to turbines or solar arrays, access roads, collection lines, substations, temporary work spaces and fences. To enable AEP-WM review, if the map is cluttered it is recommended that multiple maps be used with files labelled appropriately. Provide the name of file(s).**

Project Layout information provided in Question 64 (Figure 1).

- 67. Map of Lake/Wetland/Waterbody/Watercourse Features: Map must include project boundary line, photo imagery, all classified wetlands and setback distance from nearest project infrastructure. To enable AEP-WM review, if the map is cluttered it is recommended that multiple maps be used with files labelled appropriately. Provide the name of file(s).**

Wetland information provided in Question 64 (Figure 1).



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Maps and Figures
July 2020

- 68. Map of Wildlife Features: Map must include project boundary line, photo imagery, all identified wildlife features (house, nests, dens, leks, etc.) and associated setback boundary line, and setback distance from nearest project infrastructure. Labelling of wildlife features must match identification number of feature referenced in above section(s) of this submission. To enable AEP-WM review, if the map is cluttered it is recommended that multiple maps be used with files labelled appropriately. Provide the name of file(s).**

Wildlife features and species of management concern observations provided in Question 65 (Figure 2).

- 69. Other associated maps and figures: (insert jpeg/pdf map file). Provide any other maps referenced by the proponent in the body of this submission. To enable AEP-WM review, if map is cluttered it is recommended that multiple maps be used with files labelled appropriately. Provide the name of file(s).**

Not Applicable



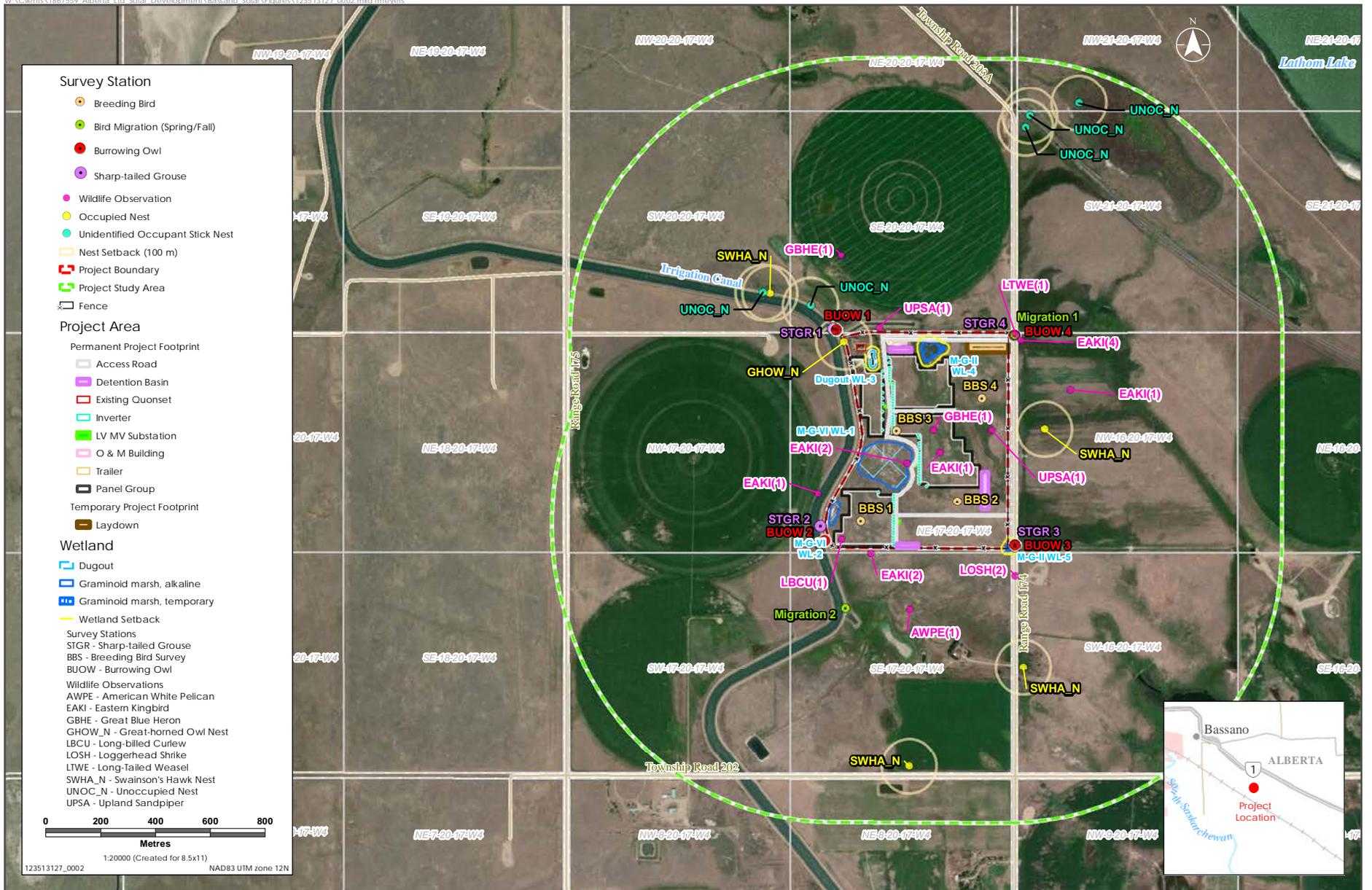


Sources: Base Data - CanVec Project Data - 1867550 Alberta Ltd. Solar Development. Imagery - Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Project Area





Sources: Base Data - CanVec Project Data - 1867559 Alberta Ltd. Solar Development. Imagery - Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Wildlife Survey Stations and Observations



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Other Comments
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OTHER COMMENTS

This section allows the proponent to provide wildlife or wildlife habitat related information that has not already been addressed in any of the above sections.

70. If there is any additional wildlife related information that the proponent would like to include in the submission, provide the information here (e.g., photographs).

Appendix A = Site Photographs

Appendix B = Species of Management Concern with the Potential Within or Adjacent to the Project Study Area



SUNALTA SOLAR PV 1 TECHNICAL DATA REPORT

Final Statement of Compliance
February 2020

FINAL STATEMENT OF COMPLIANCE

Upon completion of the submission form, the applicant or applicant's representative must fill out the following and submit as part of their application.

Once the AEP-WM has received all required documents the submission will be forwarded to the local area Biologist for review and comment. A final referral report will be completed by the AEP-Wildlife Biologist and forwarded to the AUC for inclusion within the AUC application.

TOM SMITH
I, **fill in the blank**, as an authorized representative of *1967559 A/S Ltd* **fill in the blank**, ensure that this application meets the AEP requirements as detailed in the Wildlife Directive for Alberta Wind or Solar Energy Projects. Deviations from the Directive (if any) are outlined in this submission form and include proposed mitigations and any formal discussions or agreements with AEP-Wildlife. All other supporting documents and materials for this project will abide with the statements made in this submission form.

Signature: *Tom Smith*

Date: 26 Feb 2020

Once signed, the entire submission form, including all supporting documents identified in the submission form, must be emailed by the proponent to the appropriate AEP-WM representative.



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References

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APPENDICES

SUNALTA SOLAR PV 1 TECHNICAL DATA REPORT

Appendix A Site Photos
July 2020

Appendix A SITE PHOTOS



SUNALTA SOLAR PV 1 TECHNICAL DATA REPORT

Appendix A Site Photos
July 2020



Photo A1 Tame pasture within the Project Area, looking north. Photo taken June 4, 2019.



Photo A2 Class II (temporary) graminoid marsh wetland in the Project Boundary, looking east. Photo taken August 9, 2019.



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Appendix A Site Photos
July 2020



Photo A3 Class VI (alkaline) graminoid marsh wetland in the Project Boundary, looking south. Photo taken August 9, 2019.



Photo A4 Settled area and planted trees within the Project Boundary, looking north. Photo taken June 4, 2019.



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Appendix A Site Photos
July 2020



Photo A5 Irrigation canal along the western periphery of the Project Boundary, looking northwest. Photo taken June 4, 2019.



Photo A6 Treed habitat within 1,000 m of the Project Boundary, looking south. Photo taken June 4, 2019.



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Appendix B Species of Management Concern with Potential to Occur Within or Adjacent to the Project Study Area
July 2020

Appendix B SPECIES OF MANAGEMENT CONCERN WITH POTENTIAL TO OCCUR WITHIN OR ADJACENT TO THE PROJECT STUDY AREA



SUNALTA SOLAR PV 1 TECHNICAL DATA REPORT

Appendix B Species of Management Concern with Potential to Occur Within or Adjacent to the Project Study Area
July 2020

Common Name	Scientific Name	SARA Status ¹	COSEWIC Status ¹	Alberta Wildlife Act and AESCC ²	Alberta General Status Listing ³	General Habitat Requirements
Birds						
Sharp-tailed grouse	<i>Tympanuchus phasianellus</i>	---	---	---	Sensitive	Mixed open grassland with shrubs ^{4,5}
Pied-billed grebe	<i>Podilymbus podiceps</i>	---	---	---	Sensitive	Lakes and ponds, often very small ^{4,5}
Horned grebe	<i>Podiceps auritus</i>	Special Concern	Special Concern	---	Sensitive	Large and small lakes and ponds, wet marshes ^{4,5}
Western grebe	<i>Aechmophorus occidentalis</i>	Special Concern	Special Concern	Threatened	Sensitive	Lakes ^{4,5}
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	---	---	---	Undetermined	Deciduous/coniferous forest and open woodlands ^{4,5}
Common poorwill	<i>Phalaenoptilus nuttalli</i>	---	---	---	Undetermined	Arid and semi-arid regions ^{4,5}
Common nighthawk	<i>Chordeiles minor</i>	Threatened	Threatened	---	Sensitive	Open habitats; grassland; fields ^{4,5}
Virginia rail	<i>Rallus limicola</i>	---	---	---	Undetermined	Freshwater and brackish marshes ^{4,5}
Sora	<i>Porzana Carolina</i>	---	---	---	Sensitive	Marshes, wet meadows ^{5,6}
Piping plover	<i>Charadrius melodus</i>	Endangered	Endangered	Endangered	At Risk	Sand or pebble beaches ^{4,5}
Black-necked stilt	<i>Himantopus mexicanus</i>	---	---	---	Sensitive	Marshes, shallow ponds ^{5,6}
Upland sandpiper	<i>Bartramia longicauda</i>	---	---	---	Sensitive	Open grassland, native prairie ^{4,5}
Long-billed curlew	<i>Numenius americanus</i>	Special Concern	Special Concern	Special Concern	Sensitive	Open grassland; wet meadows ^{4,5}
Black tern	<i>Chlidonias niger</i>	---	---	---	Sensitive	Shallow wetlands; swampy marshes ^{4,5}



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Appendix B Species of Management Concern with Potential to Occur Within or Adjacent to the Project Study Area
July 2020

Common Name	Scientific Name	SARA Status ¹	COSEWIC Status ¹	Alberta Wildlife Act and AESCC ²	Alberta General Status Listing ³	General Habitat Requirements
Forster's tern	<i>Sterna forsteri</i>	---	---	---	Sensitive	Marshes; marshy ponds and lakes ^{4,5}
American white pelican	<i>Pelecanus erythrorhynchos</i>	---	---	---	Sensitive	Lakes ^{4,5}
American bittern	<i>Botaurus lentiginosus</i>	---	---	---	Sensitive	Marshes ^{4,5}
Great blue heron	<i>Ardea herodias</i>	---	---	---	Sensitive	Marshes, trees, bushes and thickets ^{4,5}
Black-crowned night-heron	<i>Nycticorax nycticorax</i>	---	---	---	Sensitive	Marshes, trees, bushes and thickets ^{4,5}
Ferruginous hawk	<i>Buteo regalis</i>	Threatened	Threatened	Endangered	At Risk	Open grassland; coulees ^{4,5}
Golden eagle	<i>Aquila chrysaetos</i>	No Status	Not At Risk	---	Sensitive	Coulees; rock ledges and outcrops ^{4,5}
Burrowing owl	<i>Athene cunicularia</i>	Endangered	Endangered	Endangered	At Risk	Grassland, prairie ^{4,5}
Short-eared owl	<i>Asio flammeus</i>	Special Concern	Special Concern	---	May Be at Risk	Open native and tame grassland ^{4,5}
Pileated woodpecker	<i>Dryocopus pileatus</i>	---	---	---	Sensitive	Coniferous or deciduous forest ^{5,6}
American kestrel	<i>Falco sparverius</i>	---	---	---	Sensitive	Open country with scattered trees ^{4,5}
Prairie falcon	<i>Falco mexicanus</i>	No Status	Not At Risk	Special Concern	Sensitive	Coulees; rock outcrops and cliffs ^{4,5}
Olive-sided flycatcher	<i>Contopus cooperi</i>	Threatened	Threatened	---	May Be At Risk	Coniferous and mixed forest ^{4,5}
Western wood-pewee	<i>Contopus sordidulus</i>	---	---	---	May Be at Risk	Coniferous or deciduous woodlands ^{4,5}
Alder flycatcher	<i>Empidonax alnorum</i>	---	---	---	Sensitive	Swamps, streams or lakes; thickets ^{4,5}



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Appendix B Species of Management Concern with Potential to Occur Within or Adjacent to the Project Study Area
July 2020

Common Name	Scientific Name	SARA Status ¹	COSEWIC Status ¹	Alberta Wildlife Act and AESCC ²	Alberta General Status Listing ³	General Habitat Requirements
Least flycatcher	<i>Empidonax minimus</i>	---	---	---	Sensitive	Deciduous and mixed woodlands ^{4,5}
Eastern phoebe	<i>Sayornis phoebe</i>	---	---	---	Sensitive	Open and riparian woodlands; rocky ravines ^{5,6}
Eastern kingbird	<i>Tyrannus tyrannus</i>	---	---	---	Sensitive	Open country with scattered shrubs and trees ^{4,5}
Loggerhead shrike	<i>Lanius ludovicianus excubitorides</i>	Threatened	Threatened	Special Concern	Sensitive	Open country with scattered trees and shrubs ^{4,5}
Purple martin	<i>Progne subis</i>	---	---	---	Sensitive	Open country, near water ^{5,6}
Bank swallow	<i>Riparia riparia</i>	Threatened	Threatened	---	Sensitive	Open country, near water ^{4,5}
Barn swallow	<i>Hirundo rustica</i>	Threatened	Threatened	---	Sensitive	Open country, near water ^{4,5}
Sprague's pipit	<i>Anthus spragueii</i>	Threatened	Threatened	Special Concern	Sensitive	Short-grass prairie ^{4,5}
Chestnut-collared longspur	<i>Calcarius ornatus</i>	Threatened	Threatened	---	Sensitive	Prairie with short and sparse grass ^{4,5}
McCown's longspur	<i>Calcarius mccownii</i>	Special Concern	Threatened	---	Secure	Arid, short-grass prairie; nearly bare ground ^{4,5}
Brewer's sparrow	<i>Spizella breweri</i>	---	---	---	Sensitive	Arid brushland ^{4,5}
Grasshopper sparrow	<i>Ammodramus savannarum</i>	---	---	---	Sensitive	Grassland, prairie; cultivated fields ^{4,5}
Baird's sparrow	<i>Ammodramus bairdii</i>	Special Concern	Special Concern	---	Sensitive	Native, open grassland ^{4,5}
Bobolink	<i>Dolichonyx oryzivorus</i>	Threatened	Threatened	---	Sensitive	Open grassland; meadows; grassy marshland ^{4,5}
Baltimore oriole	<i>Icterus galbula</i>	---	---	---	Sensitive	Open woodlands ^{5,6}
Common yellowthroat	<i>Geothlypis trichas</i>	---	---	---	Sensitive	Wetlands; thickets, shrubs ^{4,5}



SUNALTA SOLAR PV 1 TECHNICAL DATA REPORT

Appendix B Species of Management Concern with Potential to Occur Within or Adjacent to the Project Study Area
July 2020

Common Name	Scientific Name	SARA Status ¹	COSEWIC Status ¹	Alberta Wildlife Act and AESCC ²	Alberta General Status Listing ³	General Habitat Requirements
Mammals						
Thirteen-lined ground squirrel	<i>Spermophilus tridecemlineatus</i>	---	---	---	Undetermined	Short-grass prairies ⁶
Hoary bat	<i>Lasiurus cinereus</i>	---	---	---	Sensitive	Treed habitat ⁶
Silver-haired bat	<i>Lasionycteris noctivagans</i>	---	---	---	Sensitive	Open country with scattered trees or woodlands, near water ⁶
Western small-footed myotis	<i>Myotis ciliolabrum</i>	---	---	Special Concern	Sensitive	Badlands, dry grasslands, arid valleys ⁶
Little brown myotis	<i>Myotis lucifugus</i>	Endangered	Endangered	---	May be at Risk	Open country or woodlands, near water ⁶
Long-tailed weasel	<i>Mustela frenata</i>	No Status	Not At Risk	---	May be at Risk	Grasslands, often near water ⁶
American badger	<i>Taxidea taxus</i>	Special Concern	Special Concern	Data Deficient	Sensitive	Open country ⁶
Herpetiles						
Tiger salamander	<i>Ambystoma tigrinum</i>	No Status	Special Concern	---	Secure	Quiet water in ponds, streams, reservoirs ⁷
Plains spadefoot	<i>Spea bombifrons</i>	---	Not At Risk	---	May Be At Risk	Sand dunes, grassland; temporary wetlands ⁷
Northern leopard frog	<i>Lithobates pipiens</i>	Special Concern	Special Concern	Threatened	At Risk	Permanent wetlands ⁷
Bull snake	<i>Pituophis catenifer</i>	No Status	Special Concern	---	Sensitive	Grassland and open brushland ⁷
Plains garter snake	<i>Thamnophis radix</i>	---	---	---	Sensitive	Wet prairies and farmland, near wetlands ⁷



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Appendix B Species of Management Concern with Potential to Occur Within or Adjacent to the Project Study Area
July 2020

Common Name	Scientific Name	SARA Status ¹	COSEWIC Status ¹	Alberta Wildlife Act and AESCC ²	Alberta General Status Listing ³	General Habitat Requirements
Wandering garter snake	<i>Thamnophis elegans</i>	---	---	---	Sensitive	Grassland, brushland ⁷
NOTES ¹ GOC 2019 ² GOA 2017b ³ AEP 2017 ⁴ Baicich and Harrison 2005 ⁵ Ehrlich et al. 1988 ⁶ Naughton 2012 ⁷ Russell and Bauer 2000						

