

# Environmental Evaluation

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## Coaldale Wind Power Project Chin, Alberta



**Prepared for:**

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## ABBREVIATIONS AND ACRONYMS

AEPA	Alberta Environment and Protected Areas
AER	Alberta Energy Regulator
AUC	Alberta Utilities Commission
AWHC	available water holding capacity
BMP	best management practice
cm	centimetre
Coaldale	Coaldale Renewables GP Inc.
DomeGeo	Dome GeoConsulting Inc.
dS/m	decisiemens per metre
EC	Ecosystem Component
Elemental	Elemental Energy Renewables Inc.
EE	Environmental Evaluation
EDI	Environmental Dynamics Inc.
EPP	Environmental Protection Plan
ESA	Environmentally Significant Area
ha	hectares
Initial C&R	Initial Conservation and Reclamation Plan
km	kilometre
m	metre
mm/m	millimetres per metre
MW	megawatt
PA	Project Area
PDSA	pre-disturbance soil assessment
PF	Project Footprint
Project	Coaldale Wind Power Project
Q	Quarter
RERR	Renewable Energy Referral Report
RESR	Renewable Energy Submission Report
<i>Rule 007</i>	<i>Rule 007: Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations, Hydro Developments and Gas Utility Pipelines</i>
SA	Study Area
WEST	Western EcoSystems Technology, ULC.
Wildlife Directive	<i>Wildlife Directive for Alberta Wind Energy Projects</i>

## **INTRODUCTION**

Western EcoSystems Technology, ULC (WEST) was retained by Coaldale Renewables GP Inc. (Coaldale), a subsidiary of Elemental Energy Renewables Inc. (Elemental) to complete an Environment Evaluation (EE) for the proposed Coaldale Wind Power Project (Project), located near Chin, Alberta.

In accordance with Alberta Utilities Commission (AUC) *Rule 007: Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations, Hydro Developments and Gas Utility Pipelines (Rule 007; AUC 2022)*, this EE describes the present environmental and land use conditions, identifies potential effects of the Project, and predicts any residual effects the Project may have. To address these requirements, WEST conducted desktop reviews and/or targeted field assessments for each Ecosystem Component (EC) to describe present conditions and determine potential adverse effects. Mitigation measures to reduce or eliminate Project effects are further detailed in the Project's Environmental Protection Plan (EPP) and Initial Conservation and Reclamation Plan (Initial C&R).

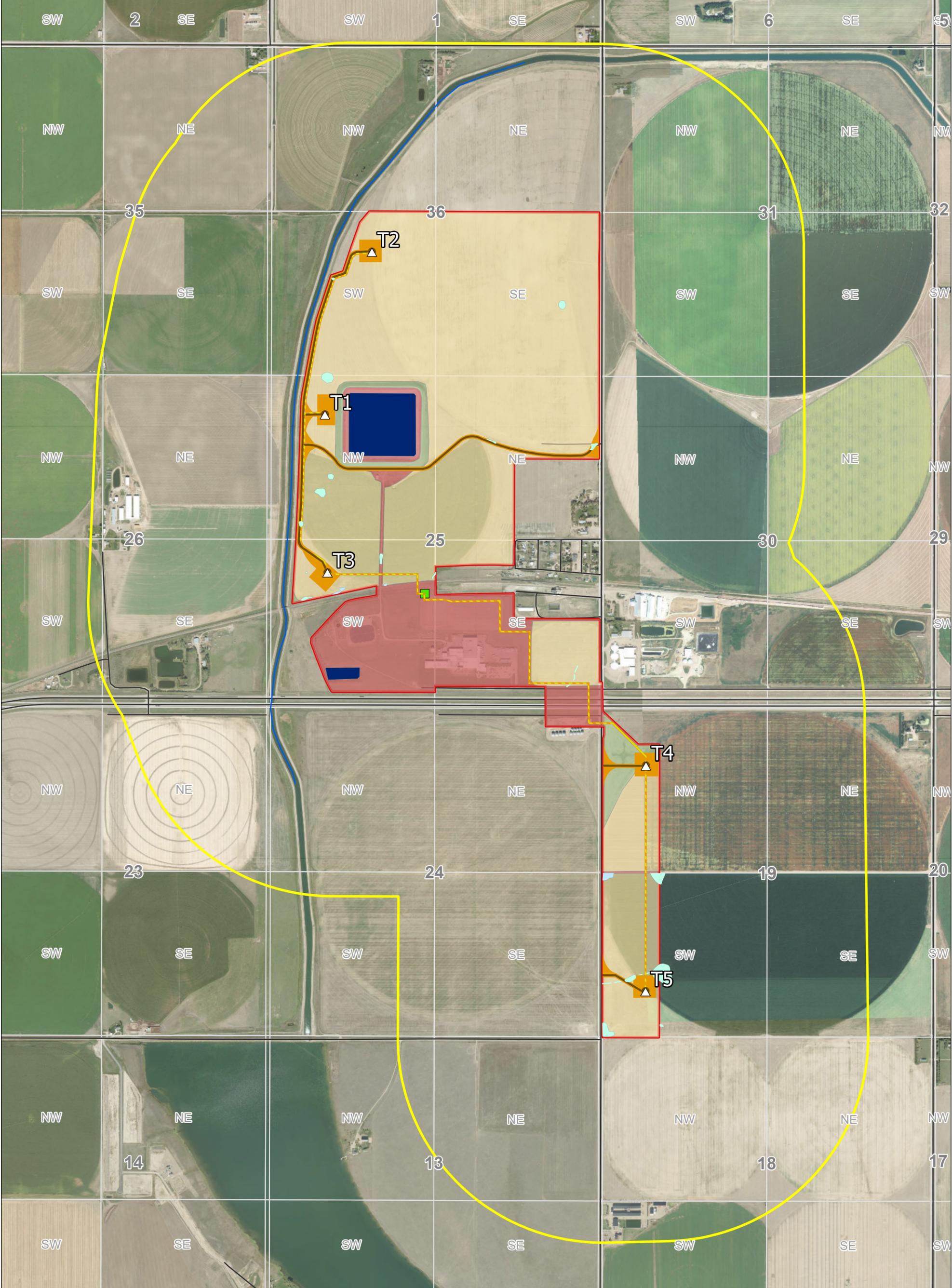
### **Project Description**

The Project will consist of the construction and operation of five turbines with a nameplate capacity of 35-megawatts (MW). The Project Footprint (PF) will be sited on 18.8 hectares (ha) of privately owned lands, within one kilometre (km) of Chin, Alberta (Figure 1). The Project Area (PA) is primarily comprised of cultivation, followed by tame grassland and anthropogenic disturbance. Construction is anticipated to commence in Quarter (Q) 4 2025 and the Project will become operational in Q4 2026. The Project will use a 7 MW turbine model with a hub height of up to 125 metres (m) and a blade length of up to 87.5 m. Other Project infrastructure will include access roads, collector lines, and turbine pads.

Additional Project details are included in the Facilities Application.

### **Project Activities**

Project activities will occur during construction, operation, and decommissioning phases. Construction activities will generally consist of site preparation (e.g., surveying, staking, clearing, and leveling as required), access road construction, collector line installation, foundations excavation, turbine foundation pouring, as well as turbine assembly and erecting. After construction is complete, all workspaces will be cleared of construction debris and areas with disturbed soils will be recontoured and reseeded. Operational activities will generally consist of vegetation management and maintenance of equipment and infrastructure. Finally, decommissioning activities at the end of the Project life will generally consist of dismantling and removing Project infrastructure and completing reclamation activities, as needed. Further details on the processes and methods for construction, operation, and decommissioning are included in the Facilities Application.



Project Area	Study Area	Quarter Section	Public Road	McCain Switching Station	Turbine	Collector Line	Permanent Footprint	Temporary Footprint	Wetlands and Waterbodies	Anthropogenic Waterbody	Class I (Ephemeral)	Class II (Temporary)	Land Cover	Anthropogenic	Cultivation	Tame Grassland
				Watercourses	Anthropogenic Watercourse	Ephemeral Draw										

**Figure 1. Project Footprint for the Coaldale Wind Power Project near Chin, Alberta**



Data Source: World Imagery  
 Coordinate System: NAD 1983 UTM Zone 12N  
 Date: 9/3/2024  
 Author: J. Sholtz



## **REGULATORY SETTING**

The Project is subject to various environmental municipal, provincial, and federal acts, directives, and guidelines including:

- *Agricultural Pests Act* (Government of Alberta 2000a)
- *Alberta Clubroot Management Plan* (Government of Alberta 2014a)
- *Alberta Wetland Policy* (Government of Alberta 2013a)
- *Alberta Wetland Mitigation Directive* (Government of Alberta 2018a)
- *Alberta Wild Species General Status Listing* (Government of Alberta 2020a)
- *Bulletin 2023-05* (Alberta Utilities Commission 2023)
- *Codes of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* (Government of Alberta 2013b)
- *Conservation and Reclamation Directive for Renewable Energy Operations* (Government of Alberta 2018b)
- *Environmental Protection and Enhancement Act* (Government of Alberta 2000b)
- *Fisheries Act* (Government of Canada 1985)
- *Historical Resources Act* (Government of Alberta 2000c)
- *Hydro and Electric Energy Act* (Government of Alberta 2000d)
- *Migratory Bird Convention Act* (Government of Canada 1994)
- *Municipal District of Taber Land Use Bylaw 1722* (Municipal District of Taber 2004)
- *Municipal Government Act* (Government of Alberta 2000e)
- *Lethbridge County Land Use Bylaw 24-007* (Lethbridge County 2024)
- *Post-construction Survey Protocols for Wind and Solar Energy Projects* (Government of Alberta 2020b)
- *Rule 007* (Alberta Utilities Commission 2022)
- *Rule 012: Noise Control* (Alberta Utilities Commission 2021)
- *Sensitive Species Inventory Guidelines* (Government of Alberta 2013c)
- *Soil Conservation Act* (Government of Alberta 2000f)
- *Species at Risk Act* (Government of Canada 2002)
- *Water Act* (Government of Alberta 2000g)
- *Weed Control Act* (Government of Alberta 2008)
- *Weed Control Regulation* (Government of Alberta 2016)
- *Wildlife Act* (Government of Alberta 2000h)
- *Wildlife Regulation* (Government of Alberta 1997)
- *Wildlife Directive for Alberta Wind Energy Projects* (Wildlife Directive; Government of Alberta 2017)

### **South Saskatchewan Regional Plan**

The Project is located within the South Saskatchewan Region of Alberta. A regional plan (Government of Alberta 2014b) is in place for the South Saskatchewan Region and provides strategies for implementation of renewable energy projects, including wind power:

- Ensure policies are in place to promote and remove barriers to new investments in renewable energy
- Invest in the development, demonstration and deployment of renewable and alternative energy technologies targeted to improve Alberta’s overall energy efficiency. This will include support for the application of new technologies and support on-going research and development in partnership with other institutions.
- Ensure reinforcement of the transmission system to enable more renewable power in the region.

### **Lethbridge County**

The Project is partially located within Lethbridge County and is subject to the objectives and bylaws contained within the *Land Use Bylaw 24-007* (Lethbridge County 2024). This bylaw provides guidance and requirements for the zoning and development of commercial or industrial wind power projects. Part 7, Section 4 of the bylaw includes proponent information requirements, setbacks, minimum blade clearance, tower access and safety, transmission lines, colour, number of turbines per parcel of land, public consultation, and development commencement.

### **Municipal District of Taber**

The Project is also partially located within the Municipal District of Taber and is subject to the objectives and bylaws contained within the *Land Use Bylaw 1722* (Municipal District of Taber 2004). The bylaw provides guidance and requirements for the zoning and development of wind power projects. Schedule 11, Part 1 of the bylaw includes proponent information requirements, setbacks, minimum blade clearance, tower access and safety, transmission lines, colour, and number of turbines per parcel of land.

### **Wildlife Directive for Alberta Wind Energy Projects**

As a requirement under the Wildlife Directive (Government of Alberta 2017), a Renewable Energy Submission Report (RESR) to Alberta Environment and Protected Areas (AEPA) for the Project on December 23, 2022 (Environmental Dynamics Inc. [EDI] 2022; Appendix C). AEPA provided a Referral Report (RERR) for the Project on October 4, 2023, and the overall Risk Ranking was Moderate (Government of Alberta 2023a; Appendix D).

Since receiving the 2023 RERR, there have been some changes to the Project and additional wildlife survey results that AEPA has not reviewed. The Project Footprint (PF) has decreased from 19.31 ha to 18.8 ha, one turbine has moved approximately 1,300 m from SE 36-9-19 W4M to NW 25-9-19 W4M and adjustments have been made to the collector lines and access roads. The Project previously proposed a turbine model with a hub height of 120 m and a blade length of up to 80 m (EDI 2022). The proposed turbine model has since increased to a hub height of up to 125 m and a blade length of up to 87.5 m. Additional wildlife surveys following the *Sensitive Species Inventory Guidelines* (Government of Alberta 2013c) were also completed in 2024 to keep wildlife surveys current, which were sharp-tailed grouse (May 12 to 13), raptor nests (May 12 to 13 and June 17 to 18), and burrowing owls (June 17 to 18). In addition, landcover, wetland,

and watercourse mapping were updated for the Project on July 30 to 31, 2024. In accordance with the *Renewable Energy Project Amendments* (Government of Alberta 2021), Coaldale will rely on the AUC to initiate the amendment process under Scenario 1.

## **Approvals Required for the Project**

### *Permit and License*

As a requirement under the *Hydro and Electric Energy Act* (Government of Alberta 2000d), an approval, issued by the AUC, must be held to construct and operate a power plant facility in Alberta. As per *Rule 007*, an application for approval must be submitted to the AUC that includes environmental information in the form of an EE, an EPP, and Initial C&R. This EE has been designed to meet the requirements listed in *Rule 007*.

### *Water Act Approval*

Prior to construction, Coaldale will apply for *Water Act* Approval for all surface water features that will be impacted by the Project (detailed in the *Alberta Environment and Protected Areas Regulated Ecosystem Components* section).

Additional approvals for the Project are detailed in the EPP (WEST 2024a).

## **EVALUATION METHODOLOGY**

This EE has been prepared to fulfill the information requirements listed in *Rule 007* while aligning with the Wildlife Directive. The EE describes the potential impacts of the Project on ECs and assesses the significance of those interactions based on the following components:

- applicable legislation and regulations
- stakeholder and regulator input
- results from desktop and field assessments
- project team experience in the region and with similar facilities
- professional judgement

The evaluation process includes identifying ECs potentially impacted by the Project, determining the effects pathways, developing mitigation measures to address impacts, and predicting the significance of residual effects.

### **Selection of Ecosystem Components**

The ECs considered for this EE are based on the ECs listed in WP15 of *Rule 007*, which are:

- soils and terrain
- surface waterbodies and hydrology
- groundwater
- vegetation species and communities

- wildlife species and habitat
- aquatic species and habitat
- air quality
- environmentally sensitive areas

The presence of ECs for the Project was identified based on a desktop review (refer to *Existing Conditions* section below) and field surveys. Potential impacts on surface waterbodies and hydrology as well as wildlife species and habitat were previously assessed by AEPA, which is summarized in the *AEPA Regulated Ecosystem Components* section below. Potential impacts on soils and terrain, environmentally sensitive areas, vegetation species and communities, as well as groundwater are provided in this EE. The remaining ECs were not assessed and their rationale for exclusion is provided below.

#### *Aquatic Species and Habitat*

A review of the Fish and Wildlife Internet Mapping Tool yielded low potential for fish bearing watercourses or waterbodies within the Project boundary (Government of Alberta 2024a). The Project is not anticipated to encroach the St. Mary's River Irrigation District main channel that runs along the west side of the PA. The Project is also not within 1,000 m of aquatic species at risk ranges or critical habitat (Government of Canada 2023a). Therefore, the potential effects to aquatic species and habitat are expected to be negligible.

#### *Air Quality*

Minimal earthworks and site machinery will be required and limited to construction and decommissioning stages of the Project. The Project will not result in continuous emissions during operations. Therefore, the potential effects to air quality from routine Project construction and operations are expected to be negligible.

#### *Environmentally Sensitive Areas*

The Project is in the Dry Mixedgrass Natural Subregion (Government of Alberta 2006b). The Project is not sited within any Parks or Protected Areas (Government of Alberta 2024e) and is not located within 1,000 m of an Important Bird Area (Important Bird Areas Canada 2024), Key Biodiversity Area (Key Biodiversity Areas 2024), named lake (Government of Alberta 2022; Government of Canada 2021), or Environmentally Significant Areas (ESAs). The nearest named lake is Stafford Reservoir, which is approximately 1,360 m from the Project Area (Government of Alberta 2022; Government of Canada 2021). The presence of ESAs was determined based on a desktop review of information and mapping provided in Government of Alberta (2024f), Fiera Biological Consulting Ltd. (2009, 2014), and Sweetgrass Consultants Ltd. (1997). Given that the Project is not sited within ESAs, the potential effects from the Project on environmentally sensitive areas are expected to be negligible.

#### *Alberta Environmental and Protected Areas Regulated Ecosystem Components*

ECs that have already been evaluated by AEPA (e.g., wildlife species and habitat, surface waterbodies and hydrology) in the RERR, are discussed in the *AEPA Regulated Ecosystem Components* section of this report. The assessment of these ECs was completed in the *Renewable Energy Referral Report for the Coaldale Wind Farm* (Government of Alberta 2023a).

## **Spatial Extent**

The evaluation of ECs was completed at three spatial scales: the Study Area (SA), the PA, and the PF. The SA consists of a 1,000 m buffer surrounding the PA to account for the maximum setback for a wildlife feature. The PA includes all lands under lease as shown in Figure 1. The PF consists of the area directly impacted by the Project including all permanent (operational) and temporary workspaces.

## **Temporal Extent**

The evaluation of ECs was completed for each of the key Project phases: construction, operation, and decommissioning. The construction phase commences with pre-construction staking, clearing, site preparation activities, and ends once infrastructure is installed, the Project is operational, and the site has been cleared of construction debris. The operation phase commences once the construction phase is completed, and the Project becomes operational and ends once the Project is no longer operational and decommissioning commences. The decommissioning phase commences once the Project is no longer operational and ends once infrastructure is removed and the site has been returned to an equivalent land capacity.

## **Existing Conditions**

Existing conditions of ECs were determined through a desktop review and field assessments, where necessary. Existing conditions for each EC and the sources used in their assessments are detailed in the sections below.

## **Mitigation Measures**

Mitigation measures can be implemented to reduce or manage the effects of the Project on ECs and the environment. Mitigation measures are described at a high level in this EE and are further detailed in the EPP and the Initial C&R. Mitigation measures have been developed to align with current regulatory requirements and best management practices (BMPs).

## **Evaluation Criteria**

For each of the applicable ECs, the existing conditions were described based on a desktop assessment and fieldwork, if necessary. The desktop assessment was completed using data from publicly available sources to gain an understanding of pre-existing conditions in the area. If required, fieldwork was completed to verify the desktop data and to determine the presence of any additional environmental features. Based on existing conditions, the anticipated pathways for residual effects are described and ranked post-mitigation using defined criteria. The criteria on which these residual effects were assessed are detailed below (Table 1).

**Table 1. Evaluation Criteria for the Effects Assessment.**

<b>Criteria</b>	<b>Ranks</b>	<b>Definition</b>
Direction	Positive	Measured or predicted effect represents a real or potential increase in abundance, quality, or other attribute of the element, resource, assessment endpoint, or parameter. Effect is desirable.
	Negative	Measured or anticipated effect represents a real or potential decrease in abundance, quality, or other attribute of the element. Effect is undesirable.
	Neutral	The element is not changing when compared to baseline conditions/trends. No measurable or anticipated effect on the element. A neutral direction indicates that there is no effect to quantity; therefore, no quantitative assessment is needed.
Magnitude	Negligible	No detectable change is expected from baseline values.
	Low	Effects are detectable but will be well within environmental baseline values and/or regulatory guidelines.
	Moderate	Effects are detectable and may slightly exceed the range of environmental baseline values and/or regulatory guidelines but are unlikely to pose a management challenge.
	High	Effects are beyond the environmental baseline values and/or regulatory guidelines and pose a management challenge.
Spatial Extent	Project Footprint	Effect occurs only with the boundary of the area being disturbed.
	Project Area	Effect occurs beyond the boundary of the PF but within the boundary of the PA.
	Study Area	Effect occurs beyond the boundary of the PA and extends to the larger SA.
Duration	Short-term	Effect occurs as a result of an activity or activities that occur once during the construction or decommissioning phase.
	Medium-term	Effect occurs as a result of an activity or activities that occur throughout the construction and/or decommissioning phase.
	Long-term	Effect occurs as a result of an activity or activities that occur during the construction and/or decommissioning phase as well as the operational phase.
Frequency	Once	Effect occurs as a result of an activity that occur once.
	Occasional	Effect occurs as a result of an activity that occurs periodically through the construction/decommissioning and/or operational phase.
	Continuous	Effect occurs as a result of an activity that occurs continuously through the construction/decommissioning and/or operational phase.
Likelihood	Low	Effect is unlikely to occur within reasonable predictions.
	Moderate	Effect may occur within reasonable predictions.
	High	Effect likely to occur within reasonable predictions.
Reversibility	Reversible	Effect can be entirely reversed once the activity has ended.
	Partially Reversible	Effect can be partially reversed once the activity has ended.
	Irreversible	Effect cannot be reversed once the activity has ended.

PF = Project Footprint; PA = Project Area; SA = Study Area.

### **Determination of Significance**

To determine the significance of residual effects, the effects assessment criteria rankings were combined and assessed after mitigation was implemented. If the combination of residual effects resulted in an overall magnitude of Low, the significance was considered Low, and the residual effect was not significant. If the combination of residual effects resulted in an overall magnitude of Moderate or High, the residual effect has the potential to be significant. Definitions for a significant residual effect, post-mitigation, for each EC are detailed in Table 2.

**Table 2. Description of a Significant Residual Effect for each Ecosystem Component.**

<b>Ecosystem Component</b>	<b>Definition of Significant Residual Effect</b>
Soils and Terrain	A resulting permanent degradation in the quality of soil (including admixing of soil series) or integrity of terrain, such that existing or equivalent land uses are no longer viable.
Surface Waterbodies and Hydrology	A resulting permanent alteration of a surface waterbody, that is not mitigated or compensated for, resulting in a degradation in the quality of water, soil, and/or vegetation or a change in the quantity of water and/or vegetation.
Groundwater	A resulting alteration to groundwater that impacts the quality or quantity of groundwater available such that existing and future uses are no longer viable.
Vegetation Species and Communities	A resulting alteration to vegetation species and/or communities that impacts the long-term viability of a species in the region or does not align with the management goals for a species of management concern.
Wildlife Species and Habitat	A resulting alteration to wildlife and/or wildlife habitat that impacts the long-term viability of a species in the region or does not align with the management goals for a species of management concern.
Aquatic Species and Habitat	An alteration to aquatic species and/or habitat that impacts the long-term viability of a species in the region or does not align with the management goals for a species of management concern.
Environmentally Sensitive Areas	An alteration to an environmentally sensitive area that does not adhere to applicable bylaws, policies, or plans.

## **ALBERTA ENVIRONMENT AND PROTECTED AREAS REGULATED ECOSYSTEM COMPONENTS**

The AEPA is responsible for determining the potential risks to wildlife and wildlife habitat from proposed wind energy projects. This section summarizes the risk ranking determination by AEPA for wildlife species and habitat applicable to the Project, as presented in the RERR (Government of Alberta 2023a). Mitigation measures for wildlife and wildlife habitat are summarized in the EPP (WEST 2024a).

AEPA determined that the Project posed an overall Moderate risk to wildlife species and habitat based on Project siting, breeding bird and migratory activity, potential impacts to breeding and migratory stopover habitat, and commitments made by Coaldale to mitigate and monitor wildlife impacts. Additional wildlife surveys were conducted in 2024 following the *Sensitive Species Inventory Guidelines* (Government of Alberta 2013c) to keep surveys current for sharp-tailed grouse, raptor nests, and burrowing owls. A summary of all wildlife surveys previously completed for the Project are provided below (EDI 2022):

- Spring bird migration:
  - April 12 to 14, 2020 (round 1)
  - April 26 to 27, 2020 (round 2)
  - May 14 to 15, 2020 (round 3)

- Fall bird migration:
  - August 18, 2021 (round 1)
  - September 15 to 16, 2021 (round 2)
  - October 15 to 16, 2021 (round 3)
- Breeding birds:
  - June 3, 2020 (round 1)
  - June 24, 2020 (round 2)
- Spring bat acoustic monitoring:
  - April 26 to June 1, 2021
- Fall bat acoustic monitoring:
  - July 15 to October 15, 2021
- Sharp-tailed grouse:
  - April 15, 2020 (round 1)
  - April 28, 2020 (round 2)
  - April 6, 2022 (round 1)
  - April 28, 2022 (round 2)
- Burrowing owls:
  - June 2, 2021
  - June 21, 2022
- Raptor nests
  - April 14, May 15, 2020
  - April 6, April 28, June 21, 2022

In 2024, WEST completed the following surveys following the *Sensitive Species Inventory Guidelines* (Government of Alberta 2013c):

- Sharp-tailed grouse:
  - May 12 (round 1) and May 13, 2024 (round 2) at 9 survey stations.
- Burrowing owls:
  - June 17 to 18, 2024 at 13 survey stations
- Raptor nests
  - May 12, June 17 to 18, 2024 within 1 km of the Project Area.

AEPA determined that the Project had a Moderate risk to wildlife and wildlife habitat (Government of Alberta 2023a). The PF was sited outside of native and critical habitats, avoided wildlife zones and critical wildlife habitat, which aligns with the Wildlife Directive. Since that determination, the Project Footprint (PF) has decreased from 19.31 ha to 18.8 ha, one turbine has moved approximately 1,300 m from SE 36-9-19 W4M to NW 25-9-19 W4M and adjustments have been made to the collector lines and access roads. The Project previously proposed a turbine model with a hub height of 120 m and a blade length of up to 80 m (EDI 2022). The proposed turbine model has since increased to a hub height of up to 125 m and a blade length of up to 87.5 m. The PF remains outside of native grassland, Class III and above wetlands, and active wildlife feature setbacks. These AEPA risk rankings and Project changes are further discussed below.

**Table 3. Habitat Type within the Project Area and Project Footprint.**

Habitat Type	Project Area (ha)	Temporary Footprint (ha)	Permanent Footprint (ha)	Project Footprint (ha)
Cultivation	249.1	11.4	3.8	15.3
Anthropogenic	58.4	1.5	0.2	1.7
Tame Grassland	11.4	1.4	0.3	1.7
Anthropogenic Waterbody	10.9	-	-	-
Wetland	1.8	0.1	0.1	0.2
<b>Totals</b>	<b>331.5</b>	<b>14.4</b>	<b>4.4</b>	<b>18.8</b>

ha = hectares.

Sums may not equal totals shown due to rounding.

No Class III or above wetlands or their setbacks were previously encroached (EDI 2022), and AEPA assessed the risk to wetland habitat and ranked it as Not Applicable (Government of Alberta 2023a). Wetland and watercourse field surveys completed in 2024 identified 17 ephemeral waterbodies (Class I), three temporary wetlands (Class II), two anthropogenic waterbodies, one anthropogenic watercourse, and two ephemeral draws (Table 4; Table 5; Figure 2). The Project now encroaches on 6 ephemeral waterbodies (Class I) and two ephemeral draws (Table 4; Table 5), and continues to not encroach any Class III or above wetlands or their setbacks.

**Table 4. Wetlands and Waterbodies within 100 metres (m) of the Project Footprint.**

Wetland Feature	Features within PA	Features within 100 m of the PF	Features Overlapped by PF
Class I (Ephemeral)	17	14	6
Class II (Temporary)	3	2	0
Anthropogenic Waterbody	2	1	0
<b>Total</b>	<b>22</b>	<b>17</b>	<b>6</b>

PA = Project Area; PF = Project Footprint.

**Table 5. Watercourses within 45 metres (m) of the Project Footprint.**

Watercourse Feature	Features within PA	Features within 45 m of the PF	Features Overlapped by PF
Ephemeral Draw	2	2	2
Anthropogenic Watercourse	1	1	0
<b>Total</b>	<b>3</b>	<b>3</b>	<b>2</b>

PA = Project Area; PF = Project Footprint.

The Project was sited outside of raptor nest and other wildlife feature setbacks (EDI 2022) and AEPA assessed the risk to raptor nests as Low as (Government of Alberta 2023a). Following the 2024 surveys, the Project remains outside of all raptor nest setbacks. Eight active wildlife features were observed during 2024 wildlife surveys, which consisted of two Swainson’s hawk nests (COSWHAN05, COSWHAN06), an osprey nest (COOSPRN01), a red-tailed hawk nest (CORTHAN02), and four cliff swallow colonies (COCLSWC01, COCLSWC02, COCLSWC03, COCLSWC04; Figure 2).

No burrowing owls or active burrowing owl features were detected within 1000 m of the PF (EDI 2022) and AEPA assessed the risk ranking to burrowing owls as low (Government of Alberta 2023a). No burrowing owls or active burrowing owl features were detected during the 2024 surveys.

The Project was not sited within any sharp-tailed grouse lek setbacks (EDI 2022) and AEPA assessed the risk to sharp-tailed grouse as Low (Government of Alberta 2023a). No active sharp-tailed grouse leks were detected during the 2024 surveys.

Breeding bird surveys conducted in 2020 identified two sensitive species, barn swallow (*Hirundo rustica*) and eastern kingbird (*Tyrannus tyrannus*) and found that breeding bird activity was moderate (i.e., between 1.0 to 2.0 birds observed per minute; EDI 2022). AEPA determined that the risk to breeding birds was low (Government of Alberta 2023a).

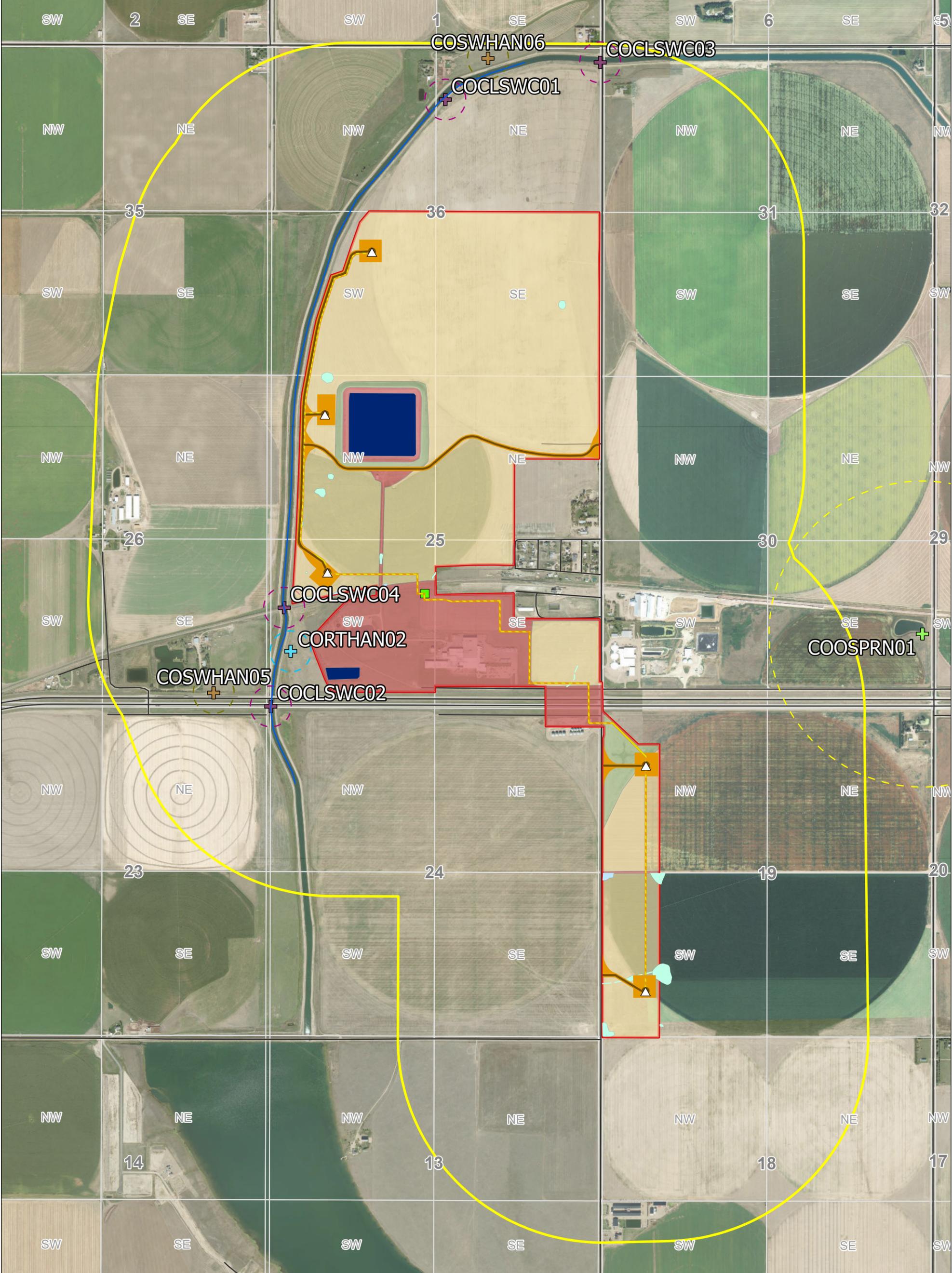
AEPA assessed the overall risk to birds as High (Government of Alberta 2023a), which is driven by bird activity rates and species at risk observations according to the *Renewable Energy Risk Framework* (Government of Alberta 2023d). Bird migration surveys conducted in 2020 and 2021 found 12 provincially listed species at risk: American kestrel (*Falco sparverius*), American white pelican (*Pelecanus erythrorhynchos*), bald eagle (*Haliaeetus leucocephalus*), barn swallow (*Hirundo rustica*), black tern (*Chlidonias niger*), black-necked stilt (*Himantopus mexicanus*), eared grebe (*Podiceps nigricollis*), eastern kingbird (*Tyrannus tyrannus*), horned grebe (*Podiceps auritus*), loggerhead shrike (*Lanius ludovicianus*), prairie falcon (*Falco mexicanus*), and western grebe (*Aechmophorus occidentalis*; EDI 2022). Bird activity rates were high (i.e., greater than 2.0 birds observed per minute) according to the *Renewable Energy Risk Framework* (Government of Alberta 2023d). Bird activity rates, however, were primarily driven by species listed by AEPA as Secure (Government of Alberta 2020a) and not listed under SARA or COSEWIC (Government of Canada 2023b). In the spring, these species included northern shoveler (*Spatula clypeata*; 360 individuals; 18% of all observations), snow goose (*Anser caerulescens*; 262 individuals; 13% of all observations), Canada goose (*Branta canadensis*; 239 individuals; 12% of all observations) and Brewer's blackbird (*Euphagus cyanocephalus*; 221 individuals; 11% of all observations). In the fall these species included ring-billed gull (*Larus delawarensis*; 4,493 individuals; 49% of all observations) and Canada goose (2,717 individuals; 30% of all observations). Moreover, the Project is located more than 1,000 m from the nearest named lake (Government of Alberta 2022; Government of Canada 2021) and more than 1,000 m from the nearest Important Bird Area (Important Bird Areas Canada 2024). The Project Footprint is not located on native grassland or within Class III and above wetlands or wetland setbacks. In addition, the Project has mitigated potential effects to birds in the EPP, which includes scheduling construction activities, to the extent possible, outside the outside of the avian breeding period (April 1 – August 17), post-construction monitoring surveys for the first three years of operation, and a further two years of monitoring if mortality is deemed higher than acceptable by AEPA (WEST 2024a).

AEPA determined the risk to bats as high (Government of Alberta 2023a). Acoustic bat surveys determined mean migratory bat passes per detector night were 12.93 in the spring (May 1 to 31, 2021) and 62.56 in the fall (August 1 to September 10, 2021; EDI 2022). Post-construction

surveys will be completed as directed by the AEPA *Post-construction Survey Protocols for Wind and Solar Energy Projects* (Government of Alberta 2020b). If mortality is deemed to be higher than acceptable (i.e., greater than 4 to 8 migratory bat fatalities per turbine per year in accordance with the *Bat Mitigation Framework for Wind Power Development* (Government of Alberta 2013d)), Coaldale will commit to a further two years of post-construction monitoring and will develop appropriate mitigation measures in consultation with AEPA. Implementing smart curtailment has been previously demonstrated as an effective mitigation measure to reduce bat mortality at operational wind energy projects (Martin et al. 2017). Therefore, Coaldale will commit to proactive bat mitigation measures not previously provided to AEPA to mitigate the potential for bat mortality at the Project:

- The Project will implement preemptive smart curtailment during the first year of operation for all Project turbines when all of the following conditions occur:
  - When the wind speed is below 6 m/s.
  - From August 1 to September 10 to align with the peak fall bat migration in Alberta (Government of Alberta 2013c).
  - When the temperature exceeds 10°C as little or no bat activity occurs below 10°C (Government of Alberta 2006a, Martin et al. 2017).
  - From one half-hour after sunset to one half-hour before sunrise (Government of Alberta 2013c, Martin et al. 2017).

AEPA previously provided the Project an overall risk ranking of Moderate (Government of Alberta 2023a). Following a turbine model update and Project design updates including a turbine move, the PF has decreased to 18.8 ha. The Project remains outside of active wildlife feature setbacks, native grassland, Class III and above wetlands and has committed to additional bat mitigation measures. Given these Project changes, the mitigation measures committed to in the EPP (WEST 2024a) and the criteria outlined in the *Renewable Energy Risk Framework* (Government of Alberta 2023d), it is anticipated that the Project risk to wildlife and wildlife habitat will remain Moderate as previously determined by AEPA (Government of Alberta 2023a). Additionally, Coaldale has also committed to bat mitigation measures during the first year of operation to further address potential effects to bats.



Project Area	Study Area	Quarter Section	Public Road	Turbine	Collector Line	Permanent Footprint	Temporary Footprint	McCain Switching Station	Cliff Swallow Nest	Osprey Nest	Red-tailed Hawk Nest	Swainson's Hawk Nest	Cliff Swallow Nest Setback - 100m	Osprey Nest Setback - 750m	Red-tailed Hawk Nest Setback - 100m	Swainson's Hawk Nest Setback - 100m	Anthropogenic Watercourse	Ephemeral Draw	Anthropogenic Waterbody	Class I (Ephemeral)	Class II (Temporary)	Anthropogenic	Cultivation	Tame Grassland
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**Figure 2. Land Cover, Surface Water Features, and Wildlife Features within the Coaldale Wind Power Project near Chin, Alberta**



Data Source: World Imagery  
 Coordinate System: NAD 1983 UTM Zone 12N  
 Date: 9/3/2024  
 Author: J. Sholtz



## **EFFECTS ASSESSMENT**

This section discusses existing conditions, potential effects, proposed mitigation measures, and residual effects for ECs that were not assessed within the RESR and then the RERR, and that have the potential to be impacted by the Project. The ECs potentially impacted by the Project are:

- soils and terrain
- groundwater
- environmentally sensitive areas
- vegetation species and communities

### **Soils and Terrain**

#### *Existing Conditions*

Existing conditions for soils and terrain were assessed using desktop review. Geotechnical assessments and pre-disturbance site assessments, required under the *Conservation and Reclamation Directive for Renewable Energy Operations* (Government of Alberta 2018b), will be completed prior to construction.

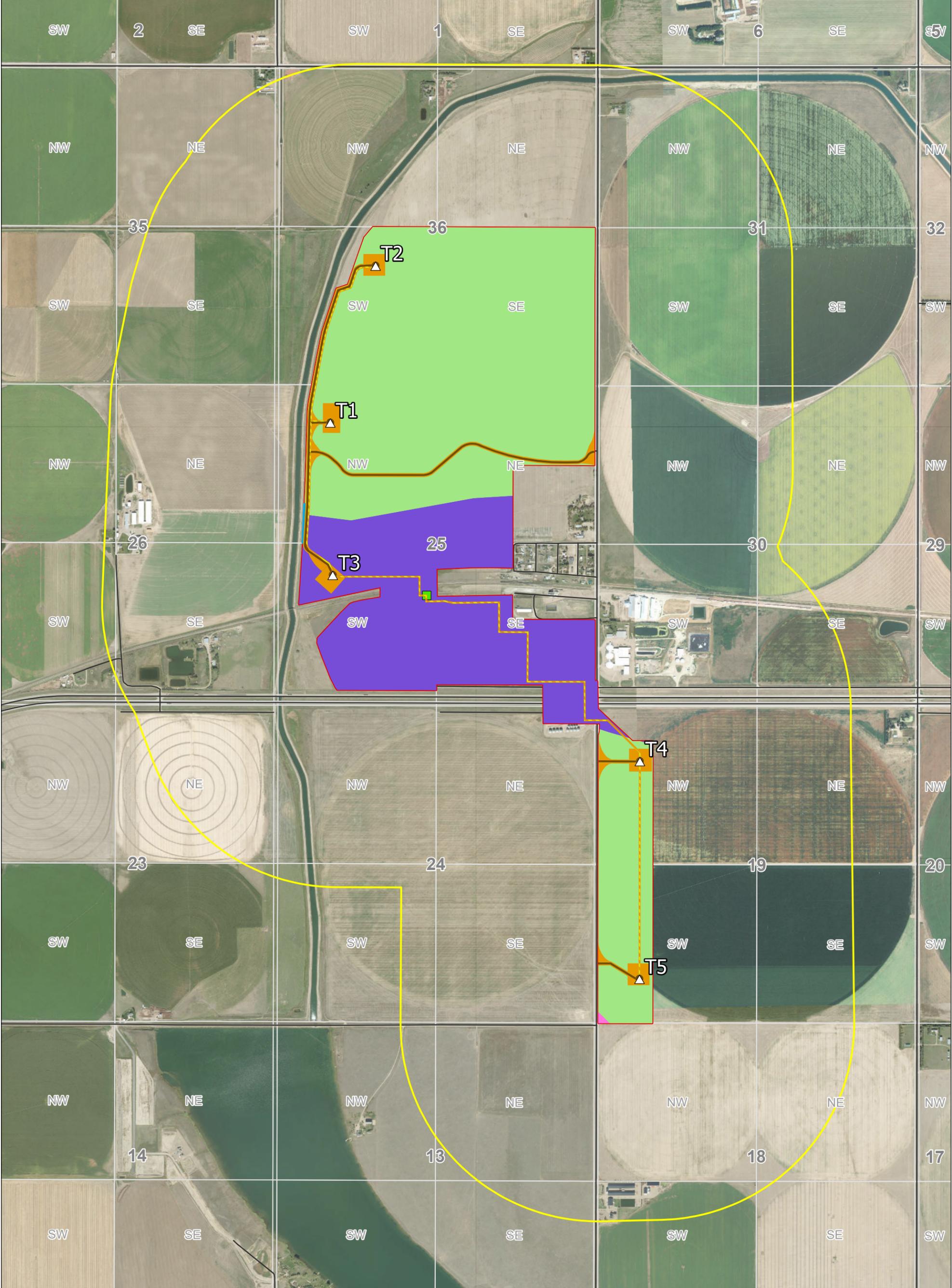
The PF overlaps with three Soil Map Units: CFCH1/U1hc, CFCH1/U1lc, and ZUN2/SC1I. One additional Soil Map Unit (MAMAs6/U1hc) is present in the PA, but does not overlap with the PF. The following three soil subgroups were identified within the PF: Orthic Brown Chernozem (O.BC), Orthic Humic Gleysol (O.HG), and Orthic Regosol (O.R). Four soil series were identified within the three soil map units: Chin (CHN), Cranford (CFD), Miscellaneous Gleysol (ZGW), and Miscellaneous Undifferentiated Mineral (ZUN; Figure 3; Table 6; Government of Alberta 2024b).

**Table 6. Soil Series within the Project Footprint and Erosion/Compaction Risk.**

Soil Map Unit Code	PF Area (ha)	PF Area (%)	Soil Series	Soil Subgroup	Parent Material	Calcareousness	Salinity	Drainage	Wind Erosion Risk	Water Erosion Risk <sup>1</sup>	Compaction and Rutting Risk
CFCH1/U1hc	14.5	77	Chin	Orthic Brown Chernozemic	Medium Glaciolacustrine	Moderate	None	Well	High	Moderate	Moderate to High
			Cranford	Orthic Brown Chernozemic	Medium Glaciolacustrine/Till	Moderate	None	Well	Moderate	Moderate	High
CFCH1/U1lc	4.3	23	Chin	Orthic Brown Chernozemic	Medium Glaciolacustrine	Moderate	None	Well	High	Moderate	Moderate to High
			Cranford	Orthic Brown Chernozemic	Medium Glaciolacustrine/Till	Moderate	None	Well	Moderate	Moderate	High
ZUN2/SC1I	0.1	<1	Miscellaneous Gleysol	Orthic Humic Gleysol	Undifferentiated Mineral	Not determined	Not determined	Poor	Low to Moderate	Moderate	Very High
			Miscellaneous Undifferentiated Mineral	Orthic Regosol	Undifferentiated Mineral	Not determined	Not determined	Well	Low	Moderate	Very High
<b>Total</b>	<b>18.8</b>	<b>100</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

<sup>1</sup> The water erosion risk for slopes of 9–15 percent (%) is presented here. The water erosion risk for slope <5% is rated as Low for all soil series soils.

ha = hectare; PF = Project Footprint.



Project Area	<b>Project Infrastructure</b>	McCain Switching Station	<b>Soil Mapping Units, Land Suitability Rating</b>
Study Area	Turbine		CFCH1/U1hc, LSR - 4M(10)
Quarter Section	Collector Line		CFCH1/U1lc, LSR - 4M(10)
Public Road	Temporary Footprint		MAMAs6/U1hc, LSR - 4M(8) - 6M(2)
	Permanent Footprint		ZUN2/SC1l, LSR - 4MT(8) - 4W(2)

**Figure 3. Soils within the Coaldale Wind Power Project near Chin, Alberta**



Data Source: World Imagery  
 Coordinate System: NAD 1983 UTM Zone 12N  
 Date: 9/3/2024 Author: J. Sholtz



Land Suitability Classification for Spring-seeded Small Grains

The Land Suitability Rating for spring-seeded small grains in the PF was extracted from Agricultural Regions of Alberta Soil Inventory Database Version 4.1, last updated May 28, 2024 (Government of Alberta 2024b). The interpretation of the classes and subclasses was extracted from *Land Suitability Rating System for Agricultural Crops: 1. Spring-seeded small grains* (Government of Canada 1995).

The PF is rated in three land suitability ratings: 4M, 4MT, and 4W (Table 7). The numbers represent Land Suitability classes, and the uppercase letters represent Subclasses. Land in Class 4 has severe limitations that restrict the growth of the specified crops or require special management practices or both (Government of Canada 1995).

Subclass M stands for Water Holding Capacity/Texture, indicating land where specified crops are adversely affected by lack of water due to inherent soil characteristics. Subclass T stands for Slope, indicating land with slopes steep enough to incur a risk of water erosion or to limit cultivation. Subclass W stands for Drainage, indicating soils in which excess water limits the production of specified crops; excess water may result from a high water table or inadequate soil drainage (Government of Canada 1995).

**Table 7. Land Suitability Rating for Agricultural Crops – Spring-seeded Small Grains.**

<b>Map Unit Name</b>	<b>Land Suitability Rating</b>	<b>Map Unit Area %</b>	<b>Project Footprint (ha)</b>
CFCH1/U1hc	4M	77	14.5
CFCH1/U1lc	4M	23	4.3
ZUN2/SC1l	4MT-4W	<1	0.1
<b>Total</b>			<b>18.8</b>

ha = hectare.

The Project will not negatively affect the inherent Available Water Holding Capacity (AWHC) of the soils nor does it adversely affect the climatic factors that contribute to the supply and retention of water in the soils. The water supplying ability, AWHC, evaluates the capacity of the soil to retain and supply water to plants for sustained growth and development. The amount of water available to plants is a function of climate (precipitation, temperature, wind) and soils. The climate factor is evaluated based on precipitation (P) minus potential evapotranspiration (PET). The soils factor is evaluated based on soil texture. Soils with high clay and silt contentment have higher AWHC than soils with coarser soil textures. The approximate AWHC of soils with loamy sand is 60 millimetre/metre (mm/m), fine sandy loam is 100 mm/m, loam is 150 mm/m, and with silt loam is 180 mm/m (Government of Canada 1995). The soil texture of Chin is fine sandy loam (zero to 13 centimeters [cm] and 65 to 120 cm) and silt loam (13 to 65 cm), the texture of Cranford is loam (zero to 30, 50 to 100 cm) and silt loam (30 to 50 cm). These soils are rated as moderate in AWHC (Government of Alberta 2024b).

## Soil Quality

### Compaction and Rutting

Compaction affects the soil's ability to support plant growth by restricting root penetration and elongation, as well as restricting air and water movement through the root zone. Topsoil and upper subsoils in the PF have moderate, high, and very high compaction textures. The percentage of coarse fragments within the soil profile is 10% or less for all the soil series (Government of Alberta 2024b), which make soils highly susceptible to rutting and compaction. Rutting causes compaction and mixing problems when vegetation clearing, soil salvage, construction and reclamation activities are conducted under saturated or moist soil conditions. The Compaction and Rutting risks were evaluated based on a compaction and puddling hazard key in B.C. Ministry of Forests (1999). The key uses the moisture regime, dominant soil texture, and coarse fragment content of the upper 30 cm of mineral soil to assess compaction hazards. The compaction and rutting risks associated with the soils identified in the PF are provided in Table 6.

### Salinity

Soil salinity is a measure of the minerals and salts that can be dissolved in water. Soil salinity is measured in electrical conductivity. No saline soils were found within the PF (Government of Alberta 2024b). The pre-disturbance soil assessment (PDSA) will determine if there are saline soils within the PF. If the PDSA identifies saline soils within the PF, the spatial extent will be properly delimited and soils from this area will be handled separately from other non-problem soils.

### Sodicity

Sodicity in soils results from the presence of a high proportion of sodium ions relative to other soluble cations, mainly calcium and magnesium. Soils are classified as sodic when the sodium adsorption ratio level equals or exceeds 13 (Alberta Agriculture, Food, and Rural Development 2010). Sodicity causes degradation of soil aggregate structure through the dispersion of clay and organic matter which plugs micropores resulting in a very hard cloddy mass that severely restricts root growth and the flow of air and water into and through the soil. Sodic soil also exhibits high pH (over 8.5) that reduces the availability of some macro and micro plant nutrients. Most sodic soils in Alberta are classified in the Solonetzic soil order (Alberta Agriculture, Food, and Rural Development 2010). Solonetzic soils have formed from parent materials containing abundant sodium salts or in areas where capillary rise of groundwater introduced sodium into the rooting zones (Alberta Agriculture, Food, and Rural Development 1993). Sodicity could also be resulted from the use of irrigation water with high levels of sodium salt. None of the soil subgroups within the PF were identified as Solonetzic.

### Fertility

Soil fertility is the ability of a soil to sustain plant growth by supplying essential plant nutrients and providing a favorable chemical, physical, and biological growing medium. The PDSA will collect baseline soil physical, chemical, and biological properties both in the field and by submitting soil samples to an accredited laboratory for the analyses of selected soil chemistry, plant nutrients and physical parameters. Project activities including soil handling, grading, trenching and

equipment traffic during construction, maintenance and decommissioning could impact soil fertility. The impacts on soil fertility of the different Project related activities are discussed under each activity below (see *Earthworks* section).

#### Contamination

A spill search on the Alberta Energy Regulator (AER) database was conducted on August 19, 2024. No oil and gas related spills were reported within PA as of August 19, 2024. A search on the AER *ST37: List of Wells in Alberta Monthly Updates* returned 10 oil and gas wells (some with multiple events) and some active gas pipelines within the PA and SA. Most of the wells are abandoned or suspended. The UWI 100/09-36-009-19W4/00 well, operated by Alphabow Energy Ltd. is the only well of “flowing gas” status (Dome GeoConsulting Inc. [DomeGeo] 2024; AER 2024).

A search of the Alberta Environmental Site Assessment Repository (Government of Alberta 2024f) returned the following items within the Project Area:

- Reclamation certificate No. 00323490-00-00 for Pengrowth Wellburn 6-25-009-19 WELL at NE-25-9-19-W4M and S-25-9-19-W4M. April 15, 2013.
- Approval to decommission a site for Clifton Associates Ltd. at SE-25-9-19-W4M. April 1, 2005.

#### Clubroot

Clubroot is a serious soil-borne disease of canola, mustard, and other crops in the cabbage family. Clubroot is caused by a microscopic, soil-borne plant pathogen called *Plasmodiophora brassicae* (Government of Alberta 2023b). Lethbridge County published a clubroot policy: *County of Lethbridge Policy Handbook: to Control the Spread of Clubroot* (Lethbridge County 2009). The Municipal District of Taber has not published a clubroot policy. No clubroot cases have been publicly reported in Lethbridge County or the Municipal District of Taber in 2023 (Government of Alberta 2023c).

#### Soil Quantity

##### Wind and Water Erosion

Disturbance during soil salvage, construction and reclamation activities could lead to the erosional loss of topsoil and subsoil both from disturbed sites and the soil stockpiles. The physical loss of topsoil due to erosion lowers topsoil thickness (rooting depth) and productivity by decreasing fertility in the rooting zone. The wind and water erosion risks for most of the soil series were extracted from Pedocan Land Evaluation Ltd. (1993). For soil series for which the risks were not evaluated in Pedocan, risk ratings were derived from soil texture of the topsoil based on Coote and Pettapiece (1989) for wind erosion and Tajek et al. (1985) for water erosion.

The wind erosion risk for the soil series identified within the PA is moderate to high for Orthic Brown Chernozemic, low to moderate for Orthic Humic Gleysol, and low for Orthic Regosol soil. Water erosion risk for all soils in the PA is rated as moderate (Table 6).

### Topography

The Study Area is in the Oldman River Watershed, Reach of Oldman River and Little Bow River to the confluence with the Bow River. The topography of the PA is gently rolling and undulating, approximately 845 to 855 metres above sea level (masl) sloping northward (DomeGeo 2024). The PF is expressed by three landform types, SC1h, U1hc and U1lc (Tables 6 and 7). The SC1h landform represents high relief topography of steep valleys with confined floodplains with steep sides of slope 9%. U1hc landform represents undulating high relief topography with slope class ranging from Class 2 (0.5–2.0%) to Class 3 (2.0–5.0%), and channeled (< 50 cm, rill, re-occur at the same position year after year). U1lc landform represents undulating low relief topography mainly in Class 2 (0.5–2.0%), and is also channeled (< 50 cm, rill, re-occur at the same position year after year [Government of Alberta 2024b]).

### Hydrology

A hydrological effects assessment for the Project was completed by DomeGeo (2024). Findings of the assessment are summarized below while the complete assessment is provided in Appendix B.

#### Surficial Hydrology

The monitoring well network includes wells screened in sandy and gravelly zones within the clay till matrix (DomeGeo 2024). Historic water level records indicate large seasonal fluctuations with undisturbed water levels ranging from 2.5 to 7.5 m below ground surface when the screened zones were saturated in April 2022, and several dry wells in May 2018 through 2021. Water levels observed in geotechnical wells reported by WSP Canada Inc. (WSP [2023b]) are consistent with the environmental monitoring observations reported by WSP (2023a).

Groundwater flow direction inferred from the most recent hydraulic head measurements reported by WSP (2023a) indicates that the water table generally mimics the topography, and the dominant horizontal gradient is sloping gently northward and westward. The apparent mounding around the storage pond in NW-25-009-19W4M is likely the result of some local seepage.

#### Groundwater

Based on the monitoring results from WSP (2023a), water quality in the surficial deposits is characteristically of sodium-sulphate type, with total dissolved solids (TDS) concentrations ranging from 4560 to 11,000 mg/L, slightly alkaline pH of 7.8 to 8.1, elevated nitrate and chloride levels (DomeGeo 2024). Groundwater with such elevated TDS concentration exceeds both the drinking water guidelines of 500 mg/L (Government of Canada 2024) and the base of groundwater protection in Alberta (AER 2007), and is deemed as saline by the Water Act (Government of Alberta 2000g).

In the bedrock aquifers, the Oldman Aquifer is also of sodium-sulphate type, with TDS ranging from 332 to 8,542 mg/L (DomeGeo 2024). The Foremost Aquifer has no dominant cation; it is either of sulphate type or bicarbonate type, with TDS ranging from 167 to 6302 mg/L (Hydrogeological Consultants Ltd. 2007).

### Aquifer Vulnerability

The Aquifer Vulnerability Index (AVI) ratings indicate qualitatively the potential of surficial materials to transmit water with contaminants to the aquifer over a period. The Study Area has a combined vulnerability ranking of “Medium sensitivity” to the potential impact of surface activities on shallow groundwater quality (Government of Alberta 2020c; Cartofact 2022).

Project effects to hydrogeology (i.e., groundwater) and the depth to groundwater are further discussed in the *Groundwater* section and in Appendix B.

### Earthworks

#### Stripping

Soil stripping could cause admixing of topsoil with upper and/or lower subsoils. Admixing topsoil with subsoil can degrade topsoil quality by reducing nutrient content and soil organic matter levels, inclusion of excess amount of calcium carbonate (CaCO<sub>3</sub>), saline or sodic material from below the surface. The decrease in topsoil quality is detrimental to the soil’s productive capability to support a vegetative cover. Unless mitigation measures are implemented, admixing of topsoil with subsoil may reduce the quality of salvaged topsoil and subsequently, land capability of the reclaimed site.

#### Grading

Grading could expose unsuitable lower subsoil or sodic parent material to the surface and if no proper erosion protection measures are applied, wind and water erosion would transport the unsuitable material and deposit it on productive topsoil and wetlands in the vicinity. Grading may alter topography, slope aspect and surficial hydrology, which may generate run off resulting in soil erosion and deposition. Grading activities can bring stones, exceeding natural conditions, to the ground surface, particularly in areas where a non-stony surficial deposit overlies a stony deposit that is within the depth of grading.

Geotechnical stratigraphy data from the geotechnical assessment and soil profile data from the PDSA will be used to determine soil handling and associated mitigation measures for areas that require grading.

The Project has been sited on mostly flat terrain; therefore, minimal site grading is expected. Localized grading, outside of wetlands and wetland setbacks, may be required for access roads and turbine pads. The areas expected to be graded will be confirmed through site inspections, topographical surveys, and engineering design.

As the PA is largely situated in cultivation (crop) that will be cut to a level that does not impede construction, and residues will be maintained to protect the soil. After construction, areas around turbines will be revegetated with cultivation or approved appropriate perennial seed mixes that require minimal maintenance and control. Methods for revegetation and co-located agricultural activities will be detailed in the Vegetation Stewardship Plan.

Additional information on earthworks can be found in the Initial C&R Plan (WEST 2024b).

### Co-locating Agricultural Activities

The Project will be co-located with irrigated and dryland crops. There is no expected impact to existing agricultural activities beyond the loss of arable land due to permanent Project infrastructure such as roads and turbine pads.

### Qualifications

Qualifications of the agrologist who prepared and reviewed the Soils and Terrain section are summarized in Appendix B.

### *Potential Effects*

Based on existing conditions for this EC, the Project may affect soils and terrain. Further details on these interactions are shown in Table 8.

**Table 8. Effect Pathways for Project Interactions with Soils and Terrain.**

<b>Potential Effect</b>	<b>Project Interaction</b>
Change in soil quality or quantity	<ul style="list-style-type: none"><li>• Loss of soil through wind and/or water erosion</li><li>• Soil compaction, admixing, or rutting</li><li>• Reduction in soil quality due to spills and/or leaks</li></ul>

### *Mitigation Measures*

To reduce or eliminate the effects of the Project on soils and terrain, several mitigation measures have been developed to align with regulatory requirements and BMPs. General mitigation measures will consist of the following:

- BMPs for soil handling, erosion and sediment control, and weed control will be followed.
- Soil stripping and disturbance will be limited to the extent possible.
- Soil will be salvaged where appropriate.
- Minimal disturbance construction techniques (e.g., ploughing in of collector lines) will be implemented, as appropriate.
- An erosion and sediment control plan will be prepared and implemented during soil handling, construction, decommissioning, and reclamation activities.
- Minimal surface disturbance techniques, such as constructing during dry or frozen conditions, low tire pressure equipment, tracked equipment, minimized fencing, and reduced road grades will be implemented, as appropriate.
- A spills and leaks protocol will be followed to prevent, minimize, and clean up any chemical spills or leaks that may cause contamination of soils.
- If the PDSA identifies areas with problem soils, such as Solonchic or saline soils, within the PF, the soil salvage and subsequent reclamation for these areas will be conducted separately from other areas with nonproblem soils.

- Soils stripped from the Miscellaneous Gleysol areas, if present, will be stockpiled separately from upland soils.
- Appropriate erosion and sediment control measures will be implemented to prevent the transport of saline soils from the disturbed site and soils stockpiles.

The mitigation measures for each of the potential Project interactions are further detailed in the EPP (WEST 2024a).

*Residual Effects*

The residual effects assessment is completed for each of the potential effects after mitigation has been implemented (Table 9). Based on the effects assessment, a determination of significance for residual effects is made for each of the potential Project interactions.

**Table 9. Residual Effects Assessment for Soils and Terrain.**

Potential Effect	Project Activity	Effects Assessment (post-mitigation)		Significance
		Criteria	Ranks	
Change in soil quality or quantity	Construction Decommissioning	Direction	Negative	Not significant
		Magnitude	Low	
		Spatial extent	PF	
		Duration	Long-term	
		Frequency	Once	
		Likelihood	High	
		Reversibility	Reversible	
	Operation	Direction	Neutral	Not significant
		Magnitude	Negligible	
		Spatial extent	PF	
Duration		Long-term		
	Frequency	Continuous		
	Likelihood	High		
	Reversibility	Reversible		

PF = Project Footprint.

The residual effects for soils, after mitigation has been implemented, are anticipated to be negligible and not significant during construction. Although soil disturbance is anticipated, it will be limited to the PF and is expected to occur only during grading, trenching, and construction of the turbines. Soil handling and storage practices, as outlined in the EPP, will reduce any localized effects to soil quality and quantity.

**Groundwater**

*Existing Conditions*

A groundwater assessment was completed by a third-party consultant, DomeGeo (Appendix B). The results from this report are summarized below. Seven groundwater wells are within the SA, there are no possibly active water wells used for domestic or stock purposes (DomeGeo 2024). Both the Hamlet of Chin and the McCain Plant receive potable water via pipeline from Lethbridge.

*Potential Effects*

Based on existing conditions for this EC, the Project has the potential to affect groundwater (Appendix B). Further details on these interactions are presented in Table 10.

**Table 10. Effect Pathways for Project Interactions with Groundwater.**

<b>Potential Effect</b>	<b>Project Interaction</b>
Change in the quantity and/or quality of groundwater	<ul style="list-style-type: none"><li>• Installation of turbine foundations</li><li>• Seepage of fluids on site</li><li>• Trenching of buried cables</li></ul>

Based on the potential interactions with groundwater, this EC was carried forward in the effects assessment.

*Mitigation Measures*

To reduce or eliminate the effects of the Project on groundwater, several mitigation measures have been developed to align with regulatory requirements and BMP. Generally, mitigation will consist of the following:

- A spills and leaks protocol will be followed to prevent, minimize, and clean up any chemical spills or leaks.
- Spill trays will be placed under parked vehicles to capture potential leaks.
- The type of cement to be chosen for foundation construction will be verified for compatibility with the salinity of the ambient soils and groundwater

The mitigation measures for each of the potential Project interactions are further detailed in the EPP (WEST 2024a).

*Residual Effects*

The residual effects assessment was completed for potential effects after mitigation has been implemented. Based on the effects assessment, a determination of significance for residual effects is made for each of the potential Project interactions (Table 11).

**Table 11. Residual Effects Assessment for Groundwater.**

Potential Effects	Project Activity	Effects Assessment (post-mitigation)		Significance
		Criteria	Ranks	
Change in the quantity or quality of groundwater	Construction Operation Decommissioning	Direction	Neutral	Not significant
		Magnitude	Negligible	
		Spatial extent	PF	
		Duration	Medium	
		Frequency	Occasional	
		Likelihood	Low	
		Reversibility	Reversible	

PF = Project Footprint.

The residual effects for groundwater, after mitigation has been implemented, are anticipated to not be significant. There are seven water wells within the PA, none of which are active water wells used for domestic or stock purposes. As shallow soils and groundwater are saline and nonpotable. Thus, groundwater quality and quantity are unlikely to be affected by Project activities. A more detailed discussion of effects to groundwater can be found in Appendix B.

### Vegetation Species and Communities

#### Existing Conditions

Existing conditions for vegetation species and communities were determined through a desktop review of the Alberta Conservation Information Management System (Government of Alberta 2024c). No records of listed plants or plant communities were found within one km of the Project boundary, and the PA is not located in the AEPA provincial layer for endangered and threatened plants ranges (Government of Alberta 2024d). The Project is not sited on native grassland. The existing conditions for landcover are addressed under AEPA Regulated Ecosystem Components section.

During field surveys in 2024, two weed species designated as Noxious under Alberta’s *Weed Control Regulation* (Government of Alberta 2016) were identified at the Project: creeping thistle (*Cirsium arvense*) and field bindweed (*Convolvulus arvensis*).

#### Potential Effects

Based on existing conditions for this EC, the Project may affect vegetation species and communities. Further details on these interactions are included below (Table 12).

**Table 12. Potential Effects and Project Interactions with Vegetation Species and Communities.**

Potential Effect	Project Interaction
Change in vegetation species and/or community	<ul style="list-style-type: none"> <li>• Introduction or proliferation of weed species</li> <li>• Loss of listed plant species or communities</li> </ul>

Based on the potential interactions with vegetation species and communities, this EC was carried forward in the effects assessment.

*Mitigation Measures*

To reduce or eliminate the effects of the Projects on vegetation species and communities, several mitigation measures have been developed to align with regulatory requirements and BMP. Generally, mitigation will consist of the following:

- The *Conservation and Reclamation Directive for Renewable Energy Operations* (Government of Alberta 2018b) will be followed.
- BMPs for weed management and vegetation clearing will be followed.
- Temporarily disturbed areas will be revegetated with a weed-free seed mix that won't interfere with crop production.
- Revegetation will occur as soon as practicable.

The mitigation measures for each of the potential Project interactions are further detailed in the EPP (WEST 2024a).

*Residual Effects*

The effects assessment is completed for each of the potential effects after mitigation has been implemented. Based on the effects assessment, a determination of significance for residual effects is made for each of the potential Project interactions (Table 13).

**Table 13. Effects Assessment for Vegetation Species and Communities.**

Potential Effects	Project Activity	Effects Assessment (post-mitigation)		Significance
		Criteria	Ranks	
Change in vegetation species and/or community	Operation	Direction	Neutral	Not significant
		Magnitude	Negligible	
		Spatial extent	PF	
		Duration	Long-term	
		Frequency	Continuous	
		Likelihood	Moderate	
		Reversibility	Reversible	

PF = Project Footprint.

The residual effects for vegetation species and communities, after mitigation has been implemented, are anticipated to be negligible and not significant. Although disturbance to existing vegetation is anticipated, 81% of the PF is sited on cultivation which does not contain natural vegetation species or communities. Environmental practices for vegetation removal and limiting introduction or spread of weeds, as outlined in the EPP, will reduce any localized effects to vegetation species and communities.

## **MONITORING**

Monitoring will occur throughout construction and during the operation phase. On-site environmental monitoring for construction will be completed throughout the construction phase. The intent of this monitoring will be to verify implementation of the EPP and to monitor for any impacts to the ECs.

As per the *Post-construction Survey Protocols for Wind and Solar Energy Projects* (Government of Alberta 2020b) and *Rule 033: Post-approval Monitoring Requirements for Wind and Solar Power Plants* (AUC 2019), wildlife fatality monitoring will be completed for three years post-construction. The intent of this monitoring will be to verify that wildlife fatality numbers do not exceed acceptable levels as determined by AEPA.

Additionally, as per the *Conservation and Reclamation Directive for Renewable Energy Operations*, Pre-disturbance Site Assessments will be completed pre-construction and Interim Monitoring Site Assessments will be completed post-construction (Government of Alberta 2018b). The intent of this monitoring is to confirm that the land can be returned to an equivalent land capacity after decommissioning.

## **SUMMARY AND CONCLUSIONS**

Of the ECs listed in WP15 of *Rule 007*, three were selected based on desktop review and field surveys that could potentially be impacted by the Project: soils and terrain, groundwater, and vegetation species and communities. Three ECs were not selected due to no anticipated potential effects. Two ECs were previously assessed in the RESR and then reviewed by AEPA and summarized above: wildlife species and habitat, and surface waterbodies and hydrology. AEPA assessed the risk to waterbodies and hydrology as Not Applicable, as well as assessed the risk to wildlife and wildlife habitat as Moderate. Mitigation measures to address these ECs were discussed above and are further detailed in the EPP. An assessment of potential effects from the Project on each of the selected ECs was undertaken. For each of the ECs assessed, no significant residual effects are anticipated with implementation of mitigation measures discussed in the EE and further detailed in the EPP.

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## **Appendix A. Qualifications**

**Mark Conboy, Associate Biologist, Field Coordinator, B.A., M.Sc.**

Mark Conboy is a Field Coordinator, Project Manager, and Wildlife Biologist in WEST's Calgary, Alberta office. He has 15 years of experience as a wildlife biologist across environmental consulting, academia, and non-governmental organizations, having worked on over 30 renewable energy projects. Mark manages projects, supervises field staff, coordinates field programs, and conducts wildlife surveys across western Canada. Mark holds a Bachelor of Arts from Lakehead University and a Master of Science in Biology from Queen's University.

**Michael Sveen, Project Manager and Senior Wildlife Biologist, B.Sc., BA, P. Biol., RPBio**

Michael Sveen is a Senior Wildlife Biologist and Project Manager for WEST's Calgary, Alberta office. Based in Saskatoon, Saskatchewan, Michael manages renewable energy projects. He is a professional biologist (P. Biol., RPBio) with 14 years of experience in wildlife ecology and holds a Bachelor of Science in Zoology (Honours). Michael has worked on 43 solar power projects (6,400 MW) and 35 wind power projects (5,200 MW), predominantly in Alberta, but also in other provinces and the United States (U.S.). As a Senior Wildlife Biologist, he was the lead author and senior reviewer on complex environmental assessment reports and conducted specialized data analysis for terrestrial biology assessments and monitoring. In Alberta, he has authored numerous renewable energy submission reports and environmental evaluations for wind and solar projects. In Saskatchewan Michael was also the lead author of the first Technical Proposal for a solar project. Michael has provided AUC hearing support for multiple wind and solar projects and was an Expert Witness for wildlife for the Dolcy Solar + Energy Storage Project as well as the Wild Rose 2 Wind Power Project. He is very familiar working with various environmental agencies including Alberta Environment and Protected Areas, the Alberta Utilities Commission, and the Saskatchewan Ministry of the Environment.

**Janet Bauman, Senior Ecologist and Project Manager, B.Sc., P. Biol., RPBio**

Ms. Bauman is a Senior Biologist with Western EcoSystems Technology, ULC and a Professional Biologist (P.Biol.) in good standing with the Alberta Society of Professional Biologists (ASPB) since 2005. She has over 29 years of environmental consulting experience in Canada and has sat on the ASPB Registration Committee in several capacities since 2005, from member to committee chair. She then became Registrar in 2016 and is currently Deputy Registrar. Ms. Bauman has a diploma in Conservation and Reclamation as well as Fish and Wildlife from Lakeland College in addition to a Bachelor of Science (B.Sc.) in Wildlife and Rangeland Resources Management from the University of Alberta. This education included the principles and practices of rangeland management, such as conservation and sustainability. In addition to her formal education, Ms. Bauman also completed the Stockmen's Range Management Course and Alberta 2010 Reclamation Criteria training.

Ms. Bauman has a diverse background in environmental consulting spanning renewable energy, infrastructure, oil and gas, forestry, government, and conservation. Ms. Bauman was an Assistant Range Rider for a township of land spanning Kananaskis Country and Bow Crow Forest Reserve in the Rocky Mountains where she managed cattle and grazing resources for five summers. She has also worked at Alberta Environmental Protection where she was an Assistant Reclamation Inspector, reviewing conservation and reclamation plans, and inspecting reclaimed sites, pipelines, gravel pits and quarries throughout southern Alberta and at Ducks Unlimited Canada where she was a resource technician, completing range inventory and condition class rating surveys and range management plans. Ms. Bauman has provided Expert Testimony in hearings for the Alberta Utilities Commission as well as for joint review panels under the Alberta Energy Regulator with respect to vegetation, soils, and wetlands. Throughout her work experience, Ms. Bauman has completed range assessment and management, weed surveys and management, reclamation planning and reseeding on agricultural lands (native grassland, forages, tame pastures), conservation and reclamation planning for pipelines and aggregate pits, vegetation inventories and mapping, soils classification, vegetation health assessments and environmental impact assessments. Ms. Bauman has senior reviewed multiple Environmental Evaluations, Environmental Protection Plans, Conservation and Reclamation Plans, and has worked in consultation with landowners and solar developers to develop Agrivoltaics Plans for renewable energy projects.

**Ali El-Naggar, Soil Scientist, Ph.D.**

Dr. Ali El-Naggar is a Soil Scientist working remotely in Edmonton, Canada. He boasts around 15 years of expertise spanning soil reclamation, conservation, surveying, classification, quality assessment, land use, environmental remediation, and sustainable management. With a background encompassing academia, industry, and consultancy, Ali is familiar with project planning and execution, research and development, stakeholder relations, and program/policy implementation, ensuring regulatory compliance and environmental stewardship. Ali holds bachelor's and master's degrees in Soil Science from Ain Shams University. He earned his doctoral degree in Natural Resources and Environmental Science from Kangwon National University. He was a postdoctoral researcher at the University of Alberta and was involved in various soil projects in Alberta and Saskatchewan.

## **Appendix B. Hydrogeological Effects Assessment**

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# MEMORANDUM

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**CLIENT:** COALDALE RENEWABLES GP INC. C/O WESTERN ECOSYSTEMS TECHNOLOGY, INC..

**ATTN:** MICHAEL SVEEN, B.SC., BA, P.BIOL., RP BIO  
SENIOR WILDLIFE BIOLOGIST

**DATE:** 2024-08-28

**SUBJECT** HYDROGEOLOGICAL EFFECTS ASSESSMENT – COALDALE WIND POWER PROJECT

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## INTRODUCTION

Dome GeoConsulting Inc. (DomeGeo) was retained to conduct a hydrogeological effects assessment for the Coaldale Wind Power Project (Project), a wind energy generating facility comprised of 5 wind energy turbines, with a total capacity of 35 MW. The Project was initiated by McCain Foods for its Coaldale Processing Plant in partnership with Coaldale Renewables GP Inc. (Coaldale), a subsidiary of Elemental Energy Renewables Inc.

The purpose of this technical memorandum is to assess the potential hydrogeological effects from the wind turbine component of the Project, and to recommend mitigation measures, per Section 4.4.2 / SP15 “*Environmental Information*” of Rule 007 (AUC, 2024) to reduce any potential residual effects to groundwater as one of the Ecosystem Components.

This assessment of hydrogeological effects is based on a desktop review of public domain information for the Project Area, the surrounding 1 kilometer (km) wide buffer zone (Study Area), and DomeGeo’s practical experience with physical and contaminant hydrogeological aspects of near-surface construction projects in Alberta.

## BACKGROUND

The Project Area straddles across the County of Lethbridge and the Municipal District of Taber. The Project area is approximately 25 km east of Lethbridge, surrounding the hamlet of Chin along Hwy 3 (Crownsnest Highway; **Figure 1**). It is located within parts of Sections 25 and 36-009-25W4M, northern part of LSD 16-24-009-19W4M, and western quarter of Section 19-009-18W4.

Land Use is zoned Rural General with agricultural operations within and around the Project Area. The Project Area is adjacent to and east of an irrigation canal and north of Stafford Reservoir.

Project Infrastructure will include (**Figure 2**):

- The wind turbines labelled as T1 through T5 will be built on the following locations:
  - T1 in 13-25-009-19W4M
  - T2 in 06-36-009-19W4M
  - T3 in 05-25-009-19W4M
  - T4 in 13-19-009-18W4M
  - T5 in 04-19-009-18W4M
- Each turbine will be accessed using temporary and permanent access roads built from Range Road 190. T1, T2 and T3 will have a shared access road on the west side of Range Road 190, while T4 and T5 will have dedicated access roads on the east side of the same range road.



- Temporary truck turns and crane pads will be built for each turbine location. The crane pads will be approximately 1.2 to 1.3 hectares.
- Each turbine will be built on gravity spread concrete slab foundations of 20 to 25 m diameter and 2.1 to 2.7 m depth
- The operational disturbance area of each turbine will be a 40 m diameter circular area.
- McCain Foods is building a switchgear in 06-25-009-19W4M adjacent to the plant site.
- The turbines will be connected to the switchgear via buried collector lines.

#### Construction and Ground Disturbance:

**For the wind turbines** the final foundation design will determine the exact depth and lateral extent of excavation. Based on preliminary design recommendations by WSP (2023), the anticipated maximum excavation depth would be approximately 1.6 m below current grade and 2.6 m below final grade, in a circular area of up to 25 m radius. The frost penetration depth is estimated at 2 m (WSP, 2023). The electrical and fibre optic cables will be installed within or below the frost penetration zone; this has yet to be determined.

The permanent roads will be built on stripped subsoil using 50 to 220 mm thick road crush gravel fill.

#### **EXISTING CONDITIONS**

The Project Area is in the Eastern Alberta Plains physiographic region, within the Oldman River Watershed, in the Reach of Oldman River / Little Bow River to the confluence with the Bow River region (Alberta Government, 2019).

##### *CLIMATE:*

The climate in the watershed is typically semi-arid (Köppen climate class BSk), with the Project Area in the Mixed Grass Natural Ecoregion (Strong and Legatt, 1981).

Annual temperature and precipitation ranges and averages are shown in **Figure 3** based on records between 1990 and 2023 from the Alberta Climate Information Service. The annual precipitation for the past 33 years ranged from 163 mm to 573 mm, with a 33-year average of 347 mm, and a noticeable decline in total precipitation after 2005.

There are no published potential evapotranspiration rate estimates for the Study Area, only monthly averages for the Oldman River Subbasin (AMEC, 2009) at the Lethbridge station. According to the AMEC (2009) report the annualized mean evapotranspiration rate is approximately 420 mm/year, which slightly exceeds the mean annual precipitation rate, leading to a negative water balance. The hydrogeological significance of these observations is in the temporary reduction of aquifer recharge potential. Note the large variation in annual precipitation values, and peak dry periods anticipated for the May – August periods.

Further detailed climate and weather information about the Coaldale – Chin area can be found at <https://weatherspark.com/y/2557/Average-Weather-in-Coaldale-Alberta-Canada-Year-Round> .

##### *TOPOGRAPHY:*

The Study Area is in the Oldman River Watershed, Reach of Oldman River / Little Bow River to the confluence with the Bow River.



The topography of the Project Area is gently rolling and undulating, of approximately 845 to 855 metres above sea level (masl) sloping northward (**Figure 1**, NTS 82H digital elevation model by AltaLis).

#### *GEOLOGY:*

**Soils:** most of the Project area is covered by Orthic Brown Chernozemic soils of undulating low relief, consisting of medium textured loam, silt loam and very fine sandy loam of approximately 0.2 to 0.3 m thickness (AGRASID).

**Surficial deposits (Figure 4;** Fenton et al., 2013; Shetsen, 1987; and HCL, 2007): The part of Project Area in sections 25 and 36-009-19W4M and the surrounding Study Area is underlain by Pleistocene age Glaciolacustrine Deposits, consisting of fine- grained sand, silt and clay. Section 19-009-18W4M and most of the surrounding Study Area is underlain by Pleistocene age moraine till (a mixture of unsorted sand, silt and clay, with traces of cobbles and pebbles). The total thickness of surficial deposits in the Project Area can reach 15 m, based on borehole logs by WSP (2023) and 25 m or more according to HCL (2007).

Geologic logs of the monitoring well network and a test hole (GIC ID 106251) in the Project Area indicate abundant clay with variable amounts of silt, sand and gravel lenses in the 0.3 to ~26 m depth beneath ground surface.

**Bedrock (Figure 5;** Prior et al, 2013 and HCL, 2007):

According to HCL (2007)'s water well log interpretation, the shallowest bedrock unit is the **Oldman Formation** within the Study Area, which is a member of the Belly River Group of Upper Cretaceous age. The Oldman Formation consists of fine- to coarse-grained sandstone with lenticular muddy siltstone and mudstone deposited in a nonmarine facies.

The Oldman Formation is underlain by the **Foremost Formation**, the oldest member of the Belly River Group of Upper Cretaceous age. It consists of sandstone, siltstone, mudstone; coal seams near the top of the formation, and it was deposited in a marginal marine to nonmarine facies.

- According to the provincial scale regional map of Prior et al. (2013), the Oldman Formation is not present in the Study Area. The discrepancy with HCL is likely due to scale difference in observations and interpretation based on third party logs.

The Foremost Formation is underlain by the **Lea Park (Pakowki) Formation** consisting of silty shale deposited in a marine environment during the Upper Cretaceous.

#### *GROUNDWATER:*

Groundwater distribution and quality information within the Study Area is limited to proprietary technical reports prepared for McCain (WSP, 2023a and WSP, 2023b), extrapolation from HCL's (2007) regional study for the MD of Taber, and the regional hydrogeological map of Tokarsky (1974).

The monitoring well network includes wells screened in sandy and gravelly zones within the clay till matrix. Historic water level records indicate large seasonal fluctuations with undisturbed water levels ranging from 2.5 to 7.5 m below ground surface when the screened zones were saturated in April 2022, and several dry wells in the month of May in 2018 through 2021. Water levels observed in geotechnical wells reported in WSP (2023b) are consistent with the environmental monitoring observations reported in WSP (2023a).



Groundwater flow direction inferred from the most recent hydraulic head measurements reported by WSP (2023a) indicates that the water table generally mimics the topography, and the dominant horizontal gradient is sloping gently northward and westward (**Figure 6**). The apparent mounding around the storage pond in NW-25-009-19W4M is likely the result of some local seepage.

#### *GROUNDWATER QUALITY*

Based on the monitoring results of WSP (2023a), water quality in the surficial deposits is characteristic of sodium-sulphate type, with total dissolved solids (TDS) concentrations ranging from 4560 to 11,000 mg/L, slightly alkaline pH of 7.8 to 8.1, elevated nitrate and chloride levels. Groundwater with such elevated TDS concentration is exceeding both the drinking water guidelines of 500 mg/L (CDWQ, 2024) and the base of groundwater protection in Alberta (AER, 2007), and is deemed “saline” by the Water Act (AB-Gov, 2024).

In the bedrock aquifers, the Oldman Aquifer is also of sodium-sulphate type, with TDS ranging from 332 to 8,542 mg/L. The Foremost Aquifer has no dominant cation; it is either of sulphate type or bicarbonate type, with TDS ranging from 167 to 6302 mg/L (HCL, 2007).

#### *GROUNDWATER USE - WATER WELL USERS*

Water well records found in the Alberta Groundwater Information Center (GIC) database within the investigation area are shown in **Figure 7** and summarised in **Appendix A**. Of the seven well records retrieved from the GIC database, within the Study Area there are no possibly active water wells used for domestic or stock purposes. Both the Hamlet of Chin and the McCain Plant receive potable water via pipeline from Lethbridge.

#### *AQUIFER VULNERABILITY:*

The Aquifer Vulnerability Index (AVI) ratings indicate qualitatively the potential of surficial materials to transmit water with contaminants to the aquifer over a period. The Study Area has a combined vulnerability ranking of “*Medium sensitivity*” to the potential impact of surface activities on shallow groundwater quality (**Figure 8**; Alberta Agriculture and Forestry, 2020; Cartofact, 2022).

#### *OILFIELD CONDITIONS*

There are 10 oil and gas wells (some with multiple events) and some active gas pipelines within the Project Area and Study Area. Most wells are abandoned or suspended. Well with UWI 100/09-36-009-19W4/00 operated by Alphasow Energy Ltd. is the only well of “flowing gas” status.

There are pipelines owned by Alphasow Energy Ltd. and CNRL (**Figure 9**) within 200 m from the proposed wind turbine sites. The proposed wind turbine access roads would be crossing these pipelines. This would require crossing agreements with the owners and logistical planning for crossing the roads with heavy loads and cranes.



## POTENTIAL EFFECTS – CONSIDERATIONS

The potential effects to groundwater quality and quantity that may result from construction activity and operation of the wind turbines near the surface and shallow subsurface was evaluated. Groundwater vulnerability to contamination is governed by the properties of the soils, hydraulic loading of contaminants, properties of the contaminants, and construction/operation practices. Areas where the surficial sediments consist mainly of sand are more vulnerable to contamination than areas covered by silty clay till owing to the higher hydraulic conductivity of the sandy soils.

Receptors considered include water well users and the irrigation system surrounding the Project Area.

Groundwater quality: aquifers with TDS less than 4,000 mg/L are to be protected per the *Water Act*.

*The following are potentially adverse effects of the environment on the Project infrastructure:*

- If an aquifer was present within the maximum depth range of trenching and foundation excavation, and the hydraulic head of the aquifer was near the ground elevation, then water could be released into an open excavation, the aquifer may be partially drained, and pathways could be opened for contaminant migration.
- The fluctuating water table elevation in the surficial deposits may cause buoyancy and to some extent liquefaction of unconsolidated soils. This effect has geotechnical foundation stability implications – to be addressed as part of detailed design.
- If the water table is deeper than the maximum depth of excavation, then aquifer drainage would be ruled out.
- Naturally high soil salinity or local residual salt contamination in the shallow subsurface could cause corrosion of steel piles or reinforced concrete foundation. The salinity and elevated chloride concentrations in groundwater could have corrosive effects on foundation materials.

## MITIGATION MEASURES

Fueling, lubrication and any fluid handling activities during construction to be done using spill and leak prevention methods. E.g., parked equipment to use spill trays to capture potential engine leaks.

The Environmental Protection Plan (EPP) provides measures for handling and storage of soluble solids or liquids within the Project Area that may become a source of contamination during the life of the Project.

The type of cement to be chosen for foundation construction must be verified for compatibility with the salinity of the ambient soils and groundwater.



## EFFECTS ASSESSMENT

A summary of effects assessment and the significance of residual effects regarding interactions with groundwater within the Project Area is presented in **Table 1**:

Potential Effect	Direction	Magnitude	Spatial Extent	Duration	Frequency	Likelihood	Reversibility	Significance
Change to groundwater quality or quantity	Neutral	Negligible	Project Footprint	Long-term	Occasional	Unlikely	Reversible	Not significant
<b>Assumptions and rationale:</b> <ul style="list-style-type: none"><li>• The anticipated maximum depth of foundation and trench excavation will be up to 2.5 m depth; the water table could be intercepted at such depths, and locally saturated sand and gravel aquifer bodies (perched water table) may be encountered.</li><li>• Saturated shallow soils may have low shear strength and competency and be prone to frost heave during the winter. This may have an impact on the stability of structures, but not on water quality or quantity.</li><li>• Shallow soils and groundwater are saline and potentially corrosive.</li><li>• Seepage of hazardous leachable solids or liquids from ground surface to domestic use aquifer is largely dependent on source volumes, duration of release, media permeability and preferential pathways. As the Project is not expected to be used for storage of soluble solids or large volumes of liquids, the source is practically eliminated.</li><li>• There are no known receptors/water wells within the Study Area, and the shallow groundwater is not potable. Thus the hydrogeological effects are negligible, and significance is low.</li></ul>								

**Table 1:** Assessment of Potential Hydrogeological Effects

## CONCLUSION

Based on the proposed construction and operation plans of the Project and the hydrogeological characteristics of the Project Area, the hydrogeological effects are anticipated to be neutral to negligible and not significant.



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## CLOSURE

Dome GeoConsulting Inc. provided this report for the sole benefit of Coaldale Renewables GP Inc. The information presented in this document was compiled and interpreted exclusively for the purposes stated in the document.

The information contained in this report is based upon, and limited by, the circumstances and conditions acknowledged herein, and upon information available at the time of its preparation. Dome GeoConsulting Inc. has exercised reasonable skill, care, and diligence to assess the information acquired during the preparation of this report but makes no guarantees or warranties as to the accuracy or completeness of this information. The information provided by others is believed to be accurate but cannot be guaranteed.

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Any questions concerning the information or its interpretation should be directed to Dr. István Almási.

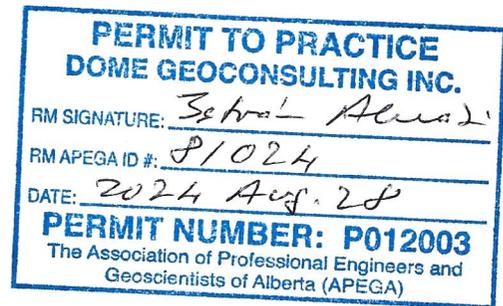
### Report prepared and submitted by:



2024 Aug. 28

Dr. István Almási, P.Geol.

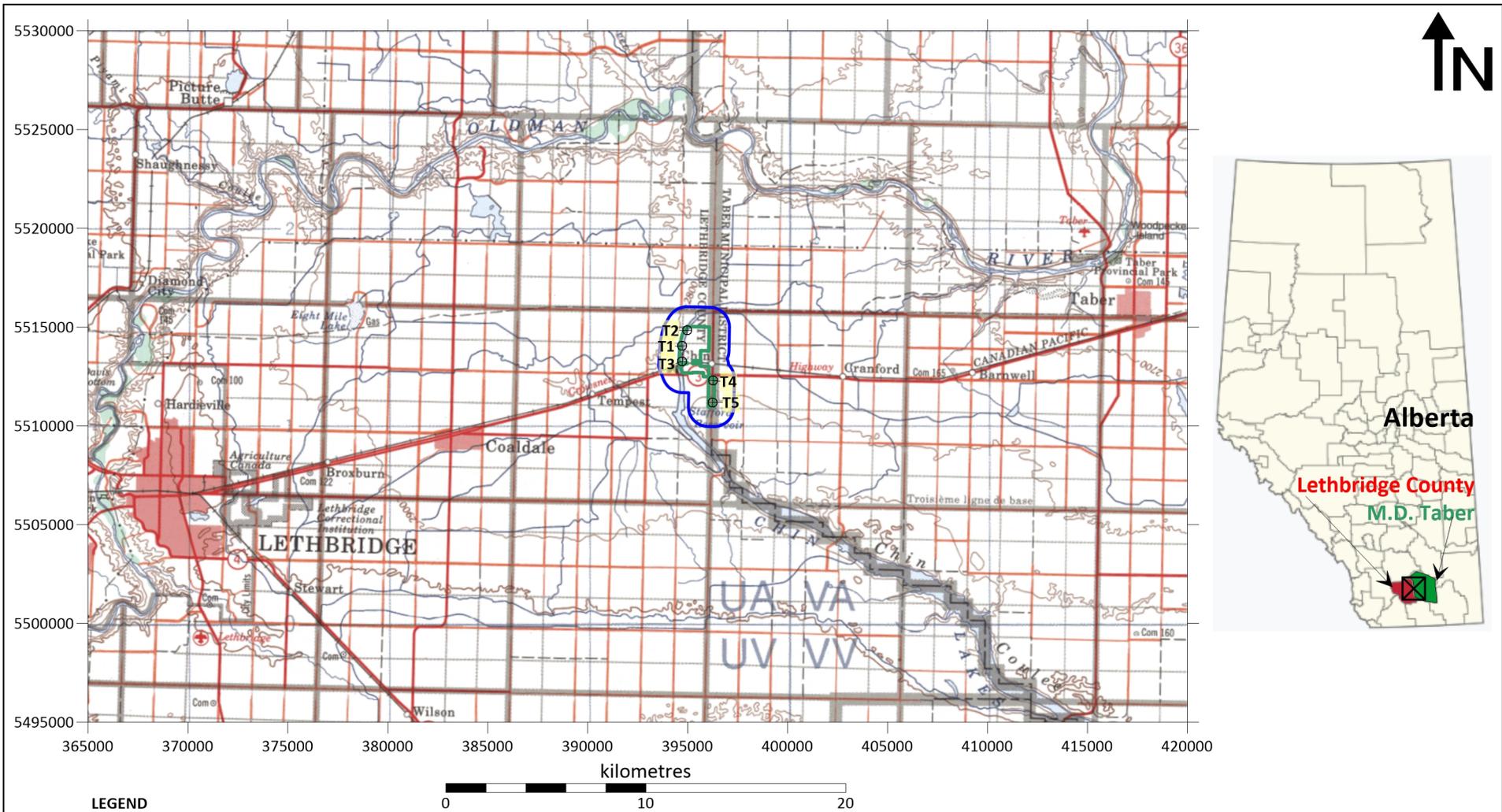
APEGA ID 81024  
Principal Hydrogeologist



**Dome GeoConsulting Inc.**  
APEGA Permit Number P 12003



## FIGURES



**LEGEND**

- Project Area
- Study Area
- ⊕ Wind Turbine (T1 to T5)

**Dome**  
GeoConsulting Inc.

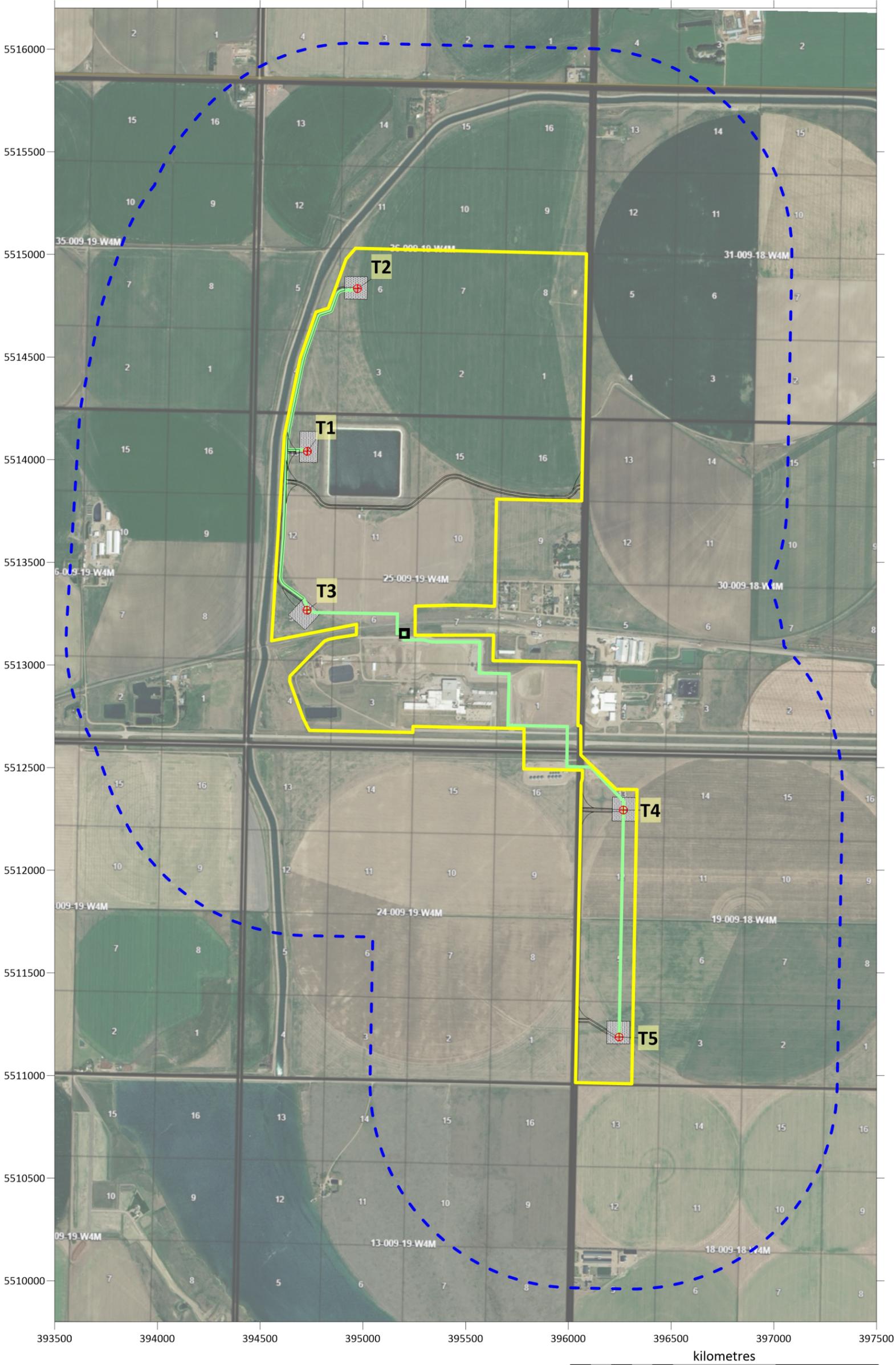
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Check: MS | Approved: MS  
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1:300,000

**NOTES:**  
1. Basemap source: ETopo NTS82H  
2. Layout: Elemental Energy (v. 2024-08-22)

**C/O WESTERN ECOSYSTEMS TECHNOLOGY, ULC**

**COALDALE WIND POWER PROJECT**  
Hydrogeological Effects Assessment  
Project Area - Location and Topography **Fig 1**



**LEGEND**

- Project Area
- Study Area
- Crane Disturbance Areas
- Access Roads
- Switchgear
- Collector Lines
- + Wind Turbine (T1 to T5)

Projection:  
 - UTM Nad83 Zone 12  
 - units: metres  
 Scale: as shown

**NOTES:**  
 1. Infrastructure features provided by Elemental Energy  
 2. Basemap by Cartofact, Satellite imagery 2022

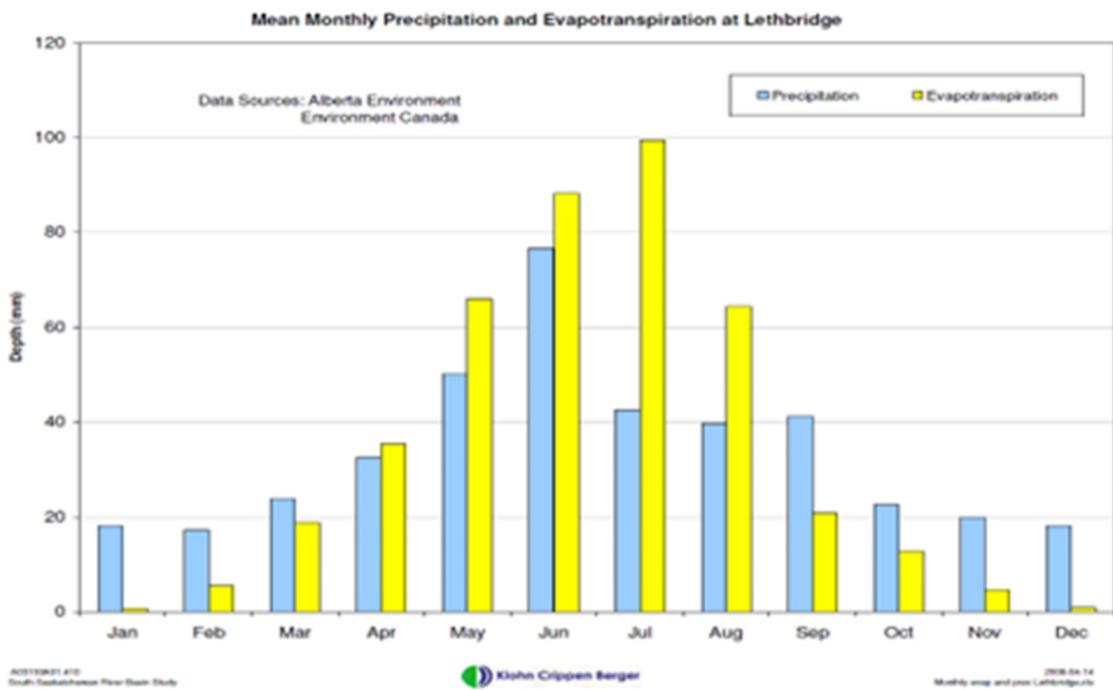
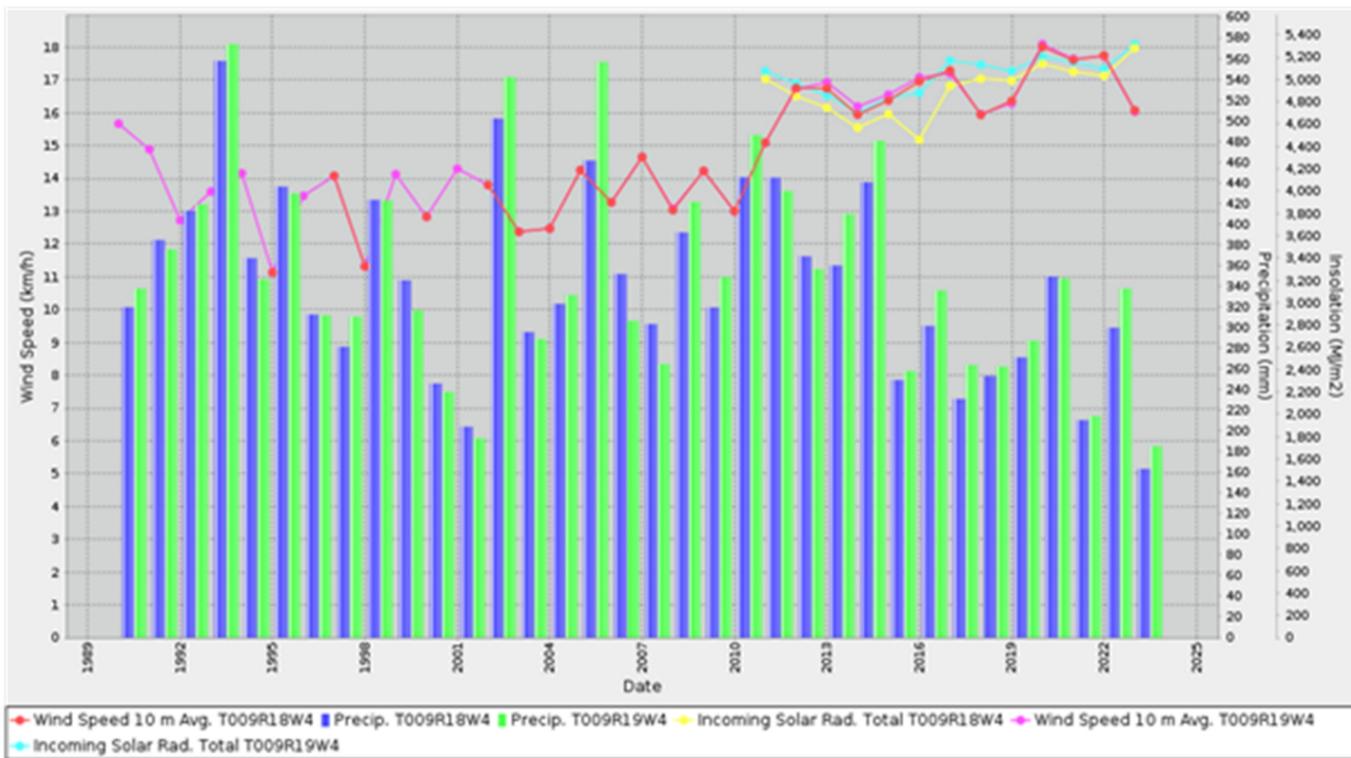
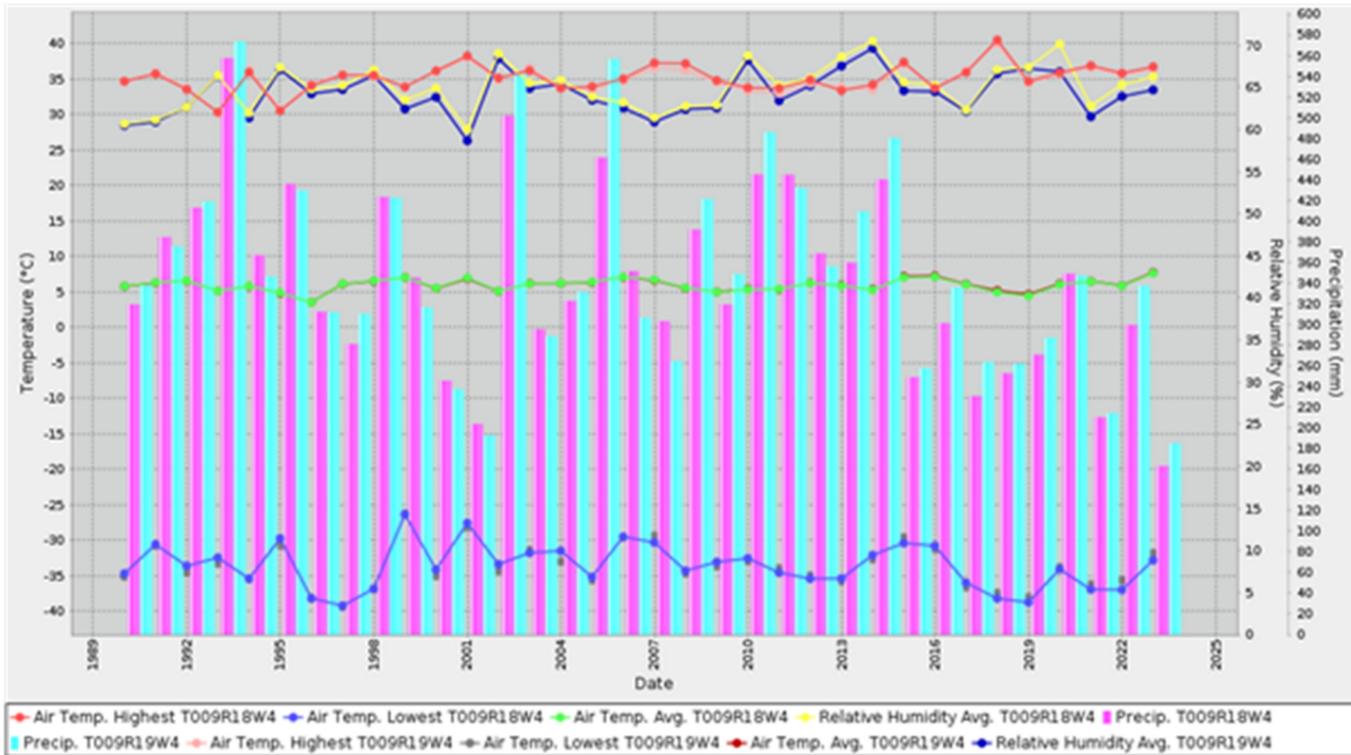


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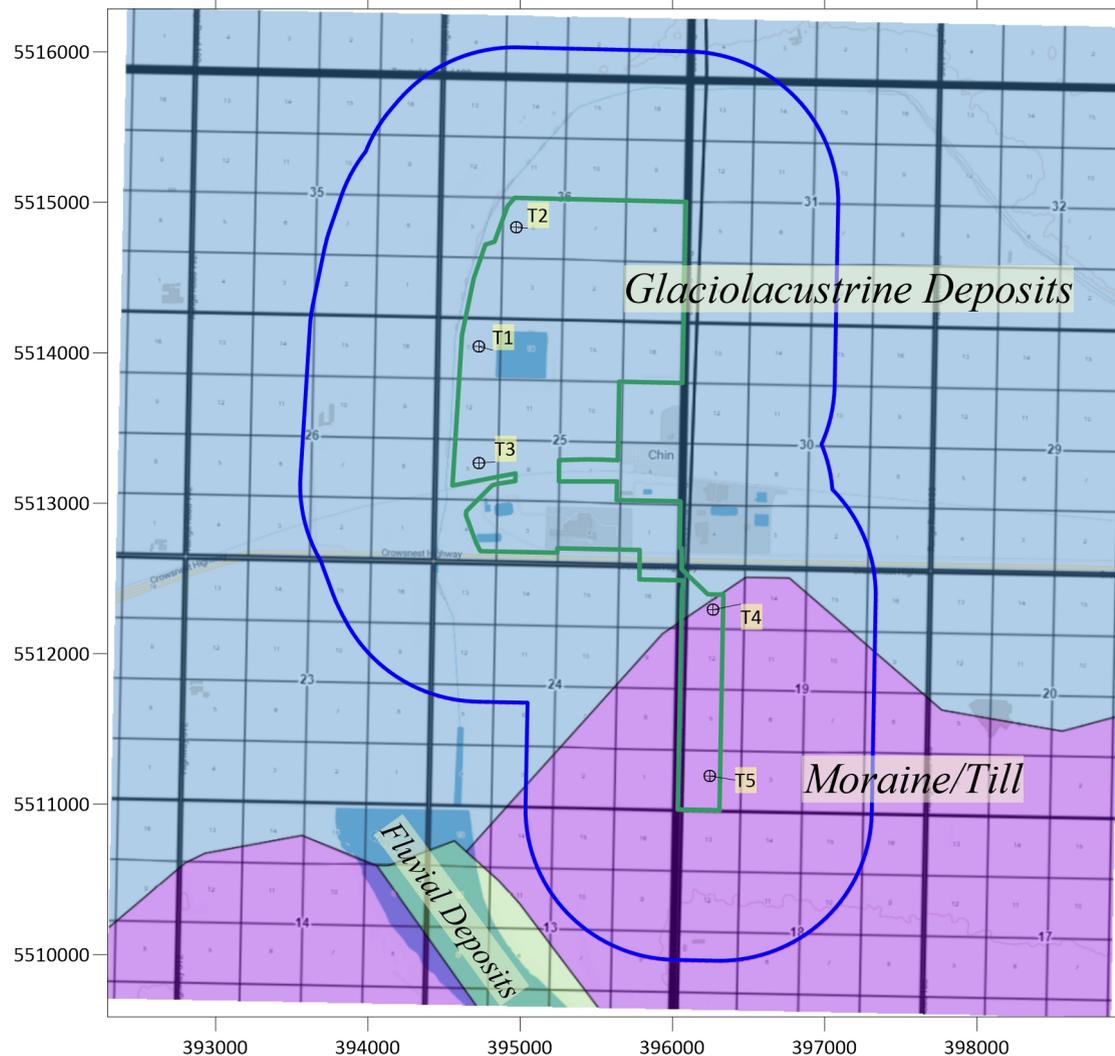
**C/O WESTERN ECOSYSTEMS TECHNOLOGY, ULC**  
**COALDALE WIND POWER PROJECT**  
 Hydrogeological Effects Assessment  
 Project Area - Infrastructure

**Fig 2**



	Air Temp. Avg. (°C)	Air Temp. Lowest (°C)	Air Temp. Highest (°C)	Precip. (mm)	Relative Humidity Avg. (%)
min	3.52	-39.29	30.14	163.19	58.68
Max	7.71	-26.22	40.47	573.81	70.49
Avg	5.95	-33.63	35.02	347.23	64.67

Climate records for Twp 010-26W4 and 011-25 W4M for the 1990 – 2023 period  
[\[https://agriculture.alberta.ca/acis/township-data-viewer.jsp\]](https://agriculture.alberta.ca/acis/township-data-viewer.jsp). Evapotranspiration chart from AMEC (2009)



**LEGEND**

-  Project Area
-  Study Area
-  Wind Turbine (T1 to T5)



Design: IA | Drawn: IA  
Check: MS | Approved: MS  
Date: 2024-08-23

Projection:  
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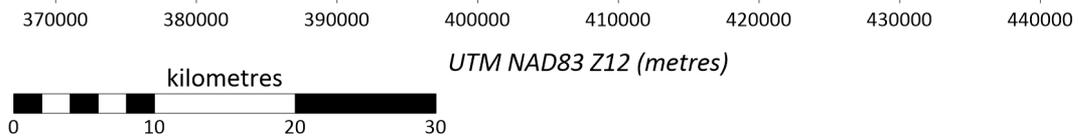
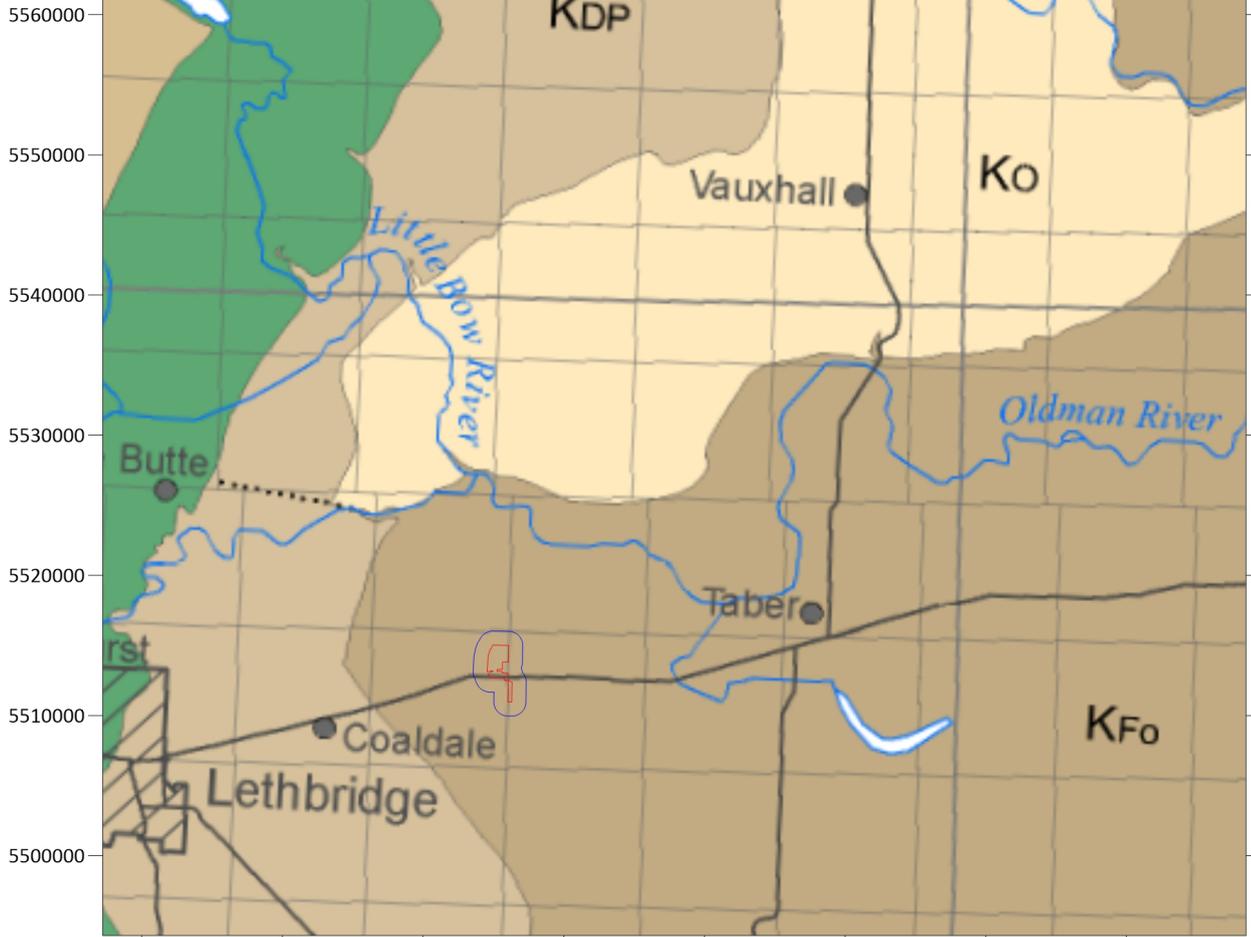
**NOTES:**  
1. Basemap source: Shetsen, 2007 - AGS Map 207  
- digitized by Cartofact  
2. Layout: Elemental Energy (v. 2024-08-22)



**C/O WESTERN ECOSYSTEMS TECHNOLOGY, ULC**

**COALDALE WIND POWER PROJECT**  
Hydrogeological Effects Assessment  
Project Area - Surficial Geology

**Fig 4**



**LEGEND**



**Southeastern Plains  
UPPER CRETACEOUS**



**KO** **OLDMAN FORMATION:** fine- to coarse-grained, light grey to yellow weathering sandstone; beds are commonly trough cross-bedded, fining upwards and lenticular; grey, muddy siltstone; grey to greenish-grey weathering mudstone commonly with carbonaceous fragments; dark grey to brown carbonaceous mudstone; concretionary sideritic layers; locally divisible into lower sandstone-dominated unit and upper siltstone unit; nonmarine



**KFo** **FOREMOST FORMATION:** pale grey and pale brown sandstone; grey to greenish-grey siltstone; dark grey carbonaceous mudstone; coal; concretionary sideritic layers; coal seams near the top of the formation; marginal marine to nonmarine

**NOTES:**

1. Basemap source: Prior, G.J., Hathway, B., Glombick, P.M., Pana, D.I., Banks, C.J., Hay, D.C., Schneider, C.L., Grobe, M., Elgr, R. and Weiss, J.A., 2013: Bedrock geology of Alberta; Alberta Energy Regulator, AER/AGS Map 600 <https://ags.aer.ca/publication/map-600>



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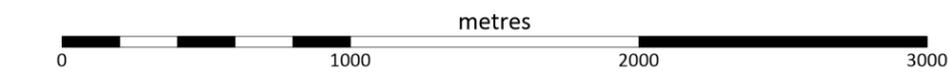
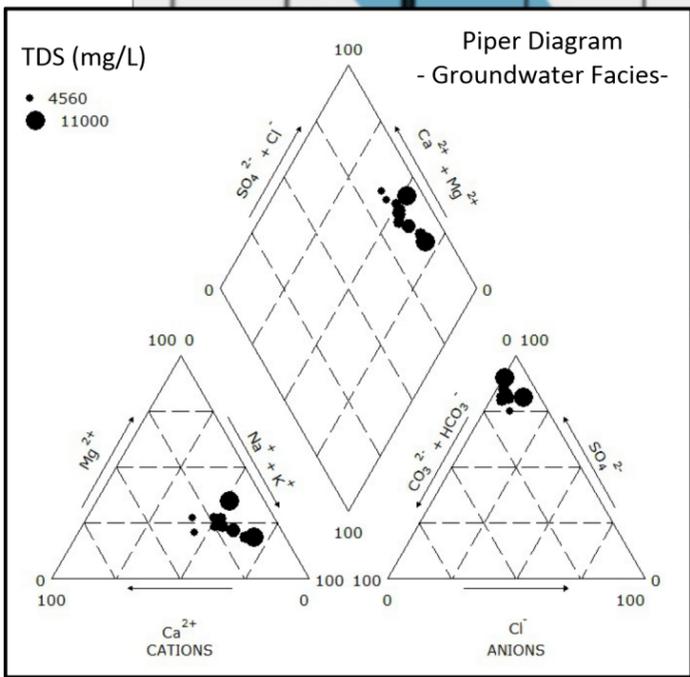
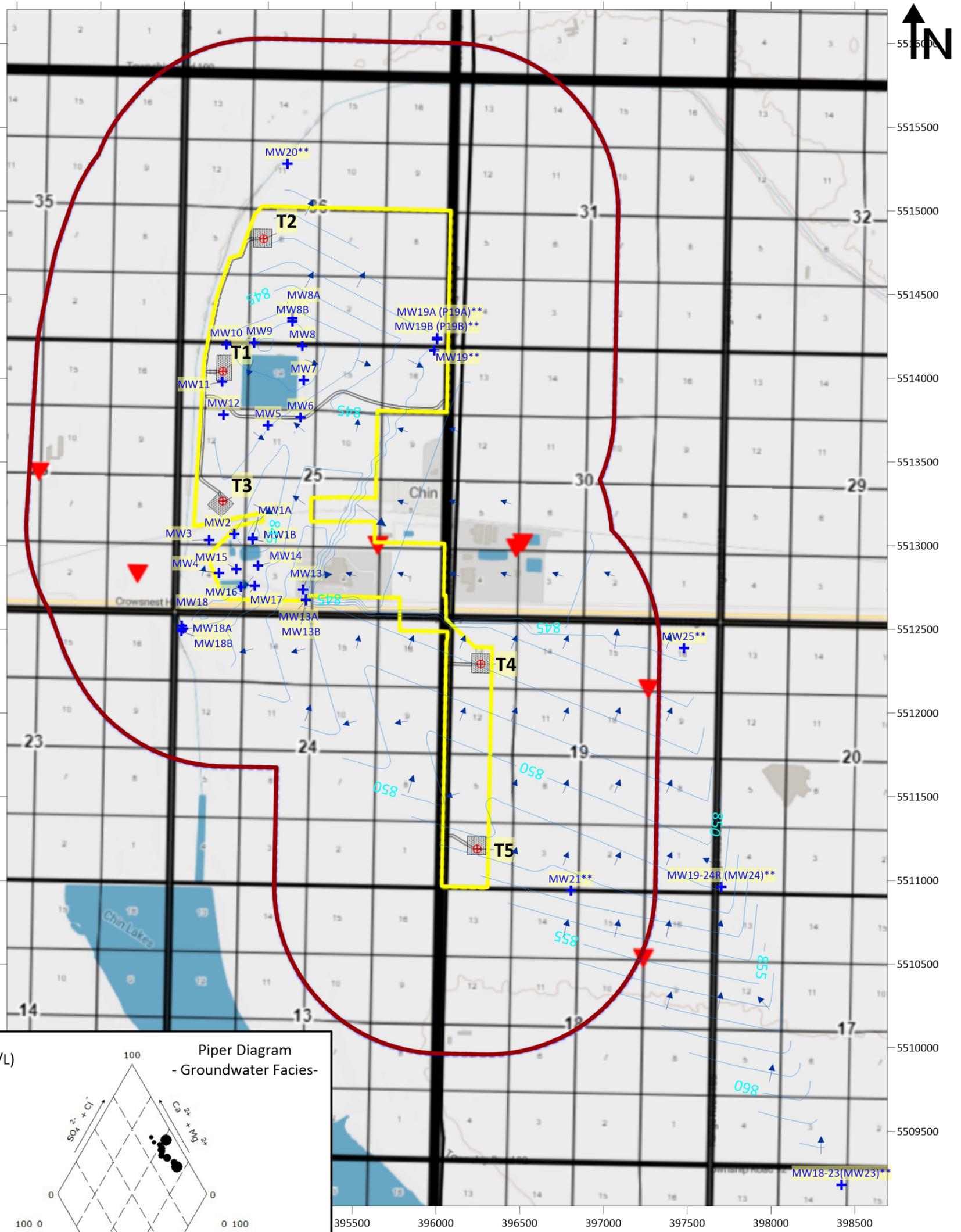
**C/O WESTERN ECOSYSTEMS TECHNOLOGY, ULC**

**COALDALE WIND POWER PROJECT**

Hydrogeological Effects Assessment

Bedrock Geology

**Fig 5**



**LEGEND**

- Project Area
- Study Area
- Crane Disturbance Areas
- Wind Turbine
- Access Roads
- GIC Water Well
- WSP monitoring well
- Hydraulic Head (masl)
- Horizontal Hydraulic Gradient

Projection:  
- UTM Nad83 Zone 12  
- units: metres  
Scale: as shown

- NOTES:**
1. Infrastructure features provided by Elemental Energy
  2. Basemap and oilfield information by Cartofact,
  3. Groundwater monitoring data from WSP (2023a)
  4. Water well locations from Groundwater Information Centre (GIC)

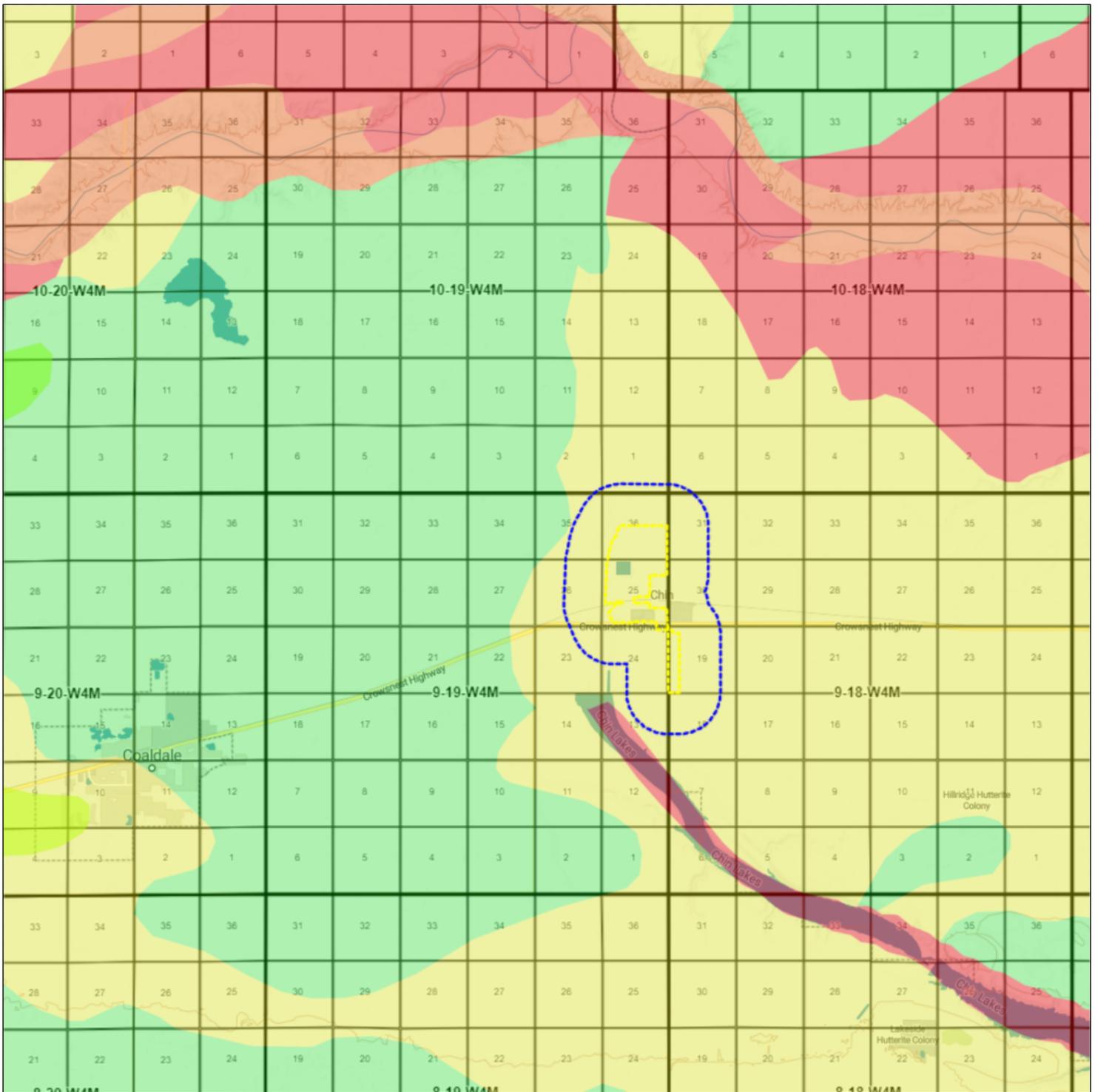


Design: IA | Drawn: IA  
Check: MS | Approved: MS  
Date: 2024-08-23



**C/O WESTERN ECOSYSTEMS TECHNOLOGY, ULC**  
**COALDALE WIND POWER PROJECT**  
Hydrogeological Effects Assessment  
Groundwater Conditions - Surficial Deposits

Fig 6



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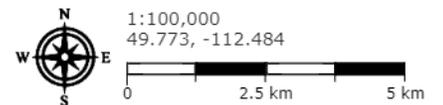
Datum: WGS84 Projection: Web Mercator EPSG:4326



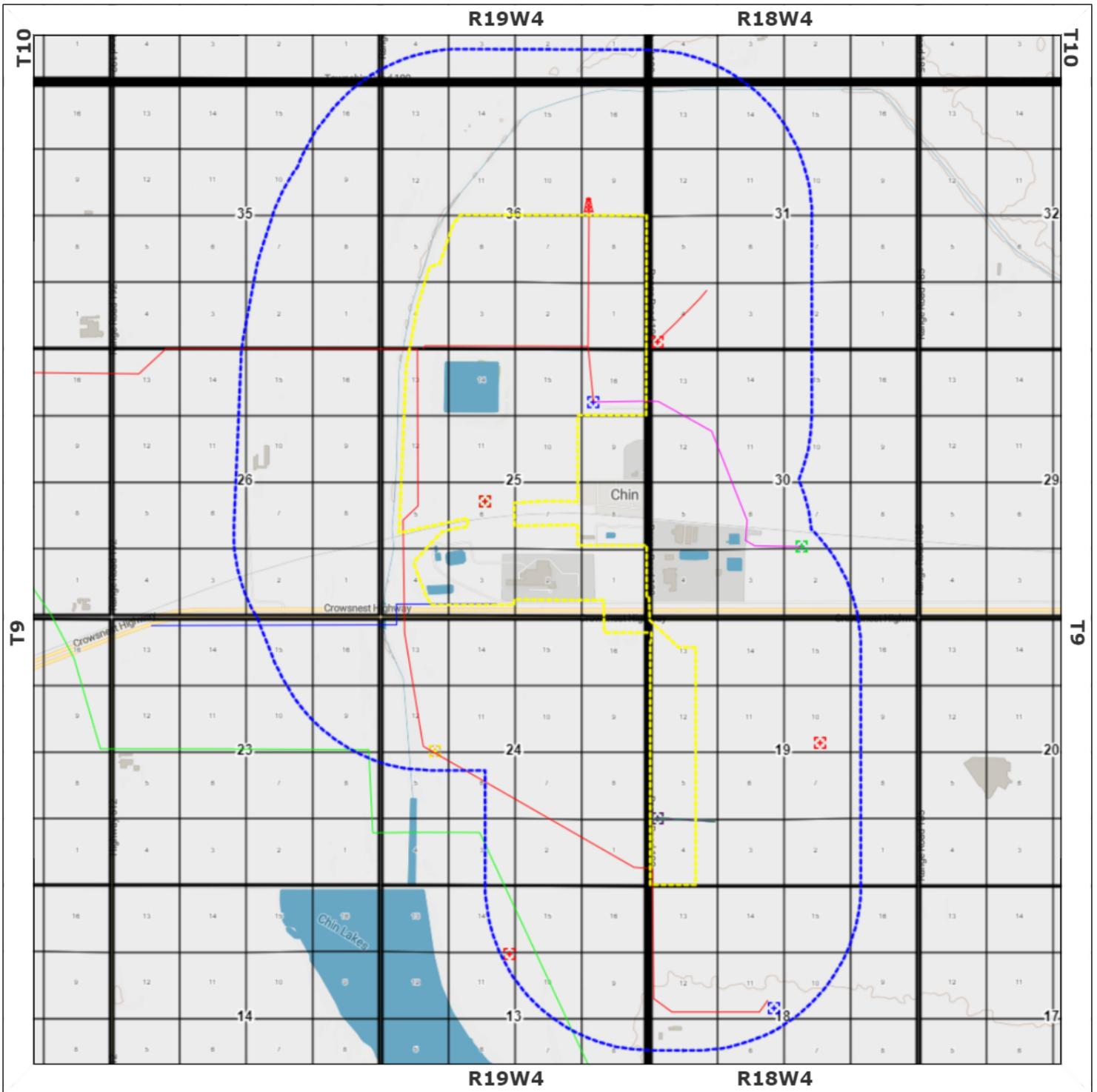
**COALDALE RENEWABLES GP INC.**  
**Coaldale Wind Power Project**

**Fig. 7: Groundwater Vulnerability**

Author: István Almási, Aug 28, 2024



- LEGEND**
- Alberta Groundwater Vulnerability
  - Medium
  - Very High
  - No Data
  - Lake
  - High
  - Low
  - Coaldale W 2024 Aug PA&SA
  - Project Area
  - Study Area (1 km buffer)



Map tiles by © MapTiler 2024. © OpenStreetMap contributors.

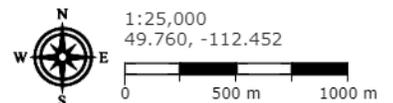
Datum: WGS84 Projection: Web Mercator EPSG:4326



**COALDALE RENEWABLES GP INC.**  
Coaldale Wind Power Project

**Fig. 8: Oilfield Infrastructure Overlap**

Author: István Almási, Aug 28, 2024



**LEGEND**

- Wells AB**
- Abandoned (5)
- Abandoned Zone (4)
- Abandoned Gas (3)
- Abandoned Zone Gas (1)
- Commingled (1)
- Drilled And Cased (1)
- Flowing Gas (1)
- Suspended Gas (1)
- Pipelines - Alberta**
- ALPHABOW ENERGY LTD. (6)
- CENOVUS ENERGY INC. (2)
- ATCO GAS AND PIPELINES LTD. (1)
- CANADIAN NATURAL RESOURCES LIMITED (1)
- IPC CANADA LTD. (1)
- Coaldale W 2024 Aug PA&SA**
- Project Area
- Study Area (1 km buffer)



## **APPENDIX A**

# **WATER WELL QUERY RESULTS**



# Reconnaissance Report

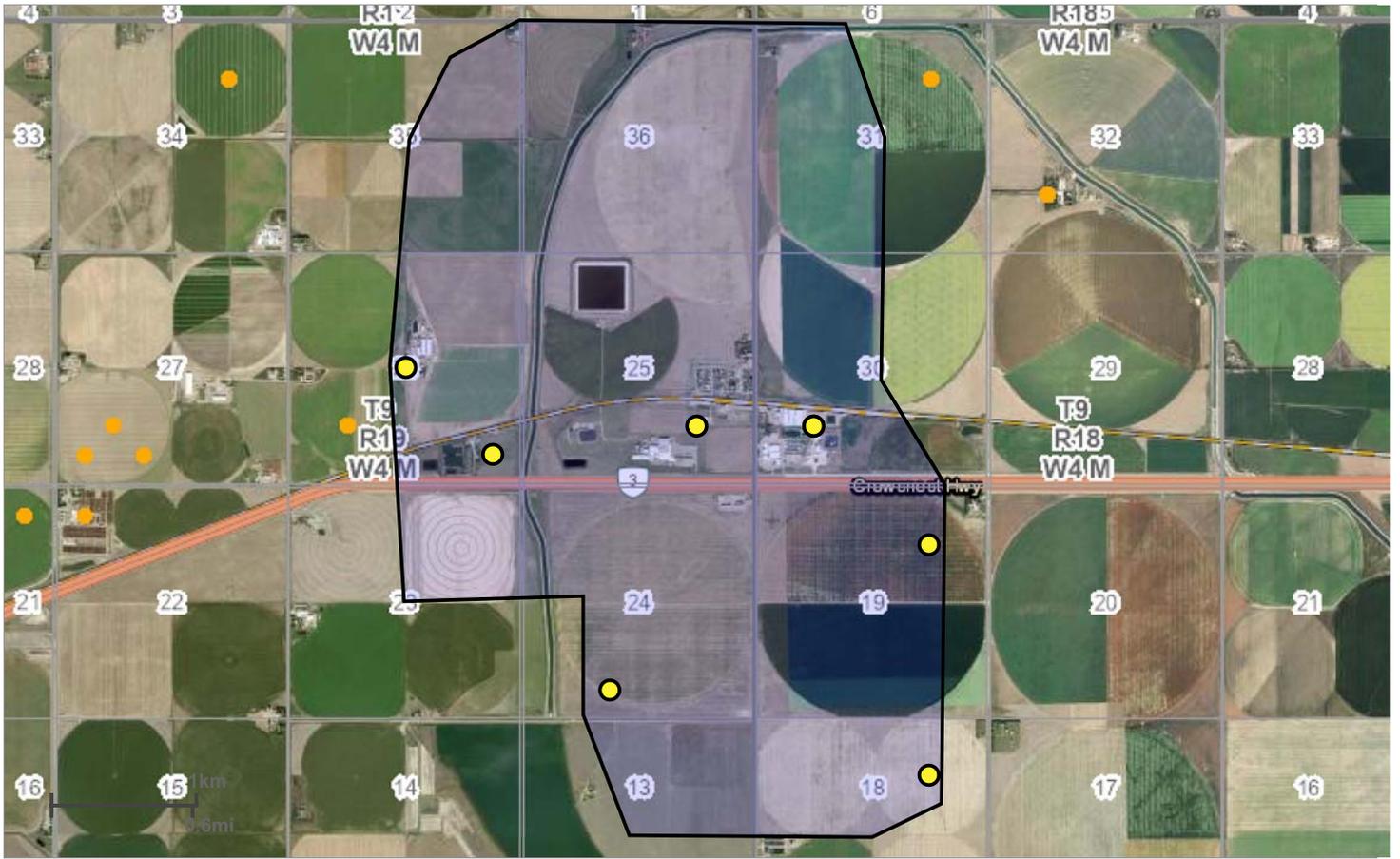
[View in Imperial](#)

[Export to Excel](#)

## Groundwater Wells

Please click the water Well ID to generate the Water Well Drilling Report.

GIC Well ID	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL (m)	TEST RATE (L/min)	SC_DIA (cm)
<a href="#">106249</a>	3	24	9	19	4	UNKNOWN DRILLER	1945-05-19	917.45	Oil Exploratory	Industrial				ROYALITE OIL CO			0.00
<a href="#">106250</a>	SE	25	9	19	4	UNKNOWN DRILLER		14.33	Chemistry	Domestic & Stock	1			KIENTOPP, WILLIAM	13.72		0.00
<a href="#">106251</a>	1	26	9	19	4	BYRT, STAN & SONS LTD.	1968-04-04	39.01	Test Hole	Investigation		8		#GH-10			0.00
<a href="#">106253</a>		26	9	19	4	UNKNOWN DRILLER		0.00	Chemistry	Domestic	1			NEUDORF, RAY			0.00
<a href="#">256041</a>	NE	18	9	18	4	MAHON JOE	1919-01-01	54.86	Federal Well Survey	Domestic & Stock				LASSITER, B.	18.29		15.24
<a href="#">256043</a>	NE	19	9	18	4	UNKNOWN DRILLER		67.06	Chemistry	Domestic	2			PERRY, WM	24.38		12.70
<a href="#">256047</a>	SW	30	9	18	4	OTHER	1910-01-01	54.86	Federal Well Survey	Stock				HAIBECK, J.	30.48		15.24
<a href="#">256048</a>	SW	30	9	18	4	UNKNOWN DRILLER	1960-10-27	0.00	Chemistry	Domestic	1			SPRINKLE			0.00



### Alberta Water Well Information Database Map

**Projection**

Web Mercator (Auxillary Sphere)

**Datum**

WGS 84

**Date**

7/19/2024, 5:01:41 PM

**Legend**

- Groundwater Drilling Report
- ◆ Baseline Water Well Report

<https://groundwater.alberta.ca/WaterWells/d/>

Information as depicted is subject to change, therefore the Government of Alberta assumes no responsibility for discrepancies at time of use.  
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# Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 106251  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

Well Identification and Location										Measurement in Metric	
<b>Owner Name</b> #GH-10		Address			Town		Province		Country		Postal Code
<b>Location</b>	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description		
	1	26	9	19	4						
<b>Measured from Boundary of</b>					<b>GPS Coordinates in Decimal Degrees (NAD 83)</b>						
_____ m from _____					Latitude <u>49.758666</u> Longitude <u>-112.468632</u>					Elevation <u>843.08</u> m	
_____ m from _____					How Location Obtained					How Elevation Obtained	
					Not Verified					Survey-Transit	

Drilling Information	
<b>Method of Drilling</b> Rotary	<b>Type of Work</b> Test Hole
<b>Proposed Well Use</b> Investigation	

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
1.52		Clayey Topsoil	
6.10		Gravelly Clay & Sand	
10.67		Clay	
13.72		Sandy Coal	
26.21		Clay	
27.74		Sandstone	
29.57		Hard Shale	
39.01		Soft Shale	

Yield Test Summary			Measurement in Metric
<b>Recommended Pump Rate</b> _____ L/min			
Test Date	Water Removal Rate (L/min)	Static Water Level (m)	

Well Completion				Measurement in Metric
Total Depth Drilled	Finished Well Depth	Start Date	End Date	
39.01 m			1968/04/04	
<b>Borehole</b>				
Diameter (cm)	From (m)	To (m)		
0.00	0.00	39.01		
<b>Surface Casing (if applicable)</b>		<b>Well Casing/Liner</b>		
Size OD :	0.00 cm	Size OD :	0.00 cm	
Wall Thickness :	0.000 cm	Wall Thickness :	0.000 cm	
Bottom at :	0.00 m	Top at :	0.00 m	
		Bottom at :	0.00 m	
<b>Perforations</b>				
From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)
Perforated by _____				
<b>Annular Seal</b>				
Placed from <u>0.00</u> m to <u>0.00</u> m				
Amount _____				
Other Seals				
Type		At (m)		
<b>Screen Type</b>				
Size OD : <u>0.00</u> cm				
From (m)	To (m)	Slot Size (cm)		
Attachment _____				
Top Fittings _____		Bottom Fittings _____		
<b>Pack</b>				
Type _____		Grain Size _____		
Amount _____				

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well UNKNOWN NA DRILLER	Certification No 1
Company Name BYRT, STAN & SONS LTD.	Copy of Well report provided to owner Date approval holder signed



# Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 106251  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

Well Identification and Location										Measurement in Metric	
<b>Owner Name</b> #GH-10		Address			Town		Province		Country		Postal Code
<b>Location</b>	1/4 or LSD 1	SEC 26	TWP 9	RGE 19	W of MER 4	Lot	Block	Plan	Additional Description		
<b>Measured from Boundary of</b>					<b>GPS Coordinates in Decimal Degrees (NAD 83)</b>						
_____ m from _____					Latitude <u>49.758666</u>		Longitude <u>-112.468632</u>		Elevation <u>843.08 m</u>		
_____ m from _____					How Location Obtained					How Elevation Obtained	
					Not Verified					Survey-Transit	

Additional Information										Measurement in Metric
Distance From Top of Casing to Ground Level _____ cm										
Is Artesian Flow _____					Is Flow Control Installed _____					
Rate _____ L/min					Describe _____					
Recommended Pump Rate _____ L/min					Pump Installed _____		Depth _____ m			
Recommended Pump Intake Depth (From TOC) _____ m					Type _____		Make _____		H.P. _____	
										Model (Output Rating) _____
Did you Encounter Saline Water (>4000 ppm TDS) _____					Depth _____ m		Well Disinfected Upon Completion _____			
Remedial Action Taken					Gas _____		Depth _____ m		Geophysical Log Taken <u>Electric</u>	
										Submitted to ESRD <u>Electric</u>
										Sample Collected for Potability _____
										Submitted to ESRD _____
Additional Comments on Well										

Yield Test			Taken From Ground Level	Measurement in Metric
Test Date	Start Time	Static Water Level		
				m
<b>Method of Water Removal</b>				
Type _____				
Removal Rate _____ L/min				
Depth Withdrawn From _____ m				
If water removal period was < 2 hours, explain why				

Water Diverted for Drilling		
Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well UNKNOWN NA DRILLER	Certification No 1
Company Name BYRT, STAN & SONS LTD.	Copy of Well report provided to owner Date approval holder signed

**Appendix C. Renewable Energy Submission Report**

# Coaldale Wind Farm Renewable Energy Project Submission to Alberta Environment and Protected Areas



## Prepared For

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## Prepared By

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Senior Ecologist

## EDI Project

22C0543  
December 2022



**Down to Earth Biology**

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Jennifer Muir, M.Sc., P.Biol..... Author

Phil Hesse, B.Sc..... GIS Analyst

Daryl Johannesen, M.Sc., P.Biol.....Senior Review



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## 1 PROJECT OVERVIEW

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

Wind Power Project.

**2. What is the name of the project?**

Coaldale Wind Farm (hereafter referred to as the Project).

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

Standard Submission.

This Project represents an update (i.e., the addition of one turbine and associated infrastructure) to a project previously reviewed by AEP (the Coaldale Wind Farm proposed by McCain Foods Ltd.; submitted to AEP on December 24, 2021) and received an AEP Referral Report on May 26, 2022.

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

The proponent is Valeco Energie Québec Inc. The primary contact person for the project is Dominic Lefort, Project Manager, available at 514-570-7264 or dominiclefort@groupevaleco.com.

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

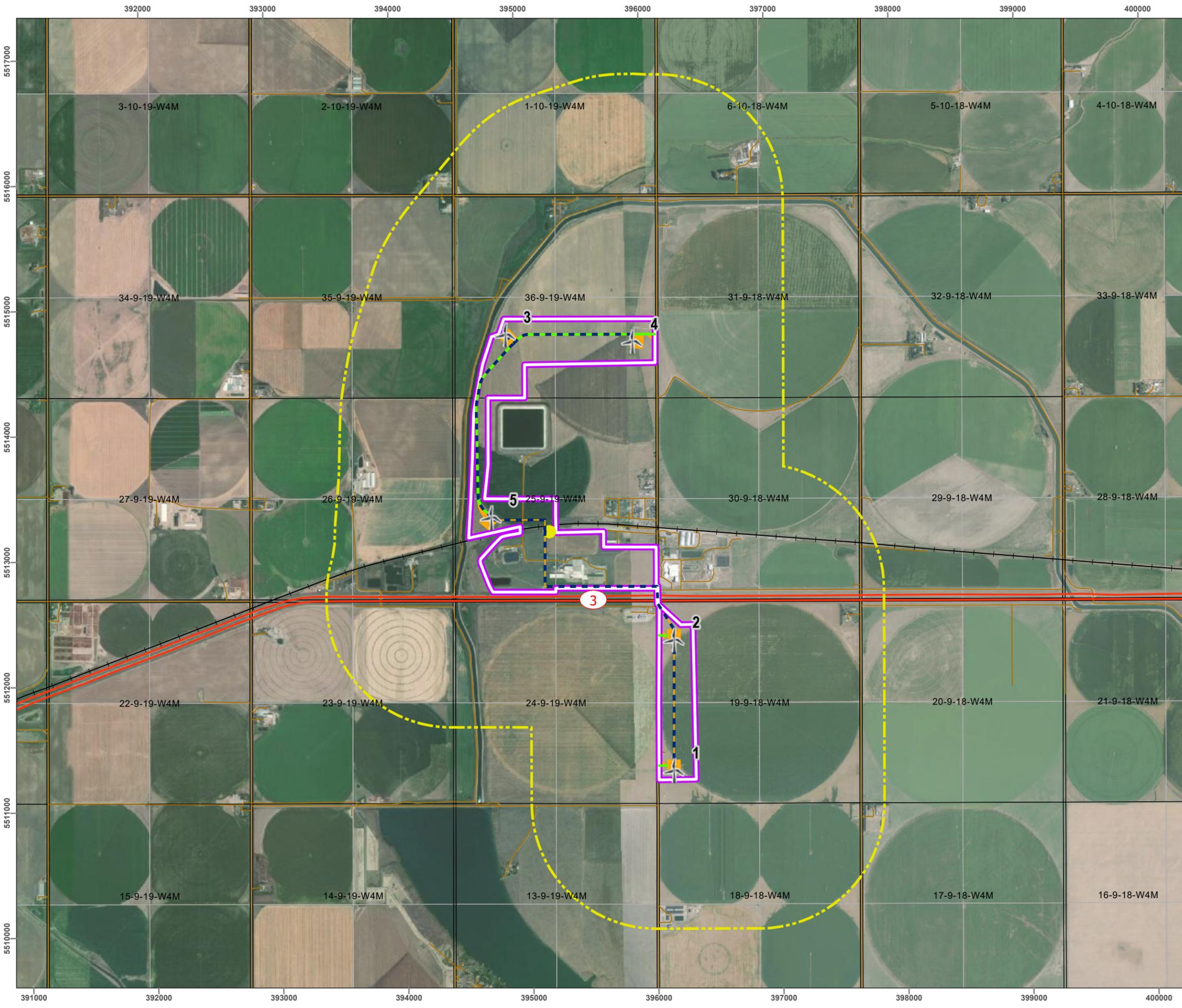
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EDI Environmental Dynamics Inc.  
440 – 622 5 Ave. SW, Calgary, AB, T2P 0M6  
Phone: (403) 444-6489  
Email: djohannesen@edynamics.com

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

The west half of the Project is located in Lethbridge County and the east half is within the Municipal District of Taber, in southern Alberta, near the hamlet of Chin.

**Table 1. Project location.**

Section	Township	Range	Meridian
36	9	19	4
25	9	19	4
19	9	18	4

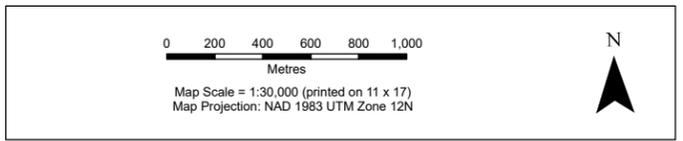


# Coaldale Wind Farm Project Location and Layout

**VALECO ENERGIE QUÉBEC INC.**

**Legend**

- Wind Turbine
- Project Boundary**
- Substation
- Access
- Collector System
- Other Disturbance (Pads, Turning Areas, Collector Lines)
- Project Area
- Wildlife Study Area
- Base Data**
- Highway
- Railway
- Road
- Section
- Quarter Section



**Data Sources**

- Main Map, World Imagery, Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
- Inset map, National Geographic, National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
- ATS Grid and roads, Altalis dataset.

**Disclaimer**  
 EDI Environmental Dynamics Inc. has made every effort to ensure this map is free of errors. Data has been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: Y. Navarro & P.Hesse	Checked: J. Muir	<b>Figure 1</b>	Date: 13/12/2022
--------------------------------	---------------------	-----------------	------------------



Path: L:\PROJECTS\2022\PR220543\_Valeco\_CoaldaleWind2022\Fig01\_MapArea.mxd



**7. Provide UTM zone for the project.**

Zone 12U.

**8. Provide the total MW size of the Project.**

The Project is proposed to have five turbine locations, totalling up to 31 MW of generating capacity.

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

The construction footprint for the Project is 19.31 ha which includes 5 turbines and associated crane pads, access, collector lines, turning radii, and a substation. The area of the construction footprint for each component is presented in Section 10, Question 48 (Table 38).

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

The operation footprint for the Project is 3.68 ha, including the substation and operational access and turbine footprints. The area of each component is presented in Section 10, Question 48 (Table 38).

**11. 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.**

**Table 2. Wind turbine locations.**

Turbine ID	UTM Zone	UTM Easting (m)	UTM Northing (m)	Quarter	Section	Township	Range	Meridian	Land Cover Type	Preferred or Alternate Location
1	12	396158	5511224	SW	19	9	18	4	Cultivation	Preferred
2	12	396181	5512266	NW	19	9	18	4	Cultivation	Preferred
3	12	394883	5514731	SW	36	9	19	4	Cultivation	Preferred
4	12	395898	5514656	SE	36	9	19	4	Cultivation	Preferred
5	12	394739	5513274	SW	25	9	19	4	Cultivation	Preferred



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

**Table 3. Wind turbine specifications.**

Specifications	Detail
Tower/Hub Height (metres from the ground)	Up to 120 m for the hub height
Rotor Swept Area (minimum to maximum metres from the ground)	The blades are estimated to be up to 80 m in length, so the total wind-swept area is 20,096 m <sup>2</sup> per turbine or approximately 100,480 m <sup>2</sup> (10 ha) in total for the five turbines. Minimum of 40 m and maximum of 200 m from the ground.
Blade Length (metres)	The blade length is expected to be up to 80 m.
Number of Blades	Three blades per turbine tower.

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

The proponent is Valeco Energie Québec Inc. (Valeco), which has been developing renewable energy projects throughout Canada since 2012, including wind, solar, and biogas. The Project is being proposed to be sited entirely on lands owned by McCain Ltd. and surrounding the operating McCain Coaldale Processing Plant.

The plant and the lands immediately surrounding the plant are zoned industrial park in Lethbridge County, and the host lands for Project infrastructure are agricultural and are presently used for intensive cultivation purposes. The host lands are under pivot irrigation and the turbine locations have been sited to use under-utilized lands for irrigation (i.e., outside the pivot arc).

## 2 WILDLIFE HABITAT LAND COVER

**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, substation 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.**

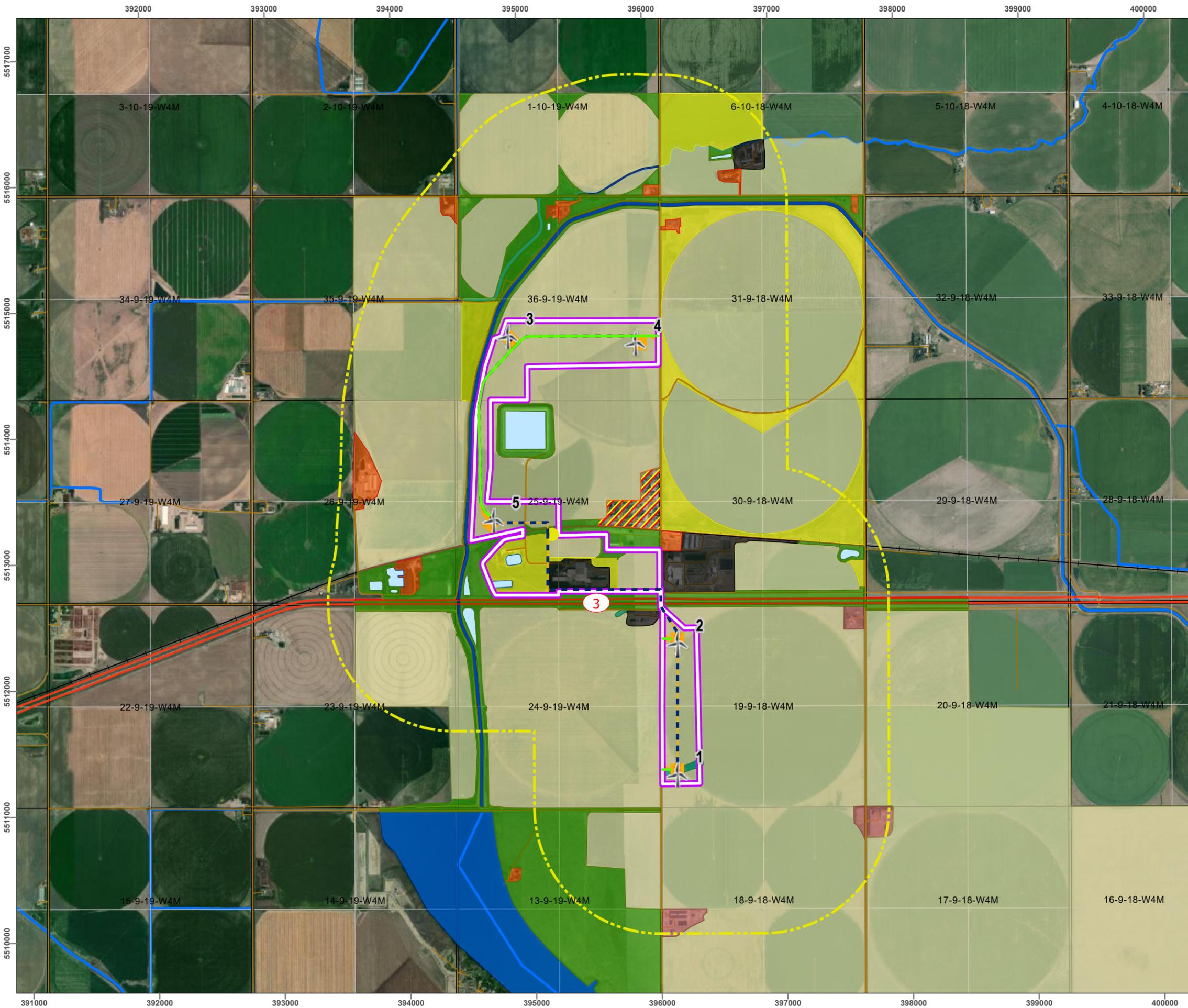


Table 4. Table of habitat types.

Habitat Type	Total project area (hectares)	Temporary project footprint (hectares)	Permanent project footprint (hectares)	Example Photo <sup>2</sup>
Native Grassland	0	0	0	NA
Tame Grassland	5.18	0.09	0	Photo 1-2
Hay land	22.72	0.55	0	Photo 3
Aspen Forest	0	0	0	NA
Boreal Forest	0	0	0	NA
Montane Forest	0	0	0	NA
Mixed Forest	0	0	0	NA
Cultivation	133.68	13.71	3.56	Photo 4-6
Wetlands	0	0	0	NA
Lake/Waterbody	0	0	0	NA
Man-made Waterbody <sup>1</sup>	1.70	0	0	Photo 7-10
Ephemeral Waterbody (EW)	1.70	0.68	0.12	NA
River/Watercourse	0	0	0	NA
Other – Buildings, Industrial, Residential, Roads and Railway	12.31	0.62	0	Photo 11-13
<b>Total number of Hectares<sup>3</sup></b>	<b>177.29</b>	<b>15.63</b>	<b>3.68</b>	NA

Notes:

- 1 McCain wastewater pond, irrigation canal, dugouts, and borrow pits.
- 2 Photos provided in Appendix A.
- 3 Some numbers are rounded for presentation purposes; totals may not equal the sum of the individual values.

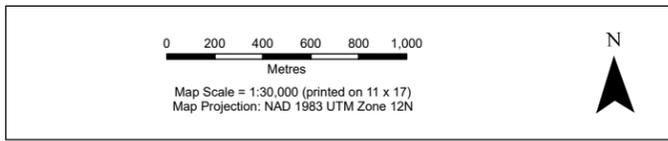


# Wildlife Habitat and Land Cover Identified for the Coaldale Wind Farm

**VALECO ENERGIE QUÉBEC INC.**

**Legend**

	Wind Turbine		Quarter Section
	Project Boundary		Habitat Type
	Substation		Buildings
	Access		Buildings/Yard Site
	Collector System		Cultivation
	Project Area		Ephemeral Waterbody
	Wildlife Study Area		Hayland
	Other Disturbance (Pads, Turning Areas, Collector Lines)		Highway
	Highway		Industrial
	Railway		Irrigation Canal
	Road		Lake/Waterbody
	Irrigation Canal		Man-made Waterbody
	Section		Railway
			Residential
			Road
			Tame Grassland



**Data Sources**

- Main Map, World Imagery, Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
- Inset map, National Geographic, National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
- ATS Grid, watercourse, roads and railway, Altalis dataset.

**Disclaimer**  
 EDI Environmental Dynamics Inc. has made every effort to ensure this map is free of errors. Data has been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: Y. Navarro & P.Hesse	Checked: J. Muir	<b>Figure 2</b>	Date: 13/12/2022
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Path: L:\PROJECTS\2022\PR20220543\_Valeco\_CoaldaleWind20220543\_Fig02\_WildlifeHabit\_LandCover\_202212



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.

f) Eastern slopes?

No.

If the project is sited in 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.

The Project is not sited in any of the above habitat types; therefore, this question is not applicable.



### 3 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.

The Project is not sited in the above wildlife zones; therefore, this question is 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.



18. Is the project sited within 100 m of a valley or coulee break? If yes, provide 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.

## 4 LAKES, WETLANDS AND WATERCOURSES

19. Provide details of the methods used to identify and classify wetlands. Not the term wetland is inclusive of natural wetlands, wetlands that have been altered by humans or man made wetlands (i.e., dugout). 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.

A Wetland assessment in accordance with the Alberta Wetland Identification and Delineation Directive (Government of Alberta 2015) and the Alberta Wetland Classification System (Alberta Environment and Sustainable Resource Development 2015) was undertaken to identify, classify, and delineate wetlands and man-made waterbodies potentially affected by the Project. A variety of available data sources were reviewed, including:

- Satellite Imagery – ESRI (2018);
- Historical aerial photographs (1969, 1986, 1999, 2002, 2014, 2015, 2018) (Government of Alberta 2021a);
- Alberta Merged Wetland Inventory (Alberta Environment and Parks 2021);
- Topography (AltaLis 1:20k contours) (AltaLIS Ltd. 2017); and,
- Historical climate data (Government of Alberta 2021b).

Wetlands and man-made waterbodies were identified and delineated within the Project Area following Pathway 5 – comprehensive desktop delineation with field verification (Government of Alberta 2015). Wetland permanence was assessed according to the Guide for Assessing Permanence of Wetland Basins (Alberta Environment and Parks 2016), including analysis of historical climate data and air photos to establish the duration of flooding and wetland inundation across changes in seasons and precipitation. All wetlands identified and mapped within the Project Area were classified according to the Alberta Wetland Classification System (AWCS) (Alberta Environment and Sustainable Resource Development 2015).



A field assessment was conducted on June 23, 2021, to verify the desktop results and confirm the identification, classification, and delineation of wetlands and man-made waterbodies with the potential to be affected by the Project. Wetland boundaries were delineated where a noticeable change from wetland to upland indicators occurred. Given the cultivated land use, topography and soil indicators were used wherever possible in conjunction with the desktop air photo review. Field data were recorded on datasheets developed to meet the Alberta Wetland Policy requirements. Following the field assessment, wetland boundaries were refined using field GPS coordinates, imagery, and historical aerial photographs in ArcMap 10.7.1.

No Project infrastructure is 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). Turbine 1 in SW 19-9-18 W4M is located on the south edge of an ephemeral waterbody (EW); however, this EW is dry, poorly defined and cultivated with no natural vegetation (i.e., chronically disturbed). A permit will be required, and applied for, for the disturbance to this EW during the installation of the collector line under the *Alberta Water Act* (Alberta Water Act, 2021). The access between turbines 3 and 5, and a buried collector line will be installed approximately 190 m to the west of the McCain wastewater pond.

**Table 5. Table of wetlands for which AEP-WM setbacks are infringed.**

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
NA	NA	NA	NA	NA

**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.**

# Wetlands and Watercourses Identified for the Coaldale Wind Farm

VALECO ENERGIE QUÉBEC INC.

## Legend

-  Wind Turbine
-  Irrigation Canal
-  Ephemeral Waterbody
-  Lake/Waterbody
-  Man-made Waterbody
- Project Boundary**
-  Substation
-  Access
-  Collector System
-  Other Disturbance (Pads, Turning Areas, Collector Lines)
-  Project Area
-  Wildlife Study Area
- Base Data**
-  Highway
-  Road
-  Railway
-  Section
-  Quarter Section



0 200 400 600 800 1,000  
Metres  
Map Scale = 1:30,000 (printed on 11 x 17)  
Map Projection: NAD 1983 UTM Zone 12N



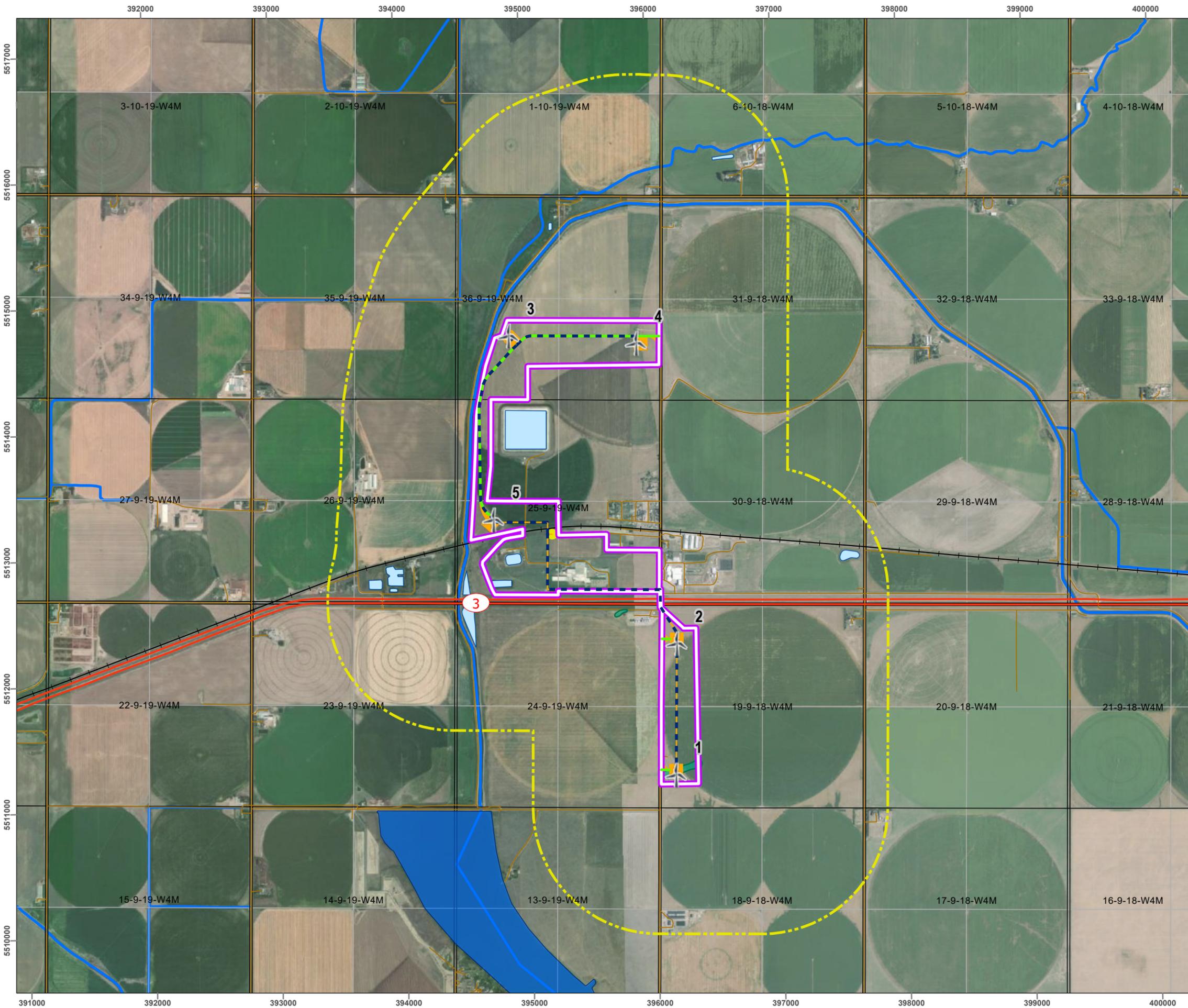
### Data Sources

- Main Map, World Imagery, Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
- Inset map, National Geographic, National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
- ATS Grid, watercourse, roads and railway, Altalis dataset.

### Disclaimer

EDI Environmental Dynamics Inc. has made every effort to ensure this map is free of errors. Data has been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: Y. Navarro & P.Hesse	Checked: J. Muir	<b>Figure 3</b>	Date: 13/12/2022
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**Provide details of construction and operational mitigation the Proponent will implement to meet the intent of the Directive.**

Not applicable. The Project construction and operational footprint were sited to avoid wetlands.

**20. Is the project sited within 1,000 m of a named lake or waterbody? If the project is site 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.**

No Project infrastructure is sited within 1,000 m of a named lake or waterbody, as named by the Natural Resources Canada Geographical Names dataset (Natural Resources Canada 2022).

**21. Amphibian Surveys: Were amphibian surveys completed? If no, continue to question 22.**

**a) 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.**

There are no wetlands within 100 m of proposed Project infrastructure and disturbance areas, and after consultation with AEP it was determined that amphibian surveys were not required for this Project. Wildlife biologists were attentive to any amphibian observations or sign while conducting other wildlife surveys; however, none were observed.

**b) Provide the survey dates.**

Not applicable.

**c) Provide the number of survey points.**

Not applicable.

**d) 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.

**e) Provide weather conditions during each survey in a table with the following headings.**

Not applicable.



**Table 6. Weather conditions during Amphibian surveys table.**

Survey Date	Survey Time	Weather Conditions	Comments
NA	NA	NA	NA

- f) 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.

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

Not applicable.

- h) Results: Were amphibians found?

Not applicable.

- i) 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.

Not applicable.

**Table 7. Table of Amphibian sightings.**

Wetland Name/ID number	Species of Amphibian	Location (UTM NAD 83)	Is the required setback met (Y/N)	Distance to the nearest project related disturbance (m)	Infrastructure type	Comments
NA	NA	NA	NA	NA	NA	NA

- j) 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. Note as there is a direct link between question 20 and question 21, include alternative mitigations for sensitive amphibians in the Proponent's response to question 20.

Not applicable.



- k) 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.**

There are no wetlands as defined by the Alberta Wetland Classification System (Government of Alberta 2015) in the Project Area that provide suitable habitat for amphibians; however, the man-made water bodies, including the Stafford reservoir irrigation canal and the McCain wastewater pond may provide marginal habitat for amphibians. These water bodies are considered marginal for amphibian due to the lack of emergent and submergent aquatic vegetation and the substrate consisting of hard packed gravel and rip rap.

**22. Identify any project infrastructure sited within:**

- a) 45 metres from the top of the break of intermittent watercourses or springs?**

No Project infrastructure is sited within 45 metres from the top of the break of intermittent watercourses or springs.

- b) 45 metres from the top of the break of small permanent watercourses?**

No Project infrastructure is sited within 45 metres from the top of the break of small permanent watercourses.

- c) 100 metres from the top of the break of large permanent watercourses?**

No Project infrastructure is sited within 100 metres from the top of the break of a large permanent watercourse.

**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.**

The Project is not sited in any of the above setbacks; therefore, this question is not applicable.



## 5 PRE-ASSESSMENT WILDLIFE SURVEYS

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

Yes.

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

Surveys in 2020 were conducted under General Permit #19-034, surveys in 2021 were conducted under General Permit #21-225, and surveys in 2022 were conducted under General Permit #22-130 issued to EDI on February 28, 2022.

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.

Yes. 2020 and 2021 data were submitted to AEP-WM in a FWMIS loadform on December 17, 2021; data from the 2022 surveys will be submitted to AEP-WM in a FWMIS loadform prior to December 31, 2022.

## 6 REQUIRED SURVEYS

This section asks for information about the methods and results from required surveys as identified in the Directive.

Based on communications between AEP wildlife biologists and Lucas Reindler (Bright Diamond), the following surveys were required or omitted:

- Spring and Fall Migration surveys: **Required** - Spring migration surveys were completed in 2020, fall surveys were completed in 2021 (as approved by AEP);
- Bat acoustic monitoring surveys: **Required** – Completed both spring and fall rounds in 2021.
- Breeding Bird surveys: **Required** – Completed in the spring of 2020.
- Raptor Nest Surveys: **Required** – Initially completed in the spring of 2020 with nest status updates in 2021.
- Burrowing Owl Surveys: **Required** – Completed in the spring of 2021.
- Sharp-tailed Grouse Surveys: **Required** - Completed in spring 2020.
- Snake Hibernacula Surveys: **Not Required** - It is noted that snakes may still be found in the project area. Therefore, a Snake Protection Plan as outlined in AEP-WM Policy will be required.
- Amphibian Surveys: **Not Required** - No habitat in Project Area.



### 23. 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. Clearly state adherence to existing AEP survey protocols. If alternative survey methods were used provide details of the survey methods with justification and rationale for using alternative methods.

Survey protocols adhered to the *Bird Migration Survey Protocol* (AEP 2020a). Spring migration point count plots were placed within the Project Area to provide coverage of all habitat types, with additional plots outside the Project Area. Spring migration stopover counts were placed within the Project Area to cover potential stopover habitats, i.e., areas where birds rest and feed along their migratory route, with additional plots outside the Project Area. All plots were placed in locations that allowed the clearest field of view of the surrounding habitat.

Each point count plot was surveyed twice (one morning survey, one afternoon/evening survey) within the three spring periods (early spring, April 1 -30; mid spring, April 15 – May 15; and, late spring, May 1 – 30) for a total of six visits to each point count plot. Each point count plot was surveyed for 20 minutes. Stopover counts were each surveyed once during the three spring periods for a total of three visits. Each stopover plot was surveyed for 15 minutes.

Both point count plots and stopover plots consisted of 800 m radius plots. Prior to beginning each survey weather conditions (temperature, wind speed, cloud cover, and precipitation) were recorded. At both plot types, all birds seen and/or heard were recorded to species where possible. In some instances (e.g., distant birds, mixed flocks) birds were not identified to species and were grouped (e.g., unidentified duck, unidentified blackbird, unidentified passerine).

For each bird observation behaviour (perched, soaring, flapping, circle soaring, hovering), flight height, flight direction, distance from observer (0-400 m, 400-800 m, >800 m), and habitats the birds were observed using were recorded. Birds were assigned to guilds as defined in the *Bird Migration Survey Protocol* (AEP 2020a):

- **Passerines:** sparrow, warbler, blackbird, jay, lark, longspur, pipit, hummingbird, nighthawk, woodpecker.
- **Birds of Prey:** owl, hawk, falcon, eagle, vulture.
- **Grouse and Allies:** grouse, partridge, pheasant, turkey, ptarmigan.
- **Waterfowl:** swan, goose, duck,
- **Shorebirds/waterbirds:** sandpiper, heron, crane, egret, coot, rail, gull, phalarope, cormorant, pelican.
- **Others:** crow, raven, magpie, dove, pigeon.



Birds observed outside of the 800 m plot radius, and birds observed while travelling between plots, were recorded as incidental observations. Incidental observations are reported on in tables that include the > 800 m distance class (Tables 10 and 11).

**b) Provide the survey dates.**

Surveys were conducted on April 12, 13, and 14, 2020, for the early spring period, April 26 and 27, 2020 for the mid spring period, and May 14 and 15, 2020, for the late spring period.

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

Morning surveys were conducted between 5:45 AM and 9:20 AM and afternoon/evening surveys were conducted between 11:00 AM and 9:27 PM.

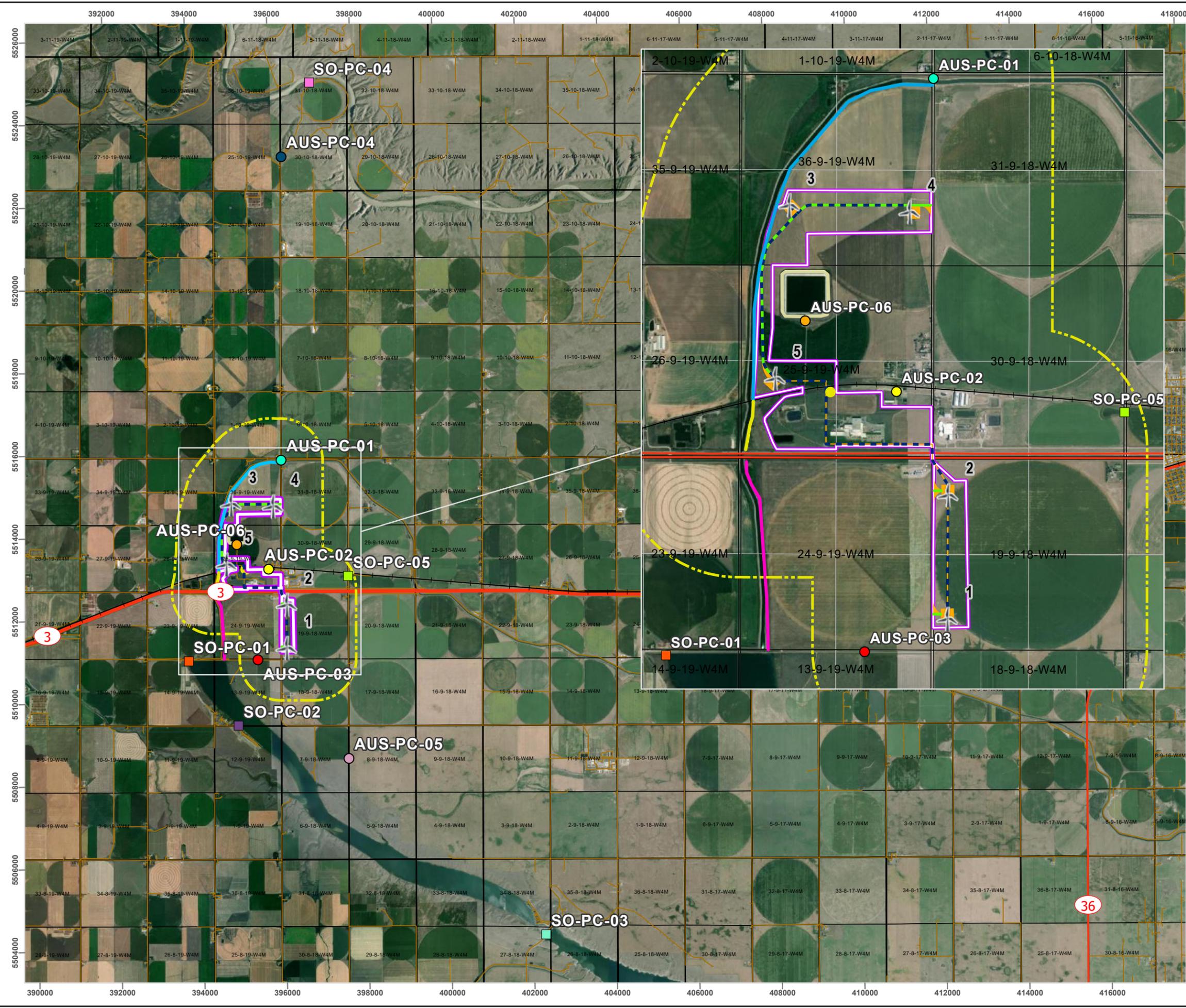
**d) Provide the number of survey points.**

Five point count plots (AUS-PC-01 through AUS-PC-05) were surveyed and four stopover plots (SO-PC-01 through SO-PC-04) were surveyed for a total of nine survey points.

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

Six hundred (600) minutes were spent surveying point count plots (five plots, AM and PM visits, three survey rounds, 20 minutes per survey) and 180 minutes were spent surveying stopover plots (four plots, three survey rounds, 15 minutes per survey) for a total of 780 minutes.

**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.**



# Bird Migration Survey Points for the Coaldale Wind Farm

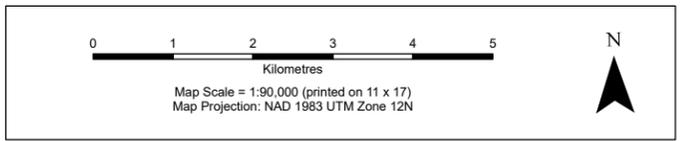
VALECO ENERGIE QUÉBEC INC.

**Legend**

<span style="color: cyan;">●</span> AUS-PC-01	<span style="border: 1px solid yellow;"> </span> Project Boundary
<span style="color: yellow;">●</span> AUS-PC-02	<span style="border: 1px dashed blue;"> </span> Collector System
<span style="color: red;">●</span> AUS-PC-03	<span style="border: 1px solid green;"> </span> Access
<span style="color: blue;">●</span> AUS-PC-04	<span style="border: 1px solid orange;"> </span> Other Disturbance (Pads, Turning Areas, Collector Lines)
<span style="color: purple;">●</span> AUS-PC-05	<span style="border: 1px solid purple;"> </span> Project Area
<span style="color: orange;">●</span> AUS-PC-06	<span style="border: 1px solid pink;"> </span> Wildlife Study Area
<span style="color: purple;">■</span> SO-PC-01	<span style="border: 1px solid black;"> </span> Base Data
<span style="color: purple;">■</span> SO-PC-02	<span style="border: 1px solid black;"> </span> Railway
<span style="color: purple;">■</span> SO-PC-03	<span style="border: 1px solid red;"> </span> Highway
<span style="color: purple;">■</span> SO-PC-04	<span style="border: 1px solid orange;"> </span> Road
<span style="color: purple;">■</span> SO-PC-05	<span style="border: 1px solid black;"> </span> Section
<span style="color: purple;">■</span> SO-PC-06	<span style="border: 1px solid black;"> </span> Transect Line
<span style="color: cyan;">—</span> SO-TR-01	<span style="color: cyan;">—</span> SO-TR-01
<span style="color: blue;">—</span> SO-TR-02	<span style="color: blue;">—</span> SO-TR-02
<span style="color: orange;">—</span> SO-TR-03	<span style="color: orange;">—</span> SO-TR-03
<span style="color: yellow;">—</span> SO-TR-04	<span style="color: yellow;">—</span> SO-TR-04

✶ Wind Turbine

AUS - Avian Use Survey (Bird Migration)    SO - Stop Over  
PC - Point Count    TR - Transect



**Data Sources**

- Main Map, World Imagery, Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
- Inset map, National Geographic, National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
- ATS Grid and roads, Altalis dataset.

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Drawn: Y. Navarro & P.Hesse	Checked: J. Muir	<b>Figure 4</b>	Date: 13/12/2022
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Path: L:\PROJECTS\2022\20220543\_Valeco\_CoaldaleWind\20220543\_maparea\_1m2020543\_Fig04\_BirdMigration\_202212



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

**Table 8. Weather conditions during spring migration bird surveys.**

Survey Date	Weather Conditions <sup>1</sup>	Comments
April 12, 2020	<b>Wind:</b> Beaufort 4 <b>Precipitation:</b> Snow flurries for some surveys <b>Temperature:</b> -1 to -3°C <b>Cloud cover:</b> >75%	-
April 13, 2020	<b>Wind:</b> Beaufort 2 <b>Precipitation:</b> Snow flurries for some surveys <b>Temperature:</b> -8 to -1°C <b>Cloud cover:</b> 25-75%	-
April 14, 2020	<b>Wind:</b> Beaufort 2 <b>Precipitation:</b> None <b>Temperature:</b> 1 to 10°C <b>Cloud cover:</b> >75%	-
April 26, 2020	<b>Wind:</b> Beaufort 4 <b>Precipitation:</b> None <b>Temperature:</b> 15 to 18°C <b>Cloud cover:</b> 51-75%	-
May 14, 2020	<b>Wind:</b> Beaufort 3 - Beaufort 4 <b>Precipitation:</b> None <b>Temperature:</b> 11 to 15°C <b>Cloud cover:</b> <10-25%	-
May 15, 2020	<b>Wind:</b> Beaufort 2 - Beaufort 3 <b>Precipitation:</b> None <b>Temperature:</b> 2 to 3°C <b>Cloud cover:</b> 10-75%	-

<sup>1</sup> Beaufort Wind Scale: Beaufort 0 < 1 km/hr, Beaufort 1 1-5 km/hr, Beaufort 2 6-11 km/hr, Beaufort 3 12-19 km/hr, Beaufort 4 20-28 km/hr, Beaufort 5 29-38 km/hr, Beaufort 6 39-49 km/hr.



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

The habitat types and land use within the 800 m plots were:

- AUS-PC-01: Cultivation, Stafford Reservoir Irrigation Canal, Residential;
- AUS-PC-02: Cultivation, Tame Grassland, Industrial, Residential;
- AUS-PC-03: Cultivation, Tame Grassland, Stafford Reservoir;
- AUS-PC-04: Cultivation, Tame Grassland, Native Grassland;
- AUS-PC-05: Cultivation, Tame Grassland;
- SO-PC-01: Cultivation, Hay land, Tame Grassland, Stafford Reservoir;
- SO-PC-02: Cultivation, Tame Grassland, Residential, Stafford Reservoir;
- SO-PC-03: Cultivation, Native Grassland, Residential, Stafford Reservoir, Industrial (wind turbines); and,
- SO-PC-04: Cultivation, Native Grassland, Oldman River

**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.**

The number of birds observed in plots was highest in the early spring period (1,455 individuals) followed by mid-spring (490 individuals) and late-spring (147 individuals). The most commonly observed guild was waterfowl (1,376 individuals) followed by shorebirds and waterbirds (622 individuals). The plots with the highest bird activity were SO-PC-01 (458 individuals), AUS-PC-01 (417 individuals), and AUS-PC-03 (338 individuals).

**Table 9. Spring Migration Bird Surveys: observations by Survey Location and Round Table: Number of individuals detected within plot (800 m radius) at each survey location (point surveys and stop over points) during each survey round.**

Survey Location	Time 1	Time 2	Time 3	Total Number of Individuals Detected
AUS-PC-01	250	109	58	417
AUS-PC-02	84	179	31	294
AUS-PC-03	267	61	10	338
AUS-PC-04	19	25	19	63
AUS-PC-05	31	26	12	69
SO-PC-01	458	0	0	458
SO-PC-02	148	0	0	148
SO-PC-03	180	0	90	189
SO-PC-04	18	13	8	39
<b>Total</b>	<b>1,455</b>	<b>490</b>	<b>147</b>	<b>2,015</b>



Table 10. Spring migration bird surveys: observations by species table.

Species	Provincial General Status	Number of Individuals	Number of Flocks <sup>1</sup> (greater than 2 birds of the same species)	Number of individuals observed within 0-400 m	Number of individuals observed within 400-800 m	Number of individuals observed greater than 800 m
American Coot	Secure	130	1	-	130	-
American Crow	Secure	11	2	7	4	-
American Robin	Secure	5	1	5	-	-
American White Pelican	Sensitive	7	2	-	7	-
American Wigeon	Secure	30	1	-	30	-
Bald Eagle	Sensitive	2	-	-	-	2
Barn Swallow	May Be at Risk	1	-	1	-	-
Brewer's Blackbird	Secure	221	16	118	103	-
Bufflehead	Secure	4	1	-	4	-
Canada Goose	Secure	239	37	78	62	99
Canvasback	Secure	20	1	-	20	-
Common Goldeneye	Secure	20	3	-	20	-
Common Raven	Secure	1	-	1	-	-
European Starling	Exotic/Alien	3	1	3	-	-
Franklin's Gull	Secure	41	5	4	37	-
Great Horned Owl	Secure	1	-	1	-	-
Herring Gull	Secure	24	3	24	-	-
Horned Lark	Secure	4	-	4	-	-
Killdeer	Secure	4	-	2	2	-
Lesser Scaup	Secure	80	2	-	80	-
Mallard	Secure	82	17	47	28	7
Merlin	Secure	3	-	3	-	-



Mourning Dove	Secure	8	3	8	-	-
Northern Harrier	Secure	1	-	-	1	-
Northern Pintail	Secure	27	2	2	25	-
Northern Shoveler	Secure	360	4	170	190	-
Osprey	Secure	1	-	-	-	1
Red-winged Blackbird	Secure	17	3	13	4	-
Ruddy Duck	Secure	20	1	-	20	-
Snow Goose	Secure	262	7	1	229	32
Swainson's Hawk	Secure	2	1	2	-	-
Unknown Blackbird	NA	24	2	24	-	-
Unknown Duck	NA	232	30	21	147	64
Unknown Gull	NA	386	35	52	136	198
Unknown Hawk	NA	2	-	-	1	1
Unknown Passerine	NA	110	24	78	21	11
Western Meadowlark	Secure	15	1	14	1	-
<b>Western Grebe</b>	At Risk	5	-	-	5	-

<sup>1</sup> Flocks are defined as a group of greater than 2 birds of the same species gathered or moving together.



Table 11. Spring migration bird surveys: bird guild summary table.

Bird Guild	Number of Individuals	Number of Flocks <sup>1</sup>	Number of individuals observed within 0-400 m	Number of individuals observed within 400-800 m	Number of individuals observed greater than 800 m
Passerines	400	48	260	129	11
Birds of Prey	12	1	6	2	4
Waterfowl	1,376	106	319	855	202
Shorebirds /waterbirds	622	48	82	342	198
Others	20	5	16	4	0

<sup>1</sup> Flocks are defined as a group of greater than 2 birds of the same species gathered or moving together.

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

**a. Point count**

1,181 individuals were observed within point count plots (800 m radius).

**b. Stopover count**

834 individuals were observed within stopover count plots (800 m radius).

**c. Combined**

2,015 individuals were observed within both plot types (800 m radius).

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

**a. Point count**

22 species were observed within point count plots (800 m radius; does not include birds not identified to species).

**b. Stopover count**

16 species were observed within point count plots (800 m radius; does not include birds not identified to species).

**c. Combined**

31 species were observed within both plot types (800 m radius; does not include birds not identified to species).

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

An average of 2.58 birds per minute of survey time were observed within plots (800 m radius).



- 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.**

Bird activity was the highest in early spring counts, and bird activity decreased in each subsequent survey round. The most common guilds were waterfowl and shorebirds/waterbirds. Waterfowl observations consisted of common ducks and geese (Table 10) and shorebird/waterbird observations consisted primarily of gulls (386/622 observations; Table 10) and American Coots (130/622 observations; Table 10).

The three survey plots with the highest bird activity all correspond to plots adjacent to water features. AUS-PC-01 was adjacent to Stafford Reservoir Irrigation Canal, and SO-PC-01 and SO-PC-03 were adjacent to Stafford Reservoir, indicating that water features are an attractant to birds. These three plots are all greater than one kilometre from the nearest proposed turbine locations.

Of the 2,015 individuals observed within plots, 303 (15%) were observed flying in the strike zone of the proposed turbines (40 – 200 m above ground). The majority of these individuals were flocks of geese (i.e., Canada Goose, 64 individuals; Snow Goose, 222 individuals).

Two species (Bald Eagle, American White Pelican) with a Provincial General Status of Sensitive were observed, one species (Barn Swallow) with a Provincial status of *May be at Risk* was observed, and one species (Western Grebe) with a Provincial General Status of *At Risk* was observed. One Bald Eagle was observed soaring at a height of 50 m over a coulee associated with the Stafford Reservoir at AUS-PC-05, approximately 3 km southeast of the nearest turbine, and one Bald Eagle was observed flying north at a height of 30 m at AUS-PC-01, approximately 1.1 km north of the nearest turbine. One American White Pelican was observed at SO-PC-03, approximately 9 km southeast of the nearest proposed turbine, and one American White Pelican was observed at SO-PC-04, approximately 8.5 km north of the nearest proposed turbine. One Barn Swallow was observed flying north at a height of 10 m at AUS-PC-01, approximately 1.1 km north of the nearest turbine. One Western Grebe was observed on the Stafford Reservoir at SO-PC-03, approximately 9 km southeast of the nearest proposed turbine. None of these sensitive species were observed flying within the strike zone (40 – 200 m above ground) of the proposed turbines.

There were 459 observations of nine species or species groups incidentally observed during surveys (i.e., >800 m from plot centre; Tables 10 and 11).



## 24. 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. Clearly state adherence to existing AEP survey protocols. If alternative survey methods were used provide details of the survey methods with justification and rationale for using alternative methods.**

Fall migration surveys followed the same protocol described in question 23.a and adhered to the *Bird Migration Survey Protocol* (AEP 2020a). Incidental observations were birds observed outside of plots (i.e., > 800 m from plot centre). Early, mid, and late fall periods were August 15 – September 30, September 15 – October 30, and October 15 – November 15, respectively.

In 2021 fall migration surveys, only four point count plots and two stopover count plots were completed; however, four stopover transects were added. Only three of the point count plots from 2020 were revisited (AUS-PC-01, AUS-PC-02, and AUS-PC-04), and only one of the stopover count plots from 2020 was revisited (SO-PC-06).

- b) **Provide the survey dates.**

Surveys were conducted on August 18, 2021, for the early fall period, September 15 and 16, 2021 for the mid fall period, and October 15 and 16, 2021, for the late fall period.

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

Morning surveys were conducted between 6:45 AM and 11:10 AM and afternoon/evening surveys were conducted between 12:47 PM and 7:56 PM.

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

Four point count plots (AUS-PC-01, AUS-PC-02, AUS-PC-04, and AUS PC-06) were surveyed, two stopover plots (SO-PC-01 and SO-PC-06) were surveyed, and four stopover transects (SO-TR-01 through SO-TR-04) for a total of six survey points and four survey transects.

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

480 minutes were spent surveying point count plots (four plots, AM and PM visits, three survey rounds, 20 minutes per survey); 120 minutes were spent surveying stopover plots (two plots, three survey rounds, 20 minutes per survey); and 179 minutes were spent surveying transects, for a total of 779 minutes.



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

Figure 4 above (Section 6 Question 26) includes both spring and fall bird migration survey points.

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

Table 12. Weather conditions during fall migration bird surveys.

Survey Date	Weather Conditions <sup>1</sup>	Comments
August 18, 2021	<b>Wind:</b> Beaufort 1 – Beaufort 2 <b>Precipitation:</b> None <b>Temperature:</b> -1 to -3°C <b>Cloud cover:</b> 51 to >75%	-
September 15, 2021	<b>Wind:</b> Beaufort 1 – Beaufort 3 <b>Precipitation:</b> None <b>Temperature:</b> 12 to 15°C <b>Cloud cover:</b> 10 - 75%	-
September 16, 2021	<b>Wind:</b> Beaufort 1 – Beaufort 2 <b>Precipitation:</b> None <b>Temperature:</b> 0 to -10°C <b>Cloud cover:</b> 10-25%	-
October 15, 2021	<b>Wind:</b> Beaufort 6 <b>Precipitation:</b> None <b>Temperature:</b> 13 to 16°C <b>Cloud cover:</b> 10-25%	Only stopover transects were conducted under high winds. Point counts and stopover plots were conducted under more favourable conditions.
October 16, 2021	<b>Wind:</b> Beaufort 1 – Beaufort 5 <b>Precipitation:</b> None <b>Temperature:</b> 9 to -20°C <b>Cloud cover:</b> 10-50%	-

<sup>1</sup> Beaufort Wind Scale: Beaufort 0 < 1 km/hr, Beaufort 1 1-5 km/hr, Beaufort 2 6-11 km/hr, Beaufort 3 12-19 km/hr, Beaufort 4 20-28 km/hr, Beaufort 5 29-38 km/hr, Beaufort 6 39-49 km/hr.

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

The habitat types and land use within the 800 m plots were:

- AUS-PC-01: Cultivation, Stafford Reservoir Irrigation Canal, Residential;
- AUS-PC-02: Cultivation, Tame Grassland, Industrial, Residential;
- AUS-PC-04: Cultivation, Tame Grassland, Native Grassland;
- AUS-PC-06: Cultivation, Tame Grassland, McCain wastewater pond;
- SO-PC-01: Cultivation, Hay land, Tame Grassland, Stafford Reservoir;
- SO-PC-05: Cultivation, Dugout;
- SO-TR-01: Cultivation, Stafford Reservoir Irrigation Canal;



- SO-TR-02: Tame Grassland, Industrial;
- SO-TR-03: Cultivation, Tame Grassland, Residential; and,
- SO-TR-04: Cultivation, Tame Grassland, McCain wastewater pond.

- 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.**

The number of birds observed in plots was highest in the mid- and late-fall survey periods (4,165 and 4,169 individuals, respectively) and lowest in the early-fall survey period (860). The most commonly observed guild was waterfowl (5,020 individuals) followed by shorebirds and waterbirds (4,719 individuals). The plots with the highest bird activity were SO-PC-05 (3,135 individuals) and AUS-PC-03 (2,561 individuals).

**Table 13. Fall Migration Bird Surveys: observations by Survey Location and Round Table: Number of individuals detected within plot (800 m radius) at each survey location (point surveys, stop over points, and stopover transects) during each survey round.**

Survey Location	Time 1	Time 2	Time 3	Total Number of Individuals Detected
AUS-PC-01	136	316	42	494
AUS-PC-03	10	2,310	241	2,561
AUS-PC-04	16	259	14	289
AUS-PC-06	196	266	277	739
SO-PC-01	204	111	6	321
SO-PC-05	7	20	3,108	3,135
SO-TR-01	28	446	86	560
SO-TR-02	77	29	85	191
SO-TR-03	114	406	310	830
SO-TR-04	72	2	-	74
Total	860	4,165	4,169	9,194



Table 14. Fall Migration Bird Survey: observations by species.

Species	Provincial General Status	Number of Individuals	Number of Flocks <sup>1</sup>	Number of individuals observed within 0-400 m	Number of individuals observed within 400-800 m	Number of individuals observed greater than 800 m
American Coot	Secure	29	2	22	7	-
American Kestrel	Sensitive	1	-	1	-	-
American Robin	Secure	14	2	14	-	-
American White Pelican	Sensitive	1	-	-	1	-
Barn Swallow	May Be at Risk	34	4	34	-	-
Black Tern	Sensitive	1	-	1	-	-
Black-billed Magpie	Secure	3	-	3	-	-
Black-necked Stilt	Sensitive	11	1	11	-	-
Blue-winged Teal	Secure	21	3	21	-	-
Brewer's Blackbird	Secure	128	6	128	-	-
Brown-headed Cowbird	Secure	102	4	85	17	-
Bufflehead	Secure	26	3	18	8	-
California Gull	Secure	1	-	1	-	-
Canada Goose	Secure	2,717	34	1,456	111	1,150
Clay-coloured Sparrow	Secure	17	3	17	-	-
Common Goldeneye	Secure	56	8	44	12	-
Common Grackle	Secure	6	2	4	2	-
Common Merganser	Secure	6	2	6	-	-
Common Raven	Secure	1	-	-	1	-
Double-crested Cormorant	Secure	1	-	1	-	-
Eared Grebe	Sensitive	10	1	10	-	-
Eastern Kingbird	Sensitive	6	1	6	-	-
European Starling	Exotic/Alien	85	16	85	-	-



Franklin's Gull	Secure	130	3	95	35	-
Gadwall	Secure	31	3	31	-	-
Gray Partridge	Exotic/Alien	45	5	30	15	-
Greater White-fronted Goose	Secure	3	1	3	-	-
Greater Yellowlegs	Secure	1	0	1	-	-
Green-winged Teal	Secure	19	3	19	-	-
Hooded Merganser	Secure	16	2	16	-	-
Horned Grebe	Sensitive	2	1	2	-	-
Horned Lark	Secure	17	3	17	-	-
House Sparrow	Exotic/Alien	74	5	74	-	-
Killdeer	Secure	7	2	7	-	-
Lesser Scaup	Secure	25	1	25	-	-
Lesser Yellowlegs	Secure	6	2	6	-	-
Loggerhead Shrike	Sensitive	1	-	1	-	-
Mallard	Secure	651	16	148	503	-
Merlin	Secure	1	-	1	-	-
Mourning Dove	Secure	76	12	76	-	-
Northern Harrier	Secure	8	-	3	5	-
Northern Pintail	Secure	2	1	2	-	-
Northern Shoveler	Secure	14	2	14	-	-
Osprey	Secure	7	1	6	1	-
Prairie Falcon	Sensitive	1	-	1	-	-
Redhead	Secure	20	1	20	-	-
Red-tailed Hawk	Secure	5	1	1	4	-
Red-winged Blackbird	Secure	10	1	10	-	-
Ring-billed Gull	Secure	4,493	27	1,559	2,434	500
Ring-necked Duck	Secure	85	1	85	-	-
Rock Pigeon	Exotic/Alien	1	-	1	-	-
Ross's Goose	Secure	6	1	6	-	-



Ruddy Duck	Secure	10	1	10	-	-
Sanderling	Secure	7	1	7	-	-
Spotted Sandpiper	Secure	27	1	27	-	-
Swainson's Hawk	Secure	3	4	3	-	-
Unknown Blackbird	NA	1159	1	409	250	500
Unknown Duck	NA	1,300	7	-	1,000	300
Unknown Hawk	NA	2	3	1	1	-
Unknown Passerine	NA	13	-	13	-	-
Unknown Sparrow	NA	60	1	60	-	-
Vesper Sparrow	Secure	8	2	6	2	-
Western Kingbird	Secure	4	2	4	-	-
Western Meadowlark	Secure	13	1	13	-	-
Willet	Secure	4	3	4	-	-

<sup>1</sup> Flocks are defined as a group of greater than 2 birds of the same species gathered or moving together.



Table 15. Fall migration bird survey: bird guild summary table.

Bird Guild	Number of Individuals	Number of Flocks <sup>1</sup>	Number of individuals observed within 0-400 m	Number of individuals observed within 400-800 m	Number of individuals observed greater than 800 m
Passerines	1,751	62	980	271	500
Birds of Prey	28	3	17	11	0
Grouse and Allies	45	5	30	15	0
Waterfowl	5,020	88	1,936	1,634	1,450
Shorebirds/ waterbirds	4,719	44	1,742	2477	500
Others	81	12	80	1	0

<sup>1</sup> Flocks are defined as a group of greater than 1 bird of the same species gathered or moving together.

**j) Provide a count of the total number of individuals observed during the surveys.**

**a. Point count**

4,083 individuals were observed within point count plots (800 m radius).

**b. Stopover count**

3,456 individuals were observed within stopover count plots (800 m radius) and 1,655 individuals were observed on stopover transects (1.6 km width) for a total of 5,111 individuals observed on stopover surveys.

**c. Combined**

9,194 individuals were observed within both plot types (800 m radius point count and stopover count and 1.6 km width transect surveys).

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

**a. Point count**

36 species were observed within point count plots (800 m radius; does not include birds not identified to species).

**b. Stopover count**

43 species were observed within stopover count plots (800 m radius) and transects (1.6 km width; does not include birds not identified to species).



**c. Combined**

60 species were observed across all plot types.

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

An average of 11.8 birds per minute of survey time were observed within plots (800 m radius).

**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.**

Bird activity was the highest during the mid- and late-fall survey periods, and bird activity was lowest in the early-fall survey period. The most common guilds were waterfowl and shorebirds/waterbirds. Waterfowl observations consisted of common ducks and geese (Table 15) and shorebird/waterbird observations consisted primarily of Ring-billed Gulls (4,493/4,719) observations; Table 15).

The two survey plots with the highest bird activity correspond to plots adjacent to or near water features. SO-PC-05 was adjacent to a Class IV wetland, and AUS-PC-03 was approximately 750 m east of Stafford Reservoir. As with the spring migration surveys, this suggests that water features are a habitat attraction for birds in the region. These three plots are all more than one kilometre from the nearest proposed turbine location. AUS-PC-03 is approximately 800 m from the nearest proposed turbine and SO-PC-05 is approximately 1.6 km from the nearest proposed turbine.

Of the 9,194 individuals observed within plots, 3,853 (42%) were observed flying in the strike zone of the proposed turbines (40 – 200 m above ground). The majority of these individuals were flocks of gulls and ducks (Ring-billed Gull, 2,239 individuals; mixed duck flock, 1,000 individuals).

Nine species with a Provincial General Status of *Sensitive* were observed:

- American Kestrel: hovering at AUS-PC-01, approximately 1.1 km north of the nearest proposed turbine, then flying north at a height of 25 m;
- American White Pelican: soaring at a height of 70 m at SO-PC-01, approximately 2.4 km west of the nearest proposed turbine;
- Black Tern: flying south at a height of 10 m at SO-PC-01, approximately 2.4 km west of the nearest proposed turbine;
- Black-necked Stilt: flying east at a height of 30 m at AUS-PC-02, approximately 860 m north of the nearest proposed turbine;
- Eared grebe: swimming on Stafford Reservoir at SO-PC-01, approximately 2.4 km west of the nearest turbine;



- Eastern Kingbird: perched, then flying north at a height of 5 m at AUS-PC-02, approximately 860 m north of the nearest proposed turbine, flying west at a height of 20 m at AUS-PC-04, approximately 8.5 km north of the nearest proposed turbine;
- Horned Grebe: observed on SO-TR-03 approximately 820 m south of the nearest proposed turbine;
- Loggerhead Shrike: perched at AUS-PC-04, approximately 8.5 km north of the nearest proposed turbine; and,
- Prairie Falcon: observed flying south at a height of 20 m, then perched at AUS-PC-03, approximately 800 m southwest of the nearest proposed turbine.

One species with a Provincial General Status of *May be at Risk* was observed (Barn Swallow). Seven individuals were observed flying in various directions at heights between 15-25 m at AUS-PC-02, approximately 860 m north of the nearest proposed turbine. One individual was observed flying north at a height of 20 m and 17 individuals were observed flying west at a height of 25 m at AUS-PC-02, approximately 860 m north of the nearest turbine. Ten individuals were observed on SO-TR-02.

Of the Sensitive Species observed, only one, American White Pelican, was observed flying in the strike zone (40 – 200 m above ground) of proposed turbines.

There were 2,450 observations of four species or species groups incidentally observed during surveys (i.e., >800 m from plot centre; Table 14), corresponding to four large flocks.

## 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.**

Survey protocols within the AEP-WM *Sensitive Species Inventory Guidelines* (AEP 2013a) were followed for breeding bird surveys. Plot locations were selected to survey all landcover types within the Project Area, for a total of 20 plots. Two five-minute survey rounds were conducted at each plot with all birds heard and seen recorded. Plots consisted of a 100 m radius circular point count, with birds heard or seen outside of 100 m and bird flying over or through the plot being considered incidental. Incidental observations were recorded and are reported on below.

- b) **Provide the survey dates.**

Surveys were completed on June 3 and June 24, 2020.



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

Surveys were completed between 5:02 AM and 9:55 AM on June 03, 2020, and between 5:06 AM and 9:34 AM on June 24, 2020.

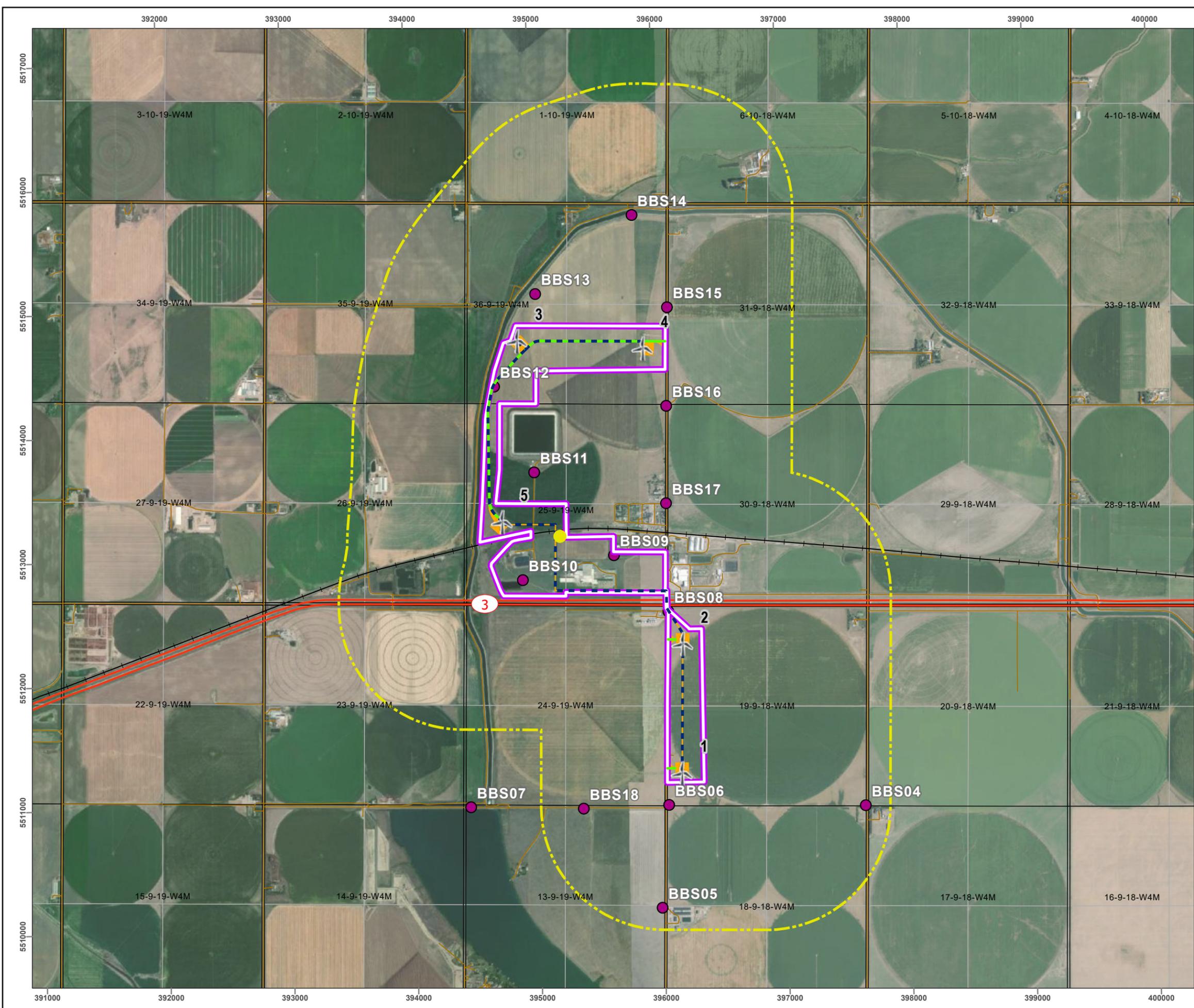
**d) Provide the number of survey points.**

20 plots were surveyed.

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

200 minutes.

**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.**

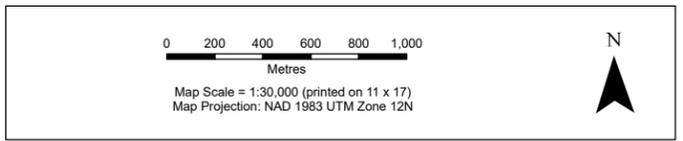


# Breeding Bird Survey Points for the Coaldale Wind Farm

**VALECO ENERGIE QUÉBEC INC.**

**Legend**

- Breeding Bird Survey
- Wind Turbine
- Project Boundary**
- Substation
- Access
- Collector System
- Other Disturbance (Pads, Turning Areas, Collector Lines)
- Project Area
- Wildlife Study Area
- Base Data**
- Highway
- Railway
- Road
- Section
- Quarter Section



**Data Sources**

- Main Map, World Imagery, Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
- Inset map, National Geographic, National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
- ATS Grid and roads, Altalis dataset.

**Disclaimer**  
 EDI Environmental Dynamics Inc. has made every effort to ensure this map is free of errors. Data has been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: Y. Navarro & P.Hesse	Checked: J. Muir	<b>Figure 5</b>	Date: 13/12/2022
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- g) Provide weather conditions during each survey date and time in a table with the following headings.

Table 16. Weather conditions during breeding bird surveys.

Survey Date	Weather Conditions <sup>1</sup>	Comments
June 3, 2020	<b>Wind:</b> Beaufort 1 – Beaufort 2 <b>Precipitation:</b> None <b>Temperature:</b> 7-12°C <b>Cloud cover:</b> <10%	
June 24, 2020	<b>Wind:</b> Beaufort 2 <b>Precipitation:</b> None <b>Temperature:</b> 17°C <b>Cloud cover:</b> 10-25%	

<sup>1</sup> Beaufort Wind Scale: Beaufort 0 < 1 km/hr, Beaufort 1 1-5 km/hr, Beaufort 2 6-11 km/hr, Beaufort 3 12-19 km/hr, Beaufort 4 20-28 km/hr, Beaufort 5 29-38 km/hr, Beaufort 6 39-49 km/hr.

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

Land use within the surveyed area consisted of Cultivation, Hay land, and Tame Grassland. Cultivation was the most common dominant habitat at 13 plots, followed by Tame Grassland at three plots and Hay land at two plots. One plot (BBS11) was adjacent to the McCain wastewater pond, and two plots (BBS12 and BBS13) were adjacent to the Stafford Reservoir Irrigation Canal.

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

Number of birds observed at plots was similar between survey round one (181 individuals; Table 17) and survey round 2 (167 individuals; Table 17). Plot BBS-17 had the highest number of individuals observed on a single survey round (24 individuals on survey round 2; Table 17) and was also the plot with the highest species richness (12 species observed).

**Average species richness (number of species observed) by habitat type:**

- average species richness in Cultivation (13 plots): 7.7 species/plot;
- average species richness in Hay land (2 plots): 9 species/plot;
- average species richness in Native Grassland (1 plot): 8 species/plot; and,
- average species richness in Tame Grassland (3 plots): 6 species/plot.

**Average species abundance (number of individuals observed) by habitat type:**

- average species abundance in Cultivation (13 plots): 17.6 individuals/plot;
- average species abundance in Hay land (2 plots): 14.5 individuals/plot;
- average species abundance in Native Grassland (1 plot): 17 individuals/plot; and,
- average species abundance in Tame Grassland (3 plots): 18.3 individuals/plot.



Table 17. Breeding bird surveys: survey location and round summary table: number of individuals detected at each survey location during each round.

Survey Location	Time 1	Time 2	Total Number of Individuals Detected
BBS01	7	8	15
BBS02	4	6	10
BBS03	13	19	32
BBS04	6	8	14
BBS05	11	11	22
BBS06	13	11	24
BBS07	15	10	25
BBS08	16	4	20
BBS09	8	5	13
BBS10	10	6	16
BBS11	7	8	15
BBS12	5	6	11
BBS13	9	6	15
BBS14	5	6	11
BBS15	4	5	9
BBS16	13	4	17
BBS17	13	24	37
BBS18	8	6	14
BBS19	4	7	11
BBS20	10	7	17
<b>Total</b>	<b>181</b>	<b>167</b>	<b>348</b>



**Table 18. Breeding bird surveys: observations by species table.**

Species	Provincial General Status	Number of Individuals
American Crow	Secure	1
American Robin	Secure	10
Barn Swallow	May Be at Risk	6
Black-billed Magpie	Secure	9
Blue-winged Teal	Secure	2
Brewer's Blackbird	Secure	30
Brown-headed Cowbird	Secure	39
Canada Goose	Secure	4
Clay-coloured Sparrow	Secure	15
Common Goldeneye	Secure	2
Common Grackle	Secure	3
Common Loon	Secure	1
Eastern Kingbird	Sensitive	2
European Starling	Exotic/Alien	22
Horned Lark	Secure	39
House Sparrow	Exotic/Alien	2
Killdeer	Secure	8
Mallard	Secure	11
Mourning Dove	Secure	5
Red-winged Blackbird	Secure	25
Rock Pigeon	Exotic/Alien	7
Savannah Sparrow	Secure	22
Spotted Sandpiper	Secure	5
Vesper Sparrow	Secure	32
Western Kingbird	Secure	2
Western Meadowlark	Secure	40
Wilson's Snipe	Secure	2
Yellow Warbler	Secure	1
Yellow-rumped Warbler	Secure	1

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

348 individuals were observed in plots (within 100 m of plot centre) during the surveys.

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

Twenty-nine species were observed in plots (within 100 m of plot centre) during the surveys.



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

An average of 1.74 birds were observed in plots (within 100 m of plot centre) per minute 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.**

Birds observed during breeding bird surveys consisted of species common in disturbed agriculturally dominated landscapes. The most commonly occurring species were Western Meadowlark (40 individuals), Brown-headed Cowbird (39 individuals) and Horned Lark (39 individuals). Six Barn Swallows, which have a Provincial General Status of *May be at Risk* were observed at plot BBS17, approximately 660 m from the nearest proposed Project infrastructure, and are likely associated with the outbuildings in the northwest corner of the plot. Two Western Kingbirds, which have a Provincial General Status of *Sensitive*, were observed: one at plot BBS17 (approximately 660 m from the nearest proposed Project infrastructure) and one at plot BBS19 (approximately 1.8 km from the nearest proposed Project infrastructure). The isolated nature of these observations, the distance from proposed Project infrastructure, and the bird's habituation to chronic disturbance in the area suggest the Project will be low risk for these species.

Plot BBS17 had the highest species richness (12) and abundance (37) of all plots. This is likely due to the treed yard sites in the west half of the plot, which provide higher habitat potential than the Cultivation that dominates the Project Area.

**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 1 – July 15<sup>th</sup>)? If no, detail any proposed alternative mitigation(s) the proponent will implement to meet the intent of the Directive.**

The Project is not sited within native habitats; therefore, this question is not applicable.

**29. Raptor nest surveys: Raptor nest surveys must be conducted for the entire project area plus 1,000 m 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.**

Survey protocols within the AEP-WM *Sensitive Species Inventory Guidelines* (AEP 2013a) were followed for raptor nest surveys, specifically survey protocols in section 7.0 *Prairie Raptors*. Surveys consisted of a visual search of the Project Area conducted by a qualified wildlife biologist. Surveys



were conducted during favourable weather conditions (wind speed below level 6 on the Beaufort Scale, no precipitation) in daylight hours (half hour after sunrise until half hour before sunset).

An early season survey was conducted prior to leaf out, when stick nests are easier to identify. A second survey was conducted during the breeding season (May 1 – June 30) to check identified nests for occupancy. Where a bird was seen occupying the nest or exhibiting agitated behaviour (swooping, calling) the nest was considered occupied. Nests that did not have birds present were examined to look for whitewash (feces), eggshells, down and feather, and prey carcasses under the nest.

**b) Provide the survey dates.**

Raptor nest surveys were conducted on April 14 and May 15, 2020, and April 6 and 28, and June 21, 2022. Additionally, all days where wildlife biologists were on site, the Project Area was scanned for raptor nests.

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

**Table 19. Weather conditions during raptor nest surveys.**

Survey Date	Weather Conditions <sup>1</sup>	Comments
April 14, 2020	<b>Wind:</b> Beaufort 3 – Beaufort 4 <b>Precipitation:</b> None <b>Temperature:</b> -1-10°C <b>Cloud cover:</b> >75%	
May 15, 2020	<b>Wind:</b> Beaufort 1 – Beaufort 2 <b>Precipitation:</b> None <b>Temperature:</b> 0-1°C <b>Cloud cover:</b> >75%	
April 6, 2022	<b>Wind:</b> Beaufort 2-4 <b>Precipitation:</b> None <b>Temperature:</b> 0 - 8°C <b>Cloud cover:</b> <10 - 25%	
April 28, 2022	<b>Wind:</b> Beaufort 2 <b>Precipitation:</b> None <b>Temperature:</b> -2 - 9°C <b>Cloud cover:</b> <10%	
June 21, 2022	<b>Wind:</b> Beaufort 2 <b>Precipitation:</b> None <b>Temperature:</b> 9 - 12°C <b>Cloud cover:</b> <10%	

<sup>1</sup> Beaufort Wind Scale: Beaufort 0 < 1 km/hr, Beaufort 1 1-5 km/hr, Beaufort 2 6-11 km/hr, Beaufort 3 12-19 km/hr, Beaufort 4 20-28 km/hr, Beaufort 5 29-38 km/hr, Beaufort 6 39-49 km/hr.



**d) Survey results: Were raptor nests found?**

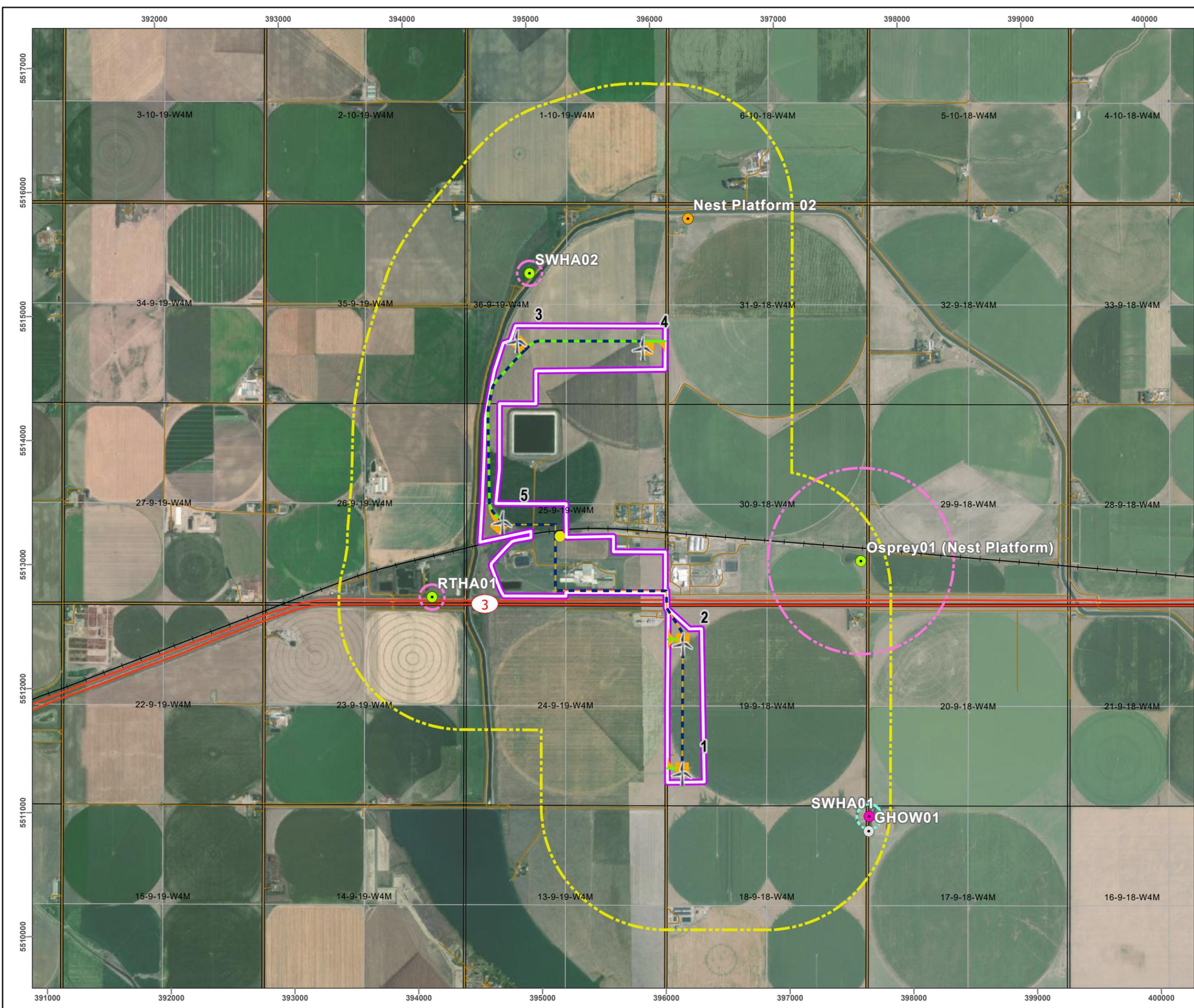
Yes. Three active raptor nests were observed in 2020, two in 2021, and three confirmed active nests and one unconfirmed nest in 2022.

**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 metres from the edge of the nest to the nearest edge of project related disturbance.**

**Table 20. Raptor nesting locations and proximity to Project infrastructure.**

Nest ID	Species	Location of nest (UTM NAD 83)	Is the required setback met (Y/N)	Distance from nest to nearest project related disturbance (m)	Comments
GHOW01	Great Horned Owl	12U 397658E 5510733N	Y	N/A	Identified in 2020. Occupied in 2020, status unconfirmed in 2021, no nest observed in 2022.
RTHA01	Red-tailed Hawk	12U 394202E 5512685N	Y	780	Identified in 2020. Occupied in 2020, 2021, 2022.
SWHA01	Swainson's Hawk	12U 397663E 5510850N	Y	1,520	Identified in 2020. Occupied in 2020, unconfirmed in 2021 and 2022.
SWHA02	Swainson's Hawk	12U 394995E 5515279N	Y	590	Identified in 2021. Occupied in 2021, unoccupied in 2022.
SWHA03	Swainson's Hawk	12U 397521E 5512522N	Y	1,300	Identified in 2022. Occupied in 2022.
Osprey01	Osprey	12U 397632E 5512912N	Y	1,500	Man-made nest platform – Identified in 2020. Occupied in 2020, 2021 and 2022.
Nest Platform02	NA	12U 396282E 5515698N	Y	NA	Man-made nest platform – Identified in 2020. Not occupied in 2020, 2021 or 2022.

**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.**

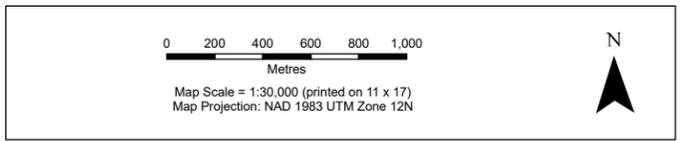


# Raptor Nests Identified for the Coaldale Wind Farm

VALECO ENERGIE QUÉBEC INC.

**Legend**

<b>Raptor Nests</b>	<b>Project Boundary</b>
○ Absent	● Substation
● Active	— Collector System
● Inactive	— Access
● Unconfirmed	■ Other Disturbance (Pads, Turning Areas, Collector Lines)
<b>Raptor Nest Buffers</b>	▭ Project Area
▭ Precautionary	▭ Wildlife Study Area
▭ Restrictive	<b>Base Data</b>
✈ Wind Turbine	— Highway
	— Railway
	— Road
	□ Section
	□ Quarter Section



**Data Sources**

- Main Map, World Imagery, Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
- Inset map, National Geographic, National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
- ATS Grid and roads, Altalis dataset.

**Disclaimer**  
 EDI Environmental Dynamics Inc. has made every effort to ensure this map is free of errors. Data has been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: Y. Navarro & P.Hesse	Checked: J. Muir	<b>Figure 6</b>	Date: 14/12/2022
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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.

Not applicable.

- 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.

In addition to the five active nests identified during raptor nest surveys, there were 40 observations of raptors during spring and fall migration surveys. This total does not indicate the presence of 40 individual raptors, however, as observations are tallied from all surveys on all dates in the spring and fall. The maximum counts for each species (highest number of individuals seen at the same survey location at the same time) are as follows:

- American Kestrel: one individual, flapping and hovering over tame pasture;
- Bald Eagle: one individual, flying over cultivation and tame pasture;
- Great Horned Owl: one individual, perched and flying in tame pasture;
- Merlin: one individual, flying over cultivation and tame pasture and hunting over cultivation;
- Osprey: three individuals, perched and flying in tame pasture and hayland;
- Prairie Falcon: one individual, perched and flying in cultivation and tame pasture;
- Red-tailed Hawk: two individuals, perched and flying in tame pasture; and,
- Swainson's Hawk: two individuals, flying over cultivation.

The habitat and land use within the Project area is dominated by Cultivation and Tame Grassland which provides low quality hunting/foraging opportunities for raptors. Additionally, a lack of nest sites (i.e., trees) in the Project Area provide limited nesting opportunities. The nests that were identified occurred in yard sites adjacent to roads and cultivated areas, suggesting these birds are habituated to chronic disturbance from traffic and agricultural activities. Uncultivated lands (i.e., a mixture of Native Grassland and Tame Grassland), approximately nine km northeast of the Project Area adjacent to the Oldman River is expected to provide higher quality foraging and nesting habitat for raptor species.



### 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.**

The acoustic bat surveys for the Coaldale Wind Farm were conducted following the survey protocols discussed in the *Handbook of Inventory Methods and Standard Protocols for Surveying Bats in Alberta* (Vonhof 2002) and the Appendix 5 supporting document *Bats and Wind Turbines. Pre-siting and pre-construction survey protocols* (Lausen et al. 2010). The Coaldale Wind Farm consists of five turbines; as such, a total of six detectors were deployed to provide spatial survey coverage based on turbine locations and landcover types. One detector was installed at a temporary meteorological tower (MET) with the microphone raised to 30 m and paired with a second detector with a microphone set at a 3 m height. The remaining 4 detectors were installed at ground level with the microphones raised to 3 m. One of the detectors was deployed 7.5 km north of the Project boundary on the south edge of the Oldman River valley. The purpose of this survey location was to provide context and comparative bat activity to the Project Area.

The full spectrum SM4-BAT detectors equipped with the U2 ultrasonic microphone manufactured by Wildlife Acoustics Inc. were used at all six survey locations. The MET was equipped with a built-in pulley system, for the purpose of conducting bat surveys and raising a microphone to a 30 m height. Extendable painter poles were used to raise the U2 microphones to 3 m for the five ground-based detectors. These were secured to the ground with t-bar posts and anchored with guy ropes and ground pegs (Photos 14-20; Appendix A). The detectors were visited regularly throughout the spring (May 1 to 31) and Fall (July 15 to October 15) survey periods to download recorded data and conduct visual inspection of the survey equipment.

The SM4-BAT detectors were triggered when ultrasonic frequency greater than 1.5 milliseconds (ms) was detected. The detector then recorded this ultrasonic frequency as a .WAV file on the Secure Digital (SD) card within the unit. The .WAV files were downloaded and organized by detector location (separately for spring and fall data) then analyzed using the SonoBat 4.4.2 North America bat analysis software (SonoBat). The SonoBat software is a comprehensive tool for analyzing and classifying full-spectrum sonograms of bat echolocation calls recorded from full spectrum bat detectors (Bat Management and Conservation, 2021). SonoBat automatically classifies the recorded files to a bat species using algorithms derived from expert acoustic classification experience and appends the information to each file's metadata that is displayed in a vetting table (SonoBat, 2021). The vetting (Identification) table includes data fields that indicate the number of accepted pulses that were analysed (#Accp) and the majority number (#Maj) of pulses out of the #Accp that were identified as a specific bat species. If SonoBat could not make a positive determination of a bat species to assign to a recording (i.e., due to poor quality recording, ambiguous call patterns or multiple species within one recording), it would leave it appropriately unidentified to reduce false-positive results and provide a suggested classification to guide manual vetting (SonoBat 2021). These types of recordings were manually vetted to a bat



species, combination species (i.e., where the pulses contained characteristics of two similar species that SonoBat could not discern) or one of the following five categories and entered into the Species Manual ID field:

- EpfuLano (Big Brown Bat/Silver-haired Bat);
- Mysp (Myotis Species);
- HiF (High Frequency Bat) — Over 40 kilohertz (kHz);
- LoF (Low Frequency Bat) — Under 40 kHz; and,
- Noise\_NonBat — Ultrasonic static or feedback noise generated by non-bat species or objects.

A total of 13,627 files were recorded and analyzed for the spring surveys and 37,327 files recorded and analyzed for the fall surveys. Once each file was classified either automatically by SonoBat, or manually by the user, the data from the vetting tables were exported to Microsoft Excel to determine the bat pass results for each season.

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

The spring bat surveys were conducted from April 26 – June 1; however, the analysis included the evening of April 30 to the morning of June 1, 2021. The fall surveys were conducted from the evening of July 15 to the morning of October 15, 2021.

**c) Provide the total number of detectors during spring and fall surveys.**

A total of 6 detectors were used for both spring and fall acoustic bat surveys.

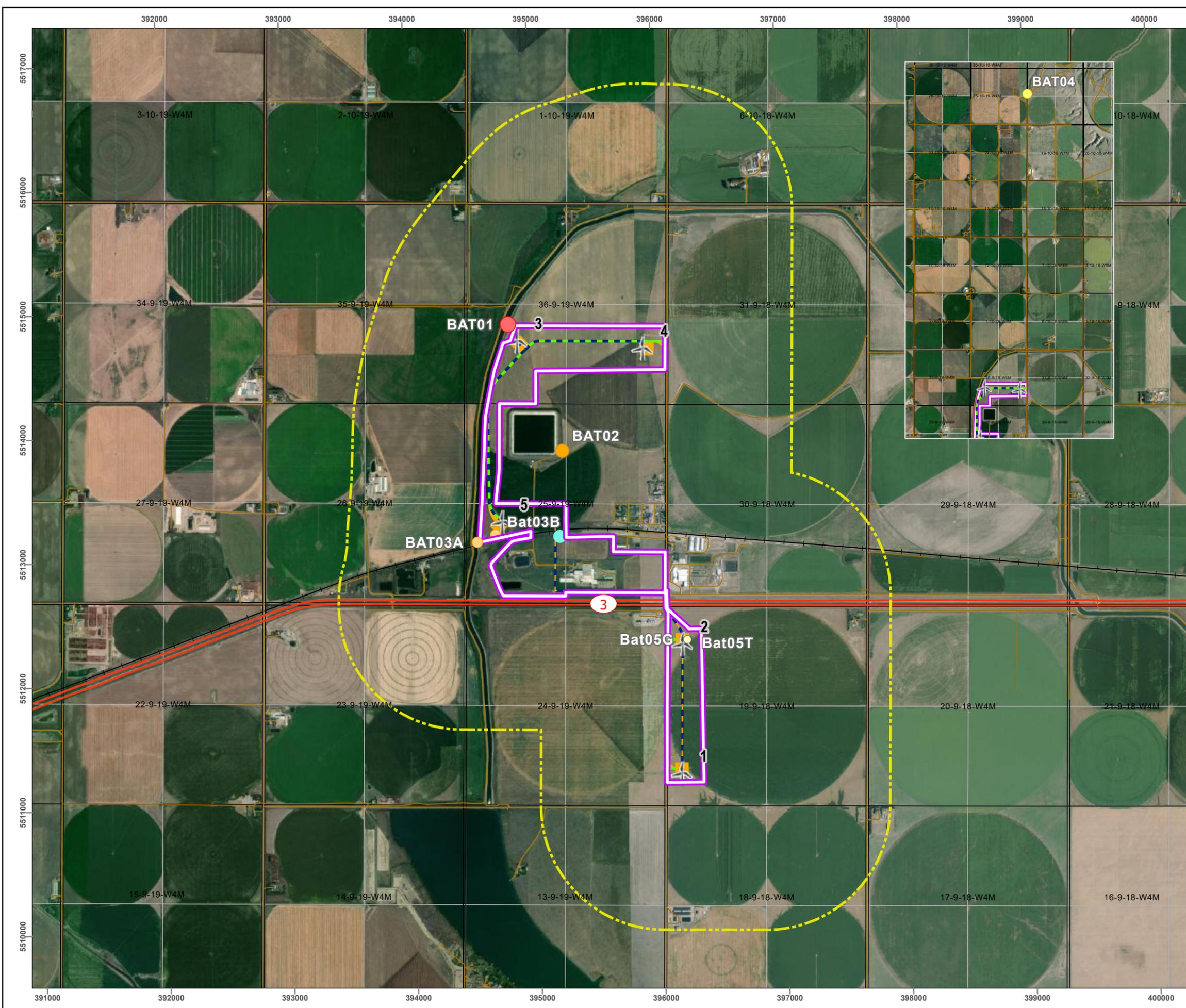
**d) Provide the number of raised detectors (30 m) during spring and fall surveys.**

Of the 6 detectors used for the acoustic bat surveys, one detector was raised to 30 m height on a MET tower.

**e) Provide the total number of detector nights (i.e., excluding nights that a detector malfunctioned) during spring and fall surveys.**

The total number of detector nights for spring acoustic bat surveys was 182 and the total number of detector nights for fall acoustic bat surveys was 523.

**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.**



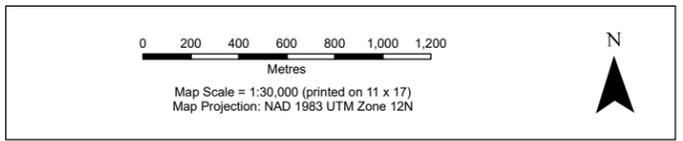
## Bat Survey Locations for the Coaldale Wind Farm

**VALECO ENERGIE QUÉBEC INC.**

**Legend**

<span style="color: red;">●</span> Bat Survey Location	<span style="color: cyan;">●</span> Substation
<span style="color: orange;">●</span> BAT01 (5726 Total Passes)	<span style="color: green;">—</span> Access
<span style="color: yellow;">●</span> BAT02 (3498 Total Passes)	<span style="color: blue;">—</span> Collector System
<span style="color: lightorange;">●</span> BAT03A/B (3059 Total Passes)*	<span style="border: 1px solid purple;"> </span> Project Boundary
<span style="color: lightyellow;">●</span> BAT04 (1558 Total Passes)	<span style="border: 1px solid orange;"> </span> Other Disturbance (Pads, Turning Areas, Collector Lines)
<span style="color: lightgreen;">●</span> Bat05G (1268 Total Passes)	<span style="border: 1px solid purple;"> </span> Project Area
<span style="color: lightblue;">●</span> Bat05T (997 Total Passes)	<span style="border: 1px dashed yellow;"> </span> Wildlife Study Area
Wind Turbine	<b>Base Data</b>
	<span style="color: red;">—</span> Highway
	<span style="color: black;">—</span> Railway
	<span style="color: brown;">—</span> Road
	<span style="border: 1px solid black;"> </span> Section
	<span style="border: 1px solid black;"> </span> Quarter Section

\* Bat 03A and Bat 03B combined total



**Data Sources**

- Main Map, World Imagery, Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
- Inset map, National Geographic, National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
- ATS Grid and roads, Altalis dataset.

**Disclaimer**  
EDI Environmental Dynamics Inc. has made every effort to ensure this map is free of errors. Data has been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: Y. Navarro & P.Hesse	Checked: J. Muir	<b>Figure 7</b>	Date: 14/12/2022
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**g) Describe the habitat type or land use near each detector location.**

A description of the habitat types at each of the six detector locations is provided below:

- Bat 01G: This detector was set-up in a 10 m wide strip of Tame Grassland between cultivated (cereal crop) habitat and the Stafford Reservoir Irrigation canal (Photo 14).
- Bat 02G: This detector was set-up on a chain-link fence surrounding the McCain Coaldale Plant's wastewater pond on the edge of Tame Grassland and Cultivation (cereal crop) habitat (Photo 15).
- Bat 03G: This detector was set-up approximately 15 m north of a train bridge crossing the Stafford Reservoir Irrigation canal in a 10 m wide strip of Tame Grassland between the canal and Cultivation (cereal crop) habitat (Photo 16). This detector was moved 140 m east of the canal on August 17, 2021 due to issues described in Section H below. The habitat of the new location was consistent with the original location; however, the irrigation canal was at a further distance.
- Bat 04G: This detector was set-up in Tame Grassland habitat adjacent to Native Grassland and Cultivation (cereal crop) habitat 7.5 km north of the project boundary on the south edge of the Oldman River valley (Photo 17).
- Bat 05G: This detector was set-up at the base of a set of guy-wires for the MET tower in idled Cultivation habitat surrounded by actively farmed (cereal crop) Cultivation habitat (Photo 18). The idled Cultivation habitat was a result of the installation of the MET.
- Bat 05T: This detector was set-up at the base of the MET tower with the microphone raised to 30 m, in idled Cultivation habitat surrounded by actively farmed (cereal crop) Cultivation habitat (Photo 19 and 20). The idled Cultivation habitat was a result of the installation of the MET.

**h) Identify any issues encountered during the survey or analysis that impacted the results.**

The total number of detector nights for spring acoustic bat surveys was 182 out of a possible 186 (6 detectors x 31 days = 186). BAT01G malfunctioned between May 28 and June 01 due to a firmware and/or SD card issue.

The total number of detector nights for fall acoustic bat surveys was 523 out of a possible 564 (94 nights x 6 detectors = 564). BAT01G malfunctioned between July 24 and 30 due to a firmware and/or SD card issue. In addition, the BAT03 SM4BATunit was stolen sometime between July 14 and July 31, losing the unit as well as the data within. A replacement unit was acquired and deployed on August 17; however, the detector location was moved 140 m east to a location less visible by humans.

**i) Survey results: Provide details of the survey results in tables using the following format.**



**Table 21. 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	Mean number of bat passes/detector night	Detector Night total
Bat 01G	Cultivation, Tame Grassland, River/Watercourse <sup>1</sup>	821	262	30.41	27
Bat 02G	Cultivation, Tame Grassland, Lake/Waterbody <sup>2</sup>	156	67	5.03	31
Bat 03G	Cultivation, Tame Grassland, River/Watercourse <sup>1</sup>	2,062	536	66.52	31
Bat 04G	Cultivation, Tame Grassland, Native Grassland	223	101	7.19	31
Bat 05G	Cultivation	222	66	7.16	31
Bat 05T	Cultivation	94	32	3.03	31
<b>Total</b>	-	<b>3,578</b>	<b>1,064</b>	<b>19.66</b>	<b>182</b>

<sup>1</sup> Stafford Reservoir Irrigation Canal; <sup>2</sup> McCain Coaldale Plant wastewater Pond.

**Table 22. 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	Mean number of bat passes/detector night	Detector Night Total
Bat 01G	Cultivation, Tame Grassland, River/Watercourse <sup>1</sup>	4,905	788	56.38	87
Bat 02G	Cultivation, Tame Grassland, Lake/Waterbody <sup>2</sup>	3,342	1,011	35.55	94
Bat 03G	Cultivation, Tame Grassland, River/Watercourse <sup>1</sup>	1,001	483	16.68	60
Bat 04G	Cultivation, Tame Grassland, Native Grassland	1,335	488	14.20	94
Bat 05G	Cultivation	1,046	375	11.13	94
Bat 05T	Cultivation	903	398	9.61	94
<b>Total</b>	-	<b>12,532</b>	<b>3,543</b>	<b>23.96</b>	<b>523</b>

<sup>1</sup> Stafford Reservoir Irrigation Canal; <sup>2</sup> McCain Coaldale Plant Wastewater Pond.



- 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.

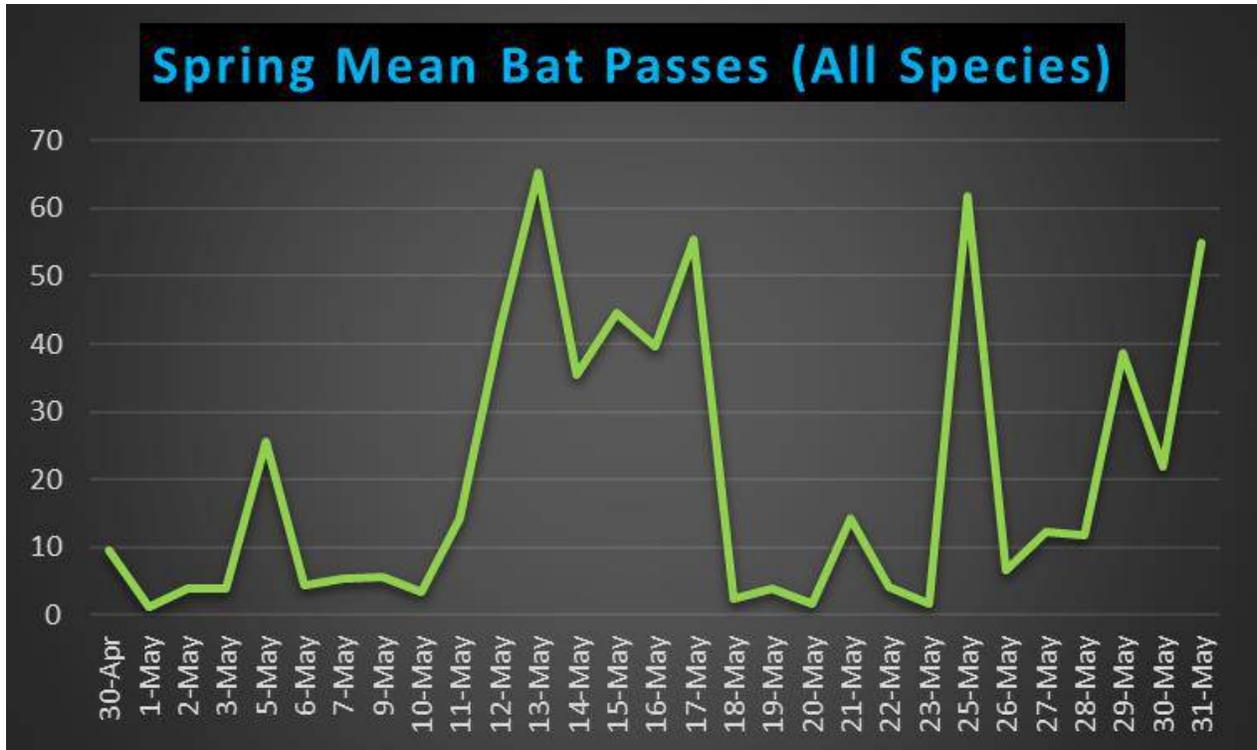


Figure 8. Mean bat passes by date recorded during spring bat surveys.

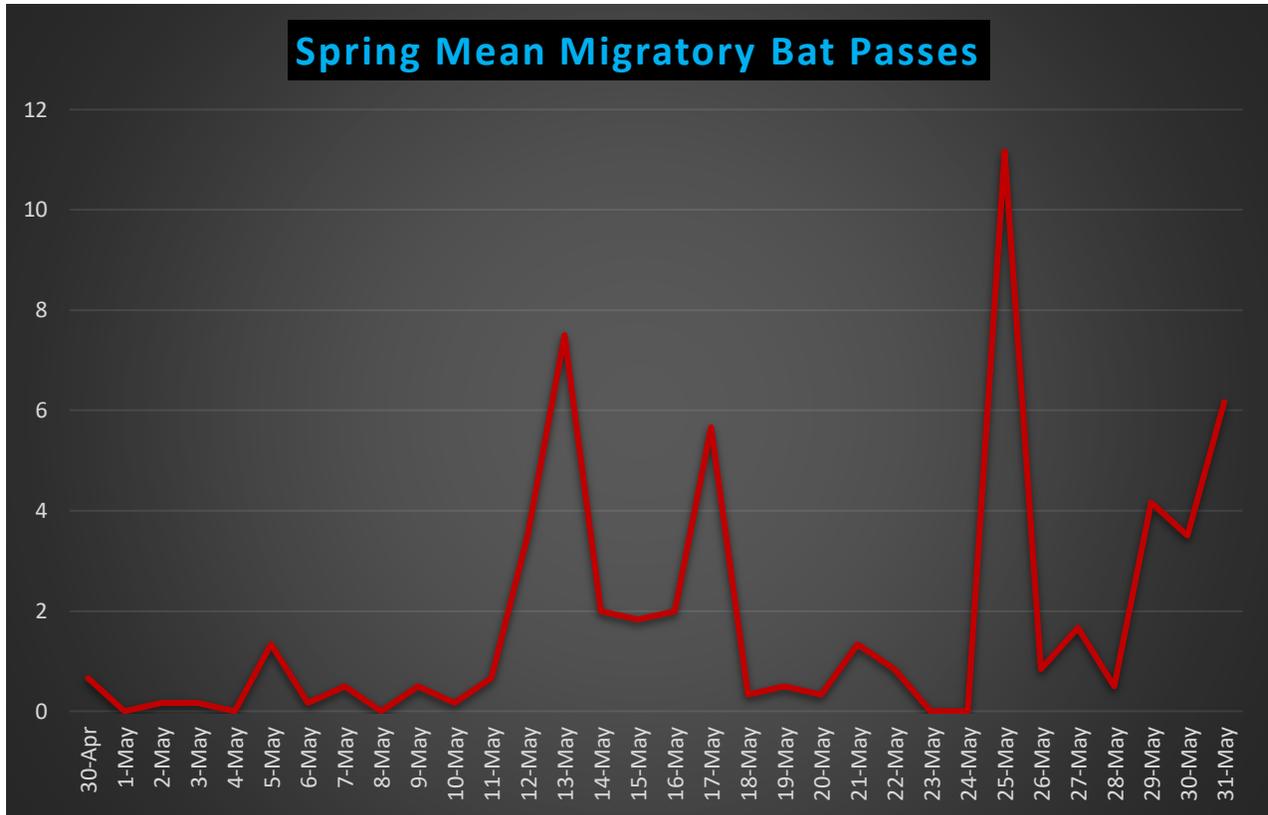


Figure 9. Mean migratory bat passes by date recorded during spring bat surveys.

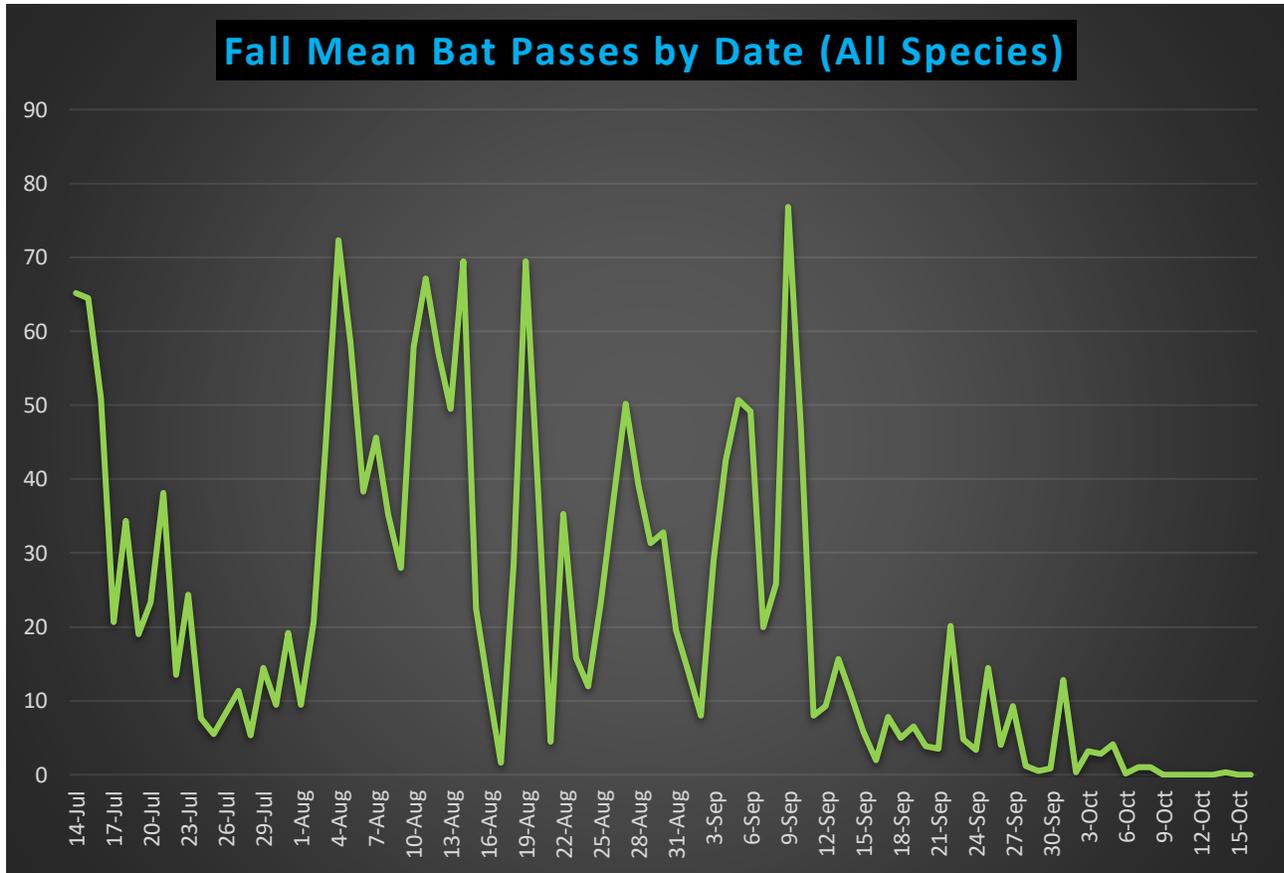


Figure 10. Mean bat passes by date recorded during fall bat surveys.

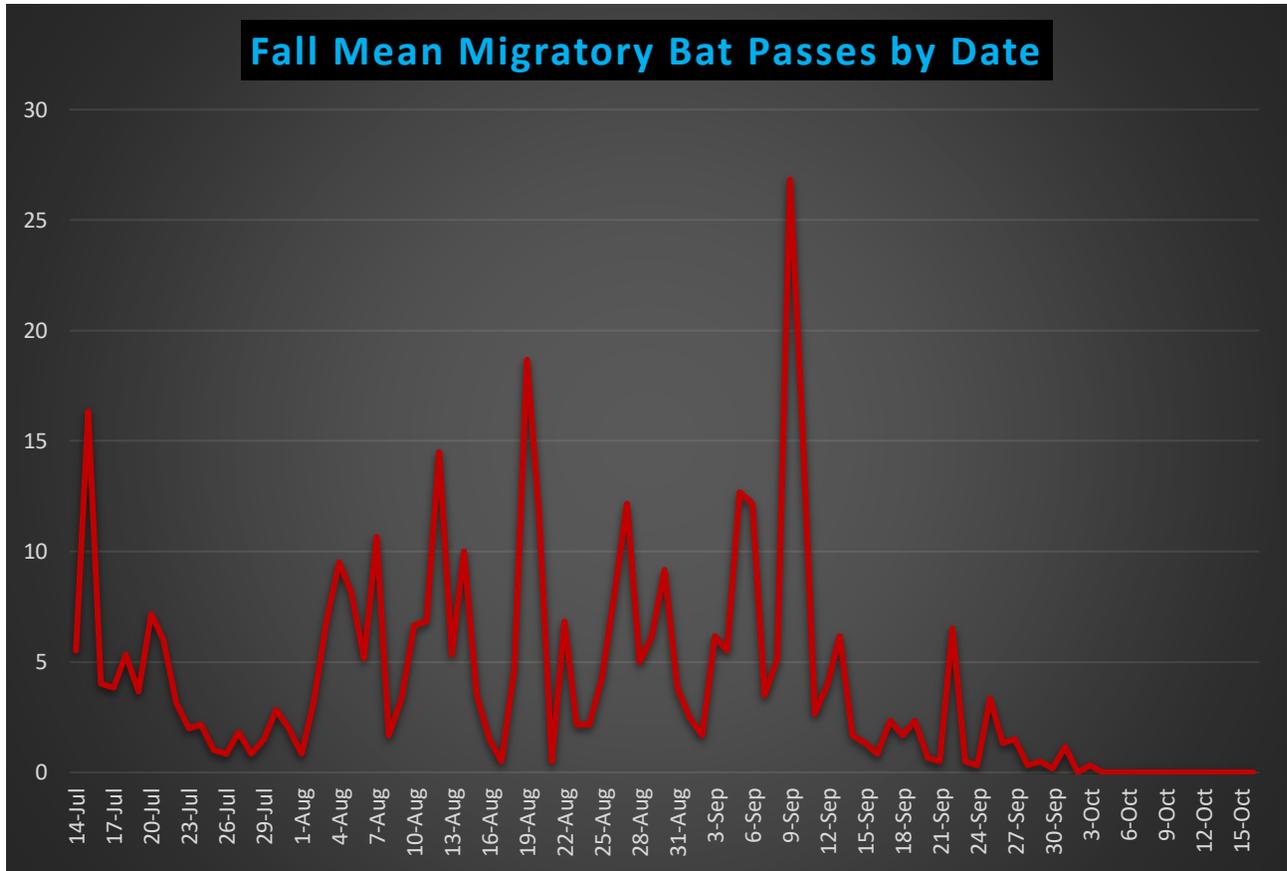


Figure 11. Mean migratory bat passes by date recorded during fall bat surveys

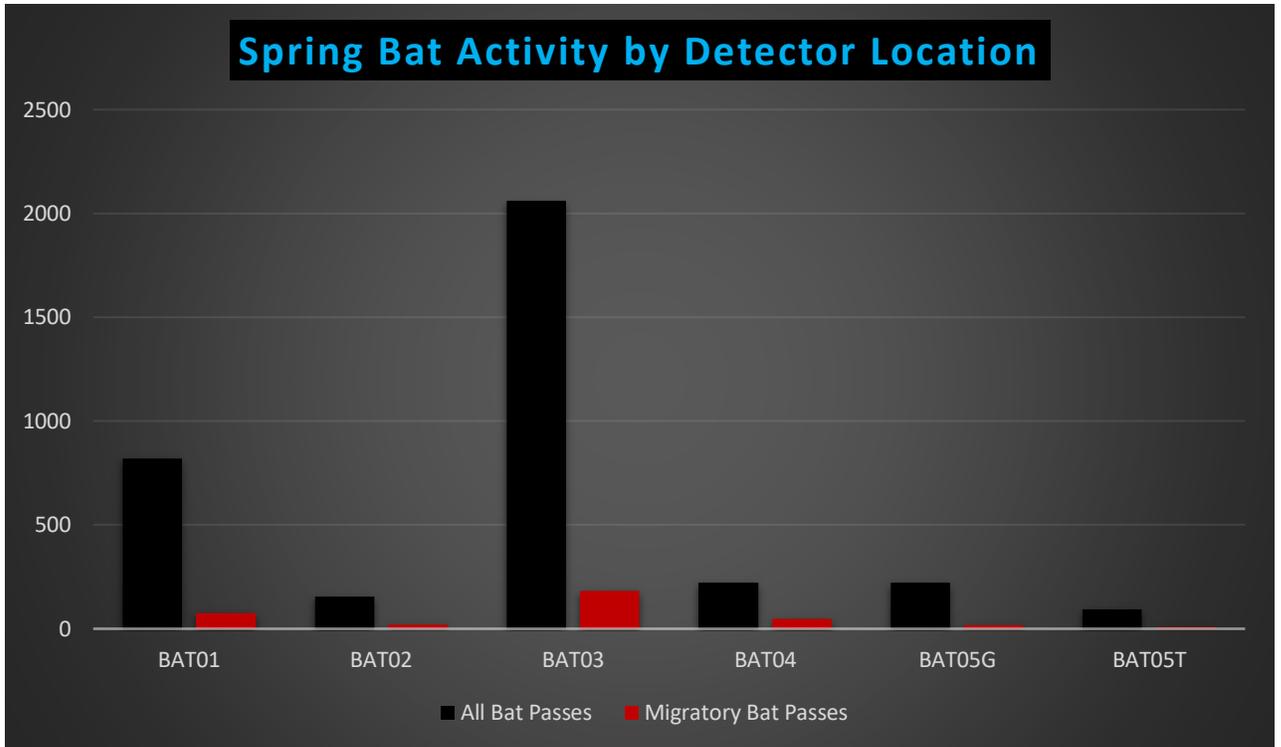


Figure 12. Spring bat activity by detector location.

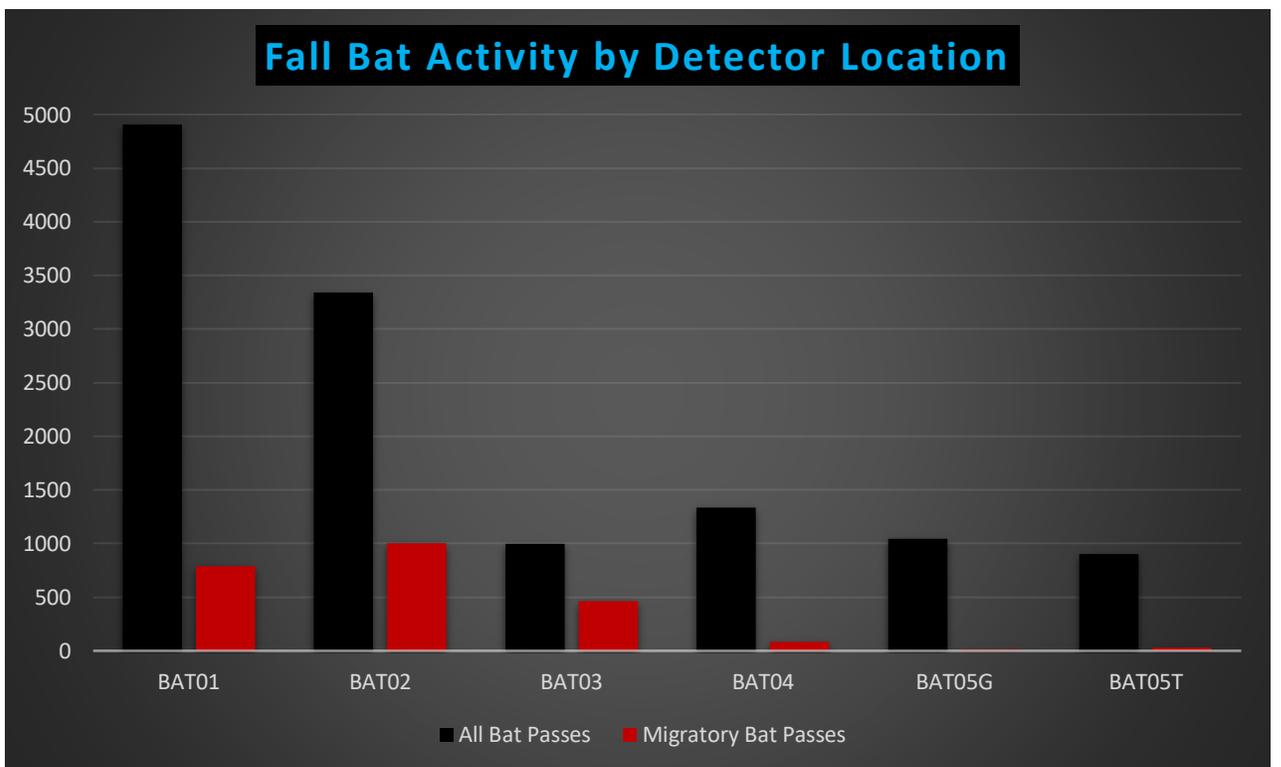


Figure 13. Fall bat activity by detector location.

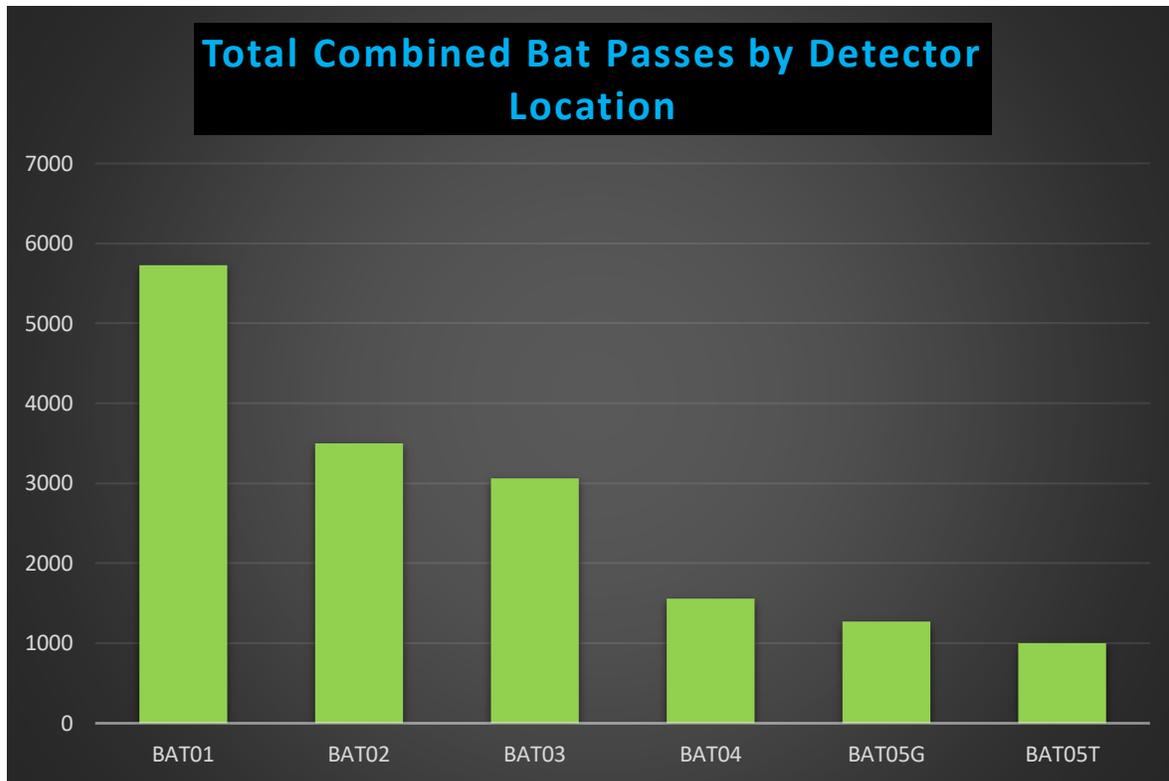


Figure 14. Total combined season bat activity by detector location.

- 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.

The total number of bat passes detected during the spring surveys was 3,578 with the mean bat passes per detector night being 123.38. The migratory bat passes per detector night recorded during the spring survey totaled 1064 (Table 21). Migratory bat activity peaked between May 11 and May 17 with a second spike in activity on May 25 (Figure 9). A total of six confirmed bat species were detected during the spring surveys and the species identified at each detector location is presented in Table 23.

The total number of bat passes detected during the fall surveys was 12,532 with the mean bat passes per detector night being 139.22. The migratory bat passes per detector night recorded during the fall survey totaled 3,543 (Table 22). Migratory bat activity gradually increased through the month of August and early September, peaking on September 10. The fall migratory bat activity decreased noticeably after September 10 (Figure 10). Seven bat species were detected during the fall surveys and the species identified at each detector location are presented in Table 24.



Table 23. Bat species identified at each detector location during the spring bat survey.

Detector ID	Big brown bat ( <i>Eptesicus fuscus</i> )	Silver-haired bat ( <i>Lasionycteris noctivagans</i> )	Big brown bat/Silver-haired bat	Hoary bat ( <i>Lasiurus cinereus</i> )	Low frequency bat (LoF)	Eastern red bat ( <i>Lasiurus borealis</i> )	Little brown myotis ( <i>Myotis lucifugus</i> )	Long-legged Myotis ( <i>Myotis volans</i> )	Myotis species (Mysp)	High frequency bat (HiF)
Bat 01G	237	149	63	160	315	3	3	0	3	12
Bat 02G	27	69	19	22	54	3	12	0	5	5
Bat 03G	504	368	138	164	449	50	75	2	49	372
Bat 04G	34	64	6	43	68	6	8	1	4	9
Bat 05G	58	52	26	22	78	0	0	0	1	6
Bat 05T	24	27	8	12	37	0	1	0	0	1
<b>Total</b>	<b>884</b>	<b>729</b>	<b>260</b>	<b>423</b>	<b>1,001</b>	<b>62</b>	<b>99</b>	<b>3</b>	<b>62</b>	<b>405</b>

Table 24. Bat species identified at each detector location during the fall bat survey.

Detector ID	Big brown bat ( <i>Eptesicus fuscus</i> )	Silver-haired bat ( <i>Lasionycteris noctivagans</i> )	Big brown bat/Silver-haired bat	Hoary bat ( <i>Lasiurus cinereus</i> )	Low frequency bat (LoF)	Eastern red bat ( <i>Lasiurus borealis</i> )	Little brown myotis ( <i>Myotis lucifugus</i> )	Long-legged Myotis ( <i>Myotis volans</i> )	Myotis species (Mysp)	High frequency bat (HiF)
Bat 01G	1,955	439	210	328	1,827	21	36	6	0	28
Bat 02G	899	476	163	420	876	115	151	24	0	83
Bat 03G	159	284	40	169	243	30	27	2	0	9
Bat 04G	270	318	78	150	355	20	35	21	1	40
Bat 05G	206	229	50	138	345	8	21	9	0	22
Bat 05T	87	234	37	163	366	1	1	1	0	4
<b>Total</b>	<b>3,576</b>	<b>1,980</b>	<b>578</b>	<b>1,368</b>	<b>4,012</b>	<b>195</b>	<b>271</b>	<b>63</b>	<b>1</b>	<b>186</b>



The detector that recorded the most overall bat passes in the spring was Bat 03 at 2,062 followed by Bat 01 at 821 passes. The detector that recorded the most overall bat passes in the fall was Bat 01 at 4,905 followed by Bat 02 at 3,342 passes. Bat 03 which recorded the highest passes in the spring recorded 997 passes in the fall; however, this number may have been higher if the detector had not been stolen.

The three detectors that had the highest combined (spring and fall) total was Bat 01 at 5,726, Bat 02 at 3,498 and Bat 03 at 3,059 passes. It is suspected that these three detector locations showed higher bat activity due to their proximity to water features (i.e., Stafford reservoir irrigation canal and McCain waster-water pond). Water sources are an essential life requisite for bats. They require water sources mainly for drinking but are also preferred habitats for foraging for insects (PCAP, 2021). Many types of water sources can be suitable including streams, wetlands, dugouts, retention ponds, watering troughs, and even sometimes rain barrels. The water source should be permanent, so bats have access to water throughout the active season (PCAP, 2021). In addition, bridges or buildings more than 2 m in height with limited access to the roosting chamber with full sun for part of the day, have been identified as preferred anthropogenic roosting sites for bats (PCAP, 2021). The train bridge at the detector location Bat 03 matches this roost criteria and may have attributed to the bat activity at this location.

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

**Table 25. Bat acoustic monitoring summary table.**

Season	Mean Bat passes/detector night	Mean Migratory bat passes/detector night
Spring: May 1–31 (year)	123.38	12.93
Fall: July 15–October 15 (year)	139.22	40.26
Fall: August 1–September 10 (year)	191.15	62.56

**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.**

No pre-emptive mitigation is proposed for the Project. The wind turbines are sited in low quality (cultivation) bat habitat, away from water sources and roosting sites with higher bat activity.

**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.**

As discussed in Section K, the detector locations that showed the highest bat activity were Bat 01, Bat 02 and Bat 03 that were located near water sources (e.g., Stafford Reservoir irrigation canal and McCain wastewater pond) and roosting sites (i.e., train bridge). Detector locations Bat 05G and Bat 05T located in cultivated habitat away from water (1.65 km east of Stafford Reservoir



irrigation canal) detected the lowest bat activity at an overall combined season (spring and fall) total of 1,268 and 997 bat passes, respectively. The five proposed turbines for the Coaldale wind farm are located in cultivated habitat away from water sources (Turbine 03 – 125 m, Turbine 05 – 200 m, Turbine 04 – 1 km, Turbine 01 – 1.6 km and Turbine 02 – 1.7 km) and potential roosting sites and are anticipated to have similar bat activity to detector locations Bat 05G and Bat 05T.

Based on the higher bat activity at detector locations Bat 01 and Bat 03, the linear water feature of the irrigation canal may attract bat activity and movement in a north-south direction.

With proactive Project planning and proposed mitigation measures, the potential for adverse effects of the Project on bats is expected to be minimal.

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

Post-construction surveys will be completed as outlined in the AEP “Post Construction Survey Protocols for Wind and Solar Energy Projects” (AEP 2020b).

## 7 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 is sited within Burrowing Owl range.

- 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.

Burrowing Owl surveys were conducted by an experienced wildlife biologist. 17 plots were placed within the Project Area to provide adequate coverage of the area and generally spaced such that no plot was closer than 600 m or further than 800 m from another plot. Some plots were moved due to landcover and access permission. Morning surveys were conducted between May 15 and July 15 under suitable weather conditions (no precipitation, wind less than 20 km/hr) between sunrise and 10:00 AM. At each survey point call playback surveys were conducted. Call playback surveys consisted of a three-minute passive scan, followed by a three-minute call playback period, and a final one-minute passive scan (seven minutes total survey time).



In addition, during other surveys, biologists were vigilant for Burrowing Owls and/or their sign, but none were ever observed, likely due to the amount of intense agricultural activity in the general Project Area.

**c) Provide the survey dates.**

Burrowing Owl surveys were conducted on June 2, 2021, and June 21, 2022.

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

Surveys were conducted between 5:37 AM and 9:55 AM.

**e) Provide the number of survey points.**

17.

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

119 minutes in 2021, and 119 minutes in 2022.

**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.**

# Burrowing Owl survey locations for the Coaldale Wind Farm

VALECO ENERGIE QUÉBEC INC.

**Legend**

- Burrowing Owl Survey Point
- Wind Turbine
- Substation
- Access
- Collector System
- Other Disturbance (Pads, Turning Areas, Collector Lines)
- Project Area
- Wildlife Study Area

**Base Data**

- Highway
- Railway
- Road
- Quarter Section
- Section



0 200 400 600 800 1,000  
Metres

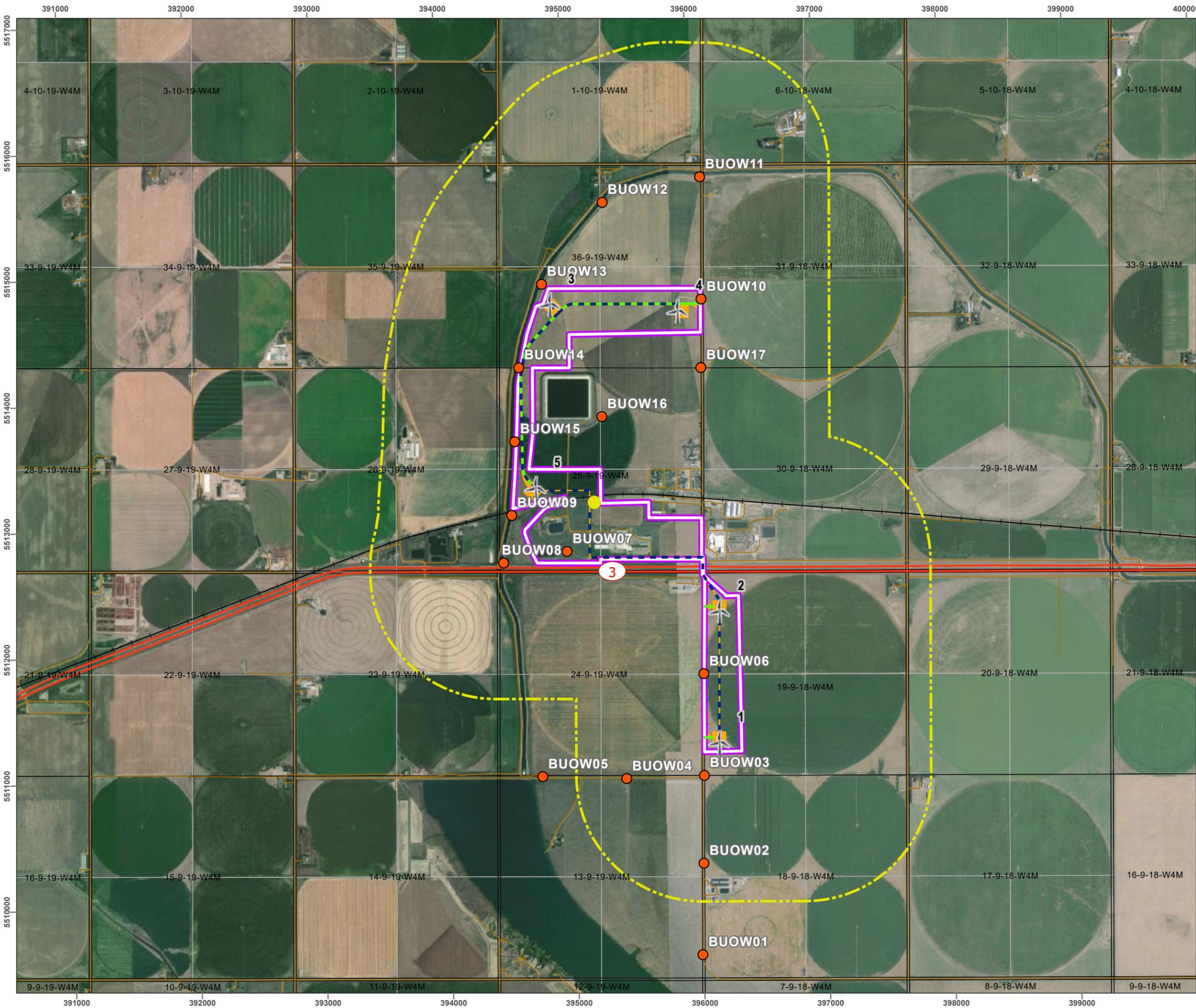
Map Scale = 1:30,000 (printed on 11 x 17)  
Map Projection: NAD 1983 UTM Zone 12N

**Data Sources**

- Main Map, World Imagery, Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
- Inset map, National Geographic, National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
- ATS Grid and roads, Altalis dataset.

**Disclaimer**  
EDI Environmental Dynamics Inc. has made every effort to ensure this map is free of errors. Data has been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: Y. Navarro & P.Hesse	Checked: J. Muir	<b>Figure 15</b>	Date: 13/12/2022
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**h) Provide weather conditions during each survey**

**Table 26. Weather conditions during Burrowing Owl surveys.**

Survey date	Weather conditions <sup>1</sup>	Comments
June 2, 2021	<b>Wind:</b> Beaufort 0 – Beaufort 3 <b>Precipitation:</b> None <b>Temperature:</b> 10-20°C <b>Cloud cover:</b> <10%	
June 21, 2022	<b>Wind:</b> Beaufort 2 <b>Precipitation:</b> None <b>Temperature:</b> 9°C <b>Cloud cover:</b> <10%	

<sup>1</sup> Beaufort Wind Scale: Beaufort 0 < 1 km/hr, Beaufort 1 1-5 km/hr, Beaufort 2 6-11 km/hr, Beaufort 3 12-19 km/hr, Beaufort 4 20-28 km/hr, Beaufort 5 29-38 km/hr, Beaufort 6 39-49 km/hr.

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

Surveys were conducted in cultivation (11 plots) and Tame Grassland (6 plots).

**j) Survey results: Was there any burrowing owl activity – nests or individuals present?**

No Burrowing Owls or nests were observed during surveys.

**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 metres from the edge of the nest to the nearest edge of the project related disturbance.**

Not applicable; no Burrowing Owl nests were found.

**Table 27. Table of Burrowing Owl nesting locations and proximity of Project infrastructure.**

Burrowing Owl nest ID number	Location (UTM NAD 83)	Is the required setback met (Y/N)	Distance from nest to nearest project related disturbance (metres)	Comments
NA	NA	NA	NA	NA

**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 10 cm or larger).**

No Burrowing Owls or nests were observed during surveys. The Project Area is predominantly cultivated land in an area of chronic disturbance. Chronic disturbances in the Project Area include Highway 3, the Hamlet of Chin, the McCain Foods plant, and other industrial agriculture infrastructure (e.g., irrigation pivots). Native habitats associated with the Oldman River, approximately 9 km NE of the Project Area, provide more suitable habitat for Burrowing Owls.

### 32. Sharp-tailed Grouse:

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

Yes. The Project is sited within Sharp-tailed Grouse range.

- 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.**

Yes. 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.**

Sharp-tailed Grouse Lek surveys were conducted by experienced wildlife biologists. Following a general ground search to identify potential lek sites, seven plots were placed to provide adequate coverage of suitable habitat within the Project Area. Surveys were conducted in April, 2020 and April 2022, in the early morning hours to coincide with peak lek activity. Surveys were conducted during suitable weather conditions (no precipitation, cool conditions, wind less than 20 km/hr). Surveys consisted of a five-minute passive observation period for Sharp-tailed Grouse at each plot. Where Sharp-tailed Grouse were observed within the five-minute passive observation period, an additional fifteen-minute passive observation period was conducted.

- d) **Provide the survey dates.**

Sharp-tailed Grouse surveys were conducted on April 15 and 28, 2020, and April 6 and 28, 2022.



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

Surveys were conducted between 5:39 AM and 8:00 AM.

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

Seven plots were surveyed in 2020 and on April 6, 2022. Six plots were surveyed on April 28, 2022 (plot STGR03 was not surveyed due to land access constraints).

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

70 minutes in 2020, and 65 minutes in 2022.

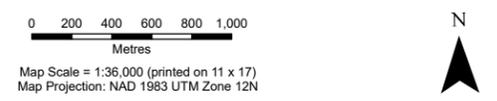
**h) The location of survey points must be provided in a map (refer to the *Maps and Figures* section below); provide the name of this map.**

# Sharp-tailed Grouse Survey Locations for the Coaldale Wind Farm

VALECO ENERGIE QUÉBEC INC.

**Legend**

Sharp-tailed Grouse Survey Location	<b>Base Data</b>
Wind Turbine	Highway
Substation	Railway
Access	Road
Collector System	Section
Other Disturbance (Pads, Turning Areas, Collector Lines)	Quarter Section
Project Area	
Wildlife Study Area	

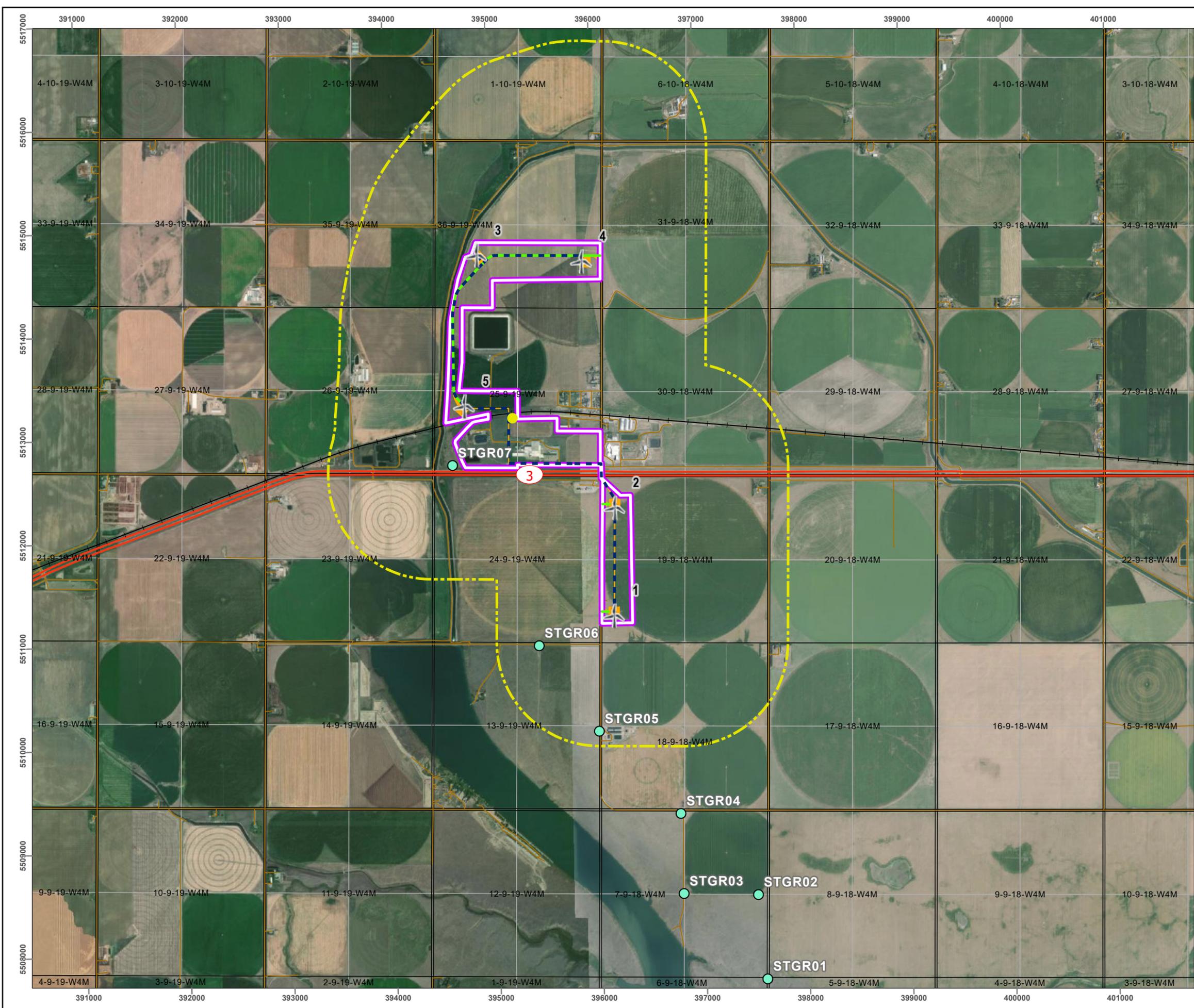


**Data Sources**

- Main Map, World Imagery, Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
- Inset map, National Geographic, National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
- ATS Grid and roads, Altalis dataset.

**Disclaimer**  
 EDI Environmental Dynamics Inc. has made every effort to ensure this map is free of errors. Data has been derived from a variety of digital sources and, as such, EDI does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: Y. Navarro & P.Hesse	Checked: J. Muir	<b>Figure 16</b>	Date: 13/12/2022
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- i) Provide weather conditions during each survey date and time in a table using the following format.

Table 28. Weather conditions during Sharp-tailed Grouse Lek surveys.

Survey date	Weather conditions <sup>1</sup>	Comments
April 15, 2020	<b>Wind:</b> Beaufort 3 <b>Precipitation:</b> None <b>Temperature:</b> 0°C Cloud cover: 51-75%	
April 28, 2020	<b>Wind:</b> Beaufort 2 <b>Precipitation:</b> None <b>Temperature:</b> 1°C <b>Cloud cover:</b> <10%	
April 6, 2022	<b>Wind:</b> Beaufort 2-3 <b>Precipitation:</b> None <b>Temperature:</b> 0°C <b>Cloud cover:</b> 10-25%	
April 28, 2022	<b>Wind:</b> Beaufort 2-3 <b>Precipitation:</b> None <b>Temperature:</b> -2°C <b>Cloud cover:</b> <10%	

<sup>1</sup> Beaufort Wind Scale: Beaufort 0 < 1 km/hr, Beaufort 1 1-5 km/hr, Beaufort 2 6-11 km/hr, Beaufort 3 12-19 km/hr, Beaufort 4 20-28 km/hr, Beaufort 5 29-38 km/hr, Beaufort 6 39-49 km/hr.

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

Surveys were conducted in Cultivation (four plots) and Tame Grassland (three plots).

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

No Sharp-tailed Grouse or leks were observed 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 metres from the edge of the nest to the nearest edge of project related disturbance.

No Sharp-tailed Grouse leks were found and no Sharp-tailed Grouse were observed; therefore, this question and questions m through o are not applicable.

Table 29. Table of Sharp-tailed Grouse lek locations and proximity of Project infrastructure.

Sharp-tailed Grouse Lek ID number	Location (UTM NAD 83)	Is the required setback met (Y/N)	Distance from lek to nearest project related disturbance (metres)	Comments
NA	NA	NA	NA	NA



- 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, no Sharp-tailed Grouse leks were found.

- 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, no Sharp-tailed Grouse leks were found.

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

No Sharp-tailed Grouse or leks were observed during surveys. The Project Area is predominantly cultivated land in an area of chronic disturbance. Chronic disturbances in the Project area include Highway 3, the Hamlet of Chin, the McCain Foods plant, and other industrial agriculture infrastructure. Native habitats associated with the Oldman River, approximately 9 km NE of the Project Area, provide more suitable habitat for Sharp-tailed Grouse.

### 33. Eastern Short-horned Lizard:

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

No, therefore questions b through m are not applicable.

- 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.

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 30. Weather conditions during Eastern Short-horned Lizard surveys.**

Survey date	Weather conditions	Comments
NA	NA	NA

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 200 m 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 500 m 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.

- 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 31. Weather conditions during Snake Hibernacula surveys.**

Survey date	Weather conditions	Comments
NA	NA	NA

- 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 metres from the edge of the nest to the nearest edge of project related disturbance.**

**Table 32. Table of Snake Hibernacula locations and proximity of Project infrastructure.**

Species and Hibernacula	Location (UTM NAD 83)	Is the required setback met (Y/N)	Distance from hibernacula to nearest project related disturbance (metres)	Comments
NA	NA	NA	NA	NA

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 250 m of Ord's Kangaroo Rat range?**

No, therefore questions b through m are not applicable.

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.

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

Table 33. Weather conditions during Ord's Kangaroo Rat surveys.

Survey date	Weather conditions	Comments
NA	NA	NA

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 250 m 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, therefore questions a through n are not applicable.

- 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 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 34. Weather conditions during Swift Fox surveys.**

Survey date	Weather conditions	Comments
NA	NA	NA



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 metres from the edge of the nest to the nearest edge of project related disturbance.

Table 35. Table of Swift Fox Den locations and proximity of Project infrastructure.

Swift Fox Den Location ID	Location (UTM NAD 83)	Is the required setback met (Y/N)	Distance from den to nearest project related disturbance (metres)	Comments
NA	NA	NA	NA	NA

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, therefore, questions a through m are not applicable. During vegetation/wetland field surveys completed on June 23, 2021, an experienced vegetation ecologist searched the Project footprint for federally listed and provincially tracked plants, and none were observed.



- 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.

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

Not applicable.

Table 36. Weather conditions during surveys for endangered and threatened plants.

Survey date	Weather conditions	Comments
NA	NA	NA

- 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 metres from the edge of the nest to the nearest edge of project related disturbance.

Table 37. Table of endangered and threatened plant locations and proximity of Project infrastructure.

Observation ID	Species	Location (UTM NAD 83)	Population extent and reference on associated maps	Is the required setback met (Y/N)	Distance from observation to nearest project related disturbance (metres)	Comments
NA	NA	NA	NA	NA	NA	NA

- 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.

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.**

Applicable site-specific surveys (i.e., sensitive raptors, Sharp-tailed Grouse, Burrowing Owl) will be repeated once every two years until the Project is constructed, and surveys will follow the AEP-WM Sensitive Species Inventory Guidelines (Government of Alberta 2013a). The same survey plots will be revisited, and survey methods will follow those described in question 29 (raptor nest surveys), question 31 (Burrowing Owl surveys) and question 32 (Sharp-tailed Grouse surveys).

Raptor nest surveys were conducted in 2020 and the nests identified during that survey year were revisited again in 2021 and 2022 to update their current status and identify new nests. As such, the raptor nest survey status is valid until the spring of 2024. The burrowing owl surveys were conducted in 2021 and 2022 and are also valid until the spring of 2024. The sharp-tailed grouse survey was conducted in the spring of 2020 and 2022 and will be updated in the spring of 2024.

If new wildlife features are identified within the applicable setback that overlaps with the Project footprint, Valeco will report these features to AEPA-WM to consult on appropriate mitigation options for the feature.

**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.**

This process will be followed.



## 8 CONSTRUCTION AND OPERATION WITH 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.

The Project is not sited in any of the above wildlife zones therefore this question is 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.

The Project is not sited within the grizzly bear zones therefore this question is not applicable.

## 9 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.

Guy wires may be needed for permanent met towers on the site, and where guy wires are required, they will be equipped with markers designed to reduce the potential for bird collisions (Power Line Sentry 2021).

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

Collector lines will be installed underground by either using trenching or plough-in methods on cultivated or previously disturbed land habitat types.



Where trenching methods are used, topsoil and subsoil will be stored separately in piles a minimum of 1 m apart. Soil backfill will occur immediately following collector line installation and will be recontoured as close as practical to the original profile. Collector lines will be installed as soon as possible following excavation to reduce the time that trenches are open (i.e., limit the risk of entrapping wildlife) and to minimize the potential for soil erosion.

If the plough-in method is used, the disturbance is minimal and localized to the furrow created by the plough-cat during the installation. Once the furrow is walked-down, agricultural activities typically mitigate the limited residual disturbance.

As the collector line installation crosses primarily cultivated and chronically disturbed lands, the effects on wildlife and wildlife habitat, are considered to be minimal.

**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.**

To mitigate the indirect effect of noise on wildlife during the construction phase, vehicles and equipment will be properly maintained and muffled to reduce engine noise.

Project traffic will likely increase dust production and poses a risk for increased wildlife collisions. To mitigate dust, roads will be lightly wetted as needed by the conditions on site (i.e., dry and dusty). Standard construction site speed limits (i.e., 30 km/hr) will be imposed on access roads to limit dust. The 30 km/hr speed limit will also reduce the risk of wildlife collisions, and Project traffic will avoid access roads during non-daylight periods to further reduce this risk.

Open excavations pose a risk for wildlife mortality if wildlife fall into or become trapped in excavations. All excavations will be fenced off when they are left open and unattended for more than 24 hours, and excavations will be backfilled as soon as possible.

A waste management program including waste minimization, reuse, and recycling will be implemented. Project waste that cannot be recycled will be disposed of at an approved facility. Hazardous materials on site (e.g., fuel) will be properly labeled, stored, and handled in accordance with the Workplace Hazardous Materials Information System (WHMIS) regulations, and will only be disposed of by an approved contractor at an approved facility.

Spill prevention and spill response protocols will be adhered to at all times. Preventative measures will include using drip trays while fueling, using drip trays under parked equipment, and regular equipment inspections to check for leaks. All staff on site will be trained in spill response, and an adequate supply of spill prevention and emergency response equipment will be on site at all times.

With the implementation of these mitigation measures, the effects on wildlife and wildlife habitat are expected to be minimal.



**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.

Not applicable.

## 10 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.**

The Project is located entirely on cultivated and previously disturbed lands and is not sited on or in close proximity to the Sensitive Snake Range. During initial communications related to wildlife surveys required to support the Project, AEP-WM noted that even though the Project Area is not within Sensitive Snake Range, snakes may still be found and requested that a Snake Protection Plan (SPP) be prepared. Considering that the entire Project will occur on land that has been, and continues to be disturbed through agricultural (e.g., irrigation), industrial (e.g., McCain Plant) and transportation (e.g., Hwy 3) corridors and activities, the potential to encounter snakes is considered to be low. The SPP considers the proactive siting and routing of the Project components as well as the anthropogenically disturbed nature of the lands affected.

The focus of the SPP relates to construction of the Project where the majority of earthworks and equipment activity is expected. During operations, the SPP relates to vehicle traffic and earth works, when and where they are required. This SPP is intended to aid the Project to comply with the *Alberta Wildlife Act* (Government of Alberta 2018). Snakes potentially found in the Project Area are: **bull snake** (*Pituophis catenifer sayi*); plains gartersnake (*Thamnophis radix haydenii*); **rattlesnake** (*Crotalus viridis*); red-sided gartersnake (*Thamnophis sirtalis parietalis*); wandering gartersnake (*Thamnophis elegans vagrans*); *western hognose snake* (*Heterodon nasicus*). Species in italics are provincially listed species, while species in italics and bold are provincially and federally listed species.

This SPP is most applicable during sensitive periods for snakes are typically during spring migration (April 1 to June 15) and fall migration (August 15 to October 31), but will be applied from April 1 to October 31, inclusive.

Even with the low potential for the Project to interact with snakes, the mitigation measures listed below are applicable to the construction and operations of the Project (i.e., within the Project Area) and are expected to avoid or minimize the risk of adverse effects on snakes, regardless of species:



- A research permit and collection licence will be acquired from AEPA by a experienced wildlife biologist prior to the implementation of this SPP.
- The experienced wildlife biologist will address all Project-snake interactions and will be responsible for handling and translocating all snakes that may be found on the work site. The wildlife biologist will have the authority to Stop Work at a given location/area within the Project Area, as safety requires. If work is stopped, and the wildlife biologist determines that additional mitigation is required, communication with AEPA-WM will occur to determine acceptable mitigation so that construction activities can resume.
- Health and safety training for Project crews will include: snake awareness training, including safety around venomous snakes; a zero tolerance for wildlife harassment; the need for wildlife observation reporting; and, a review of the SPP. Wildlife/snake issues will be part of daily tail-gate meetings, as appropriate for the season.
- All Project activities will occur within approved access and workspaces.
- A speed limit of 30 km/hr will be enforced on all access roads used by crews within the Project Area during construction to limit the potential for snake road mortalities.
- In the event that a snake is discovered to be in conflict with construction or operations, on-site staff and contractors will immediately stop work at that location and inform the Project's environmental representative. In consultation with the wildlife biologist, the following will occur:
  - The species will be identified, if possible.
  - If translocation of a snake(s) is required, the AEPA-WM Wildlife Biologist or appropriate regulating body will be informed. If safe, individual snakes would likely be moved off the right-of-way or work area by the wildlife biologist with snake tongs to outside the construction zone.
- The crews and on-site environmental representative will check under and around equipment and around stored materials before entering and starting equipment or working in the area to limit the potential for snake mortality and worker/equipment-snake interactions.
- Open excavations (e.g., turbine foundations, collector line trenches) will be checked daily by the on-site environmental representative or a designate for snakes, and if present, the Wildlife Monitor will translocate them to a safe distance from the work site.
- A qualified wildlife biologist will address all incidental snake observations and interactions, and will be responsible for handling and translocating all snakes, if found on the work site. If snakes are observed in the vicinity of an open excavation, exclusion fencing at that work site would be installed on a site-specific basis. Due to the chronically disturbed nature of the lands (heavily worked cultivated and irrigated fields), snake interactions are not anticipated for the small construction window for the Project. If appropriate (i.e., snakes are observed in the vicinity of an open excavations), installation of exclusion fencing at that work site would be considered.
- In the unlikely event that a hibernaculum is discovered during construction, the AEPA-WM Wildlife Biologist or appropriate regulating body will be contacted immediately to determine appropriate mitigation.



- In the event that an injured or dead individual of a species listed provincially and/or federally is observed on-site, the on-site environmental representative will notify the local AEPA-WM Wildlife Biologist as soon as practical.

Reporting of snakes and/or hibernacula encountered during construction and operations of the Project will be completed by the on-site environmental representative. The brief reports will include: date; location (e.g., UTM coordinates and a site name); name of the on-site environmental representative; wildlife biologist; details of observation; mitigation measures employed; results of the mitigation; and, a note on any remedial actions required as per the adaptive management process. Photographs, if taken, will be provided in the report to document the issue. Records of consultation with the AEPA Wildlife Biologist or regulatory agency will be included in the reports.

Considering the highly disturbed nature of the Project Area, and the mitigation proposed in this SPP, the potential for adverse effects on snakes as a result of the Project is expected to be minimal.

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

Project personnel will notify Valeco's on-site Project Manager of any wildlife issues including injured or dead wildlife or nuisance wildlife.

For compliance with standard 100.4.7 of the Directive the local AEPA Wildlife Biologist will be notified of any mortality of provincially (AEP 2020c) or federally (Government of Canada 2021) listed wildlife species, or high levels of mortality as defined by the AEP Bat Mitigation Framework (AEP 2013b). Additionally, the carcasses of species at risk and sensitive species will be collected, identified, labelled, frozen, and submitted to the AEPA-WM wildlife lab in Edmonton for compliance with Standard 100.4.9 in the Directive.

**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?**

The temporary Project construction footprint (i.e., not part of the operational footprint) will be reclaimed to the previous land capability (i.e., Cultivation) following construction, in accordance with the *Conservation and Reclamation Directive for Renewable Energy Operations* (C&R Directive; AEP 2018). The temporary Project construction footprint includes access roads, temporary workspaces, laydown areas, and the collector lines (see Table 38).



Table 38. Temporary construction footprint to be reclaimed.

Proposed Type of Infrastructure	Total Project Construction Footprint (ha)	Total Project Operation Footprint (ha)	Total Project Footprint to be Reclaimed Following Construction (ha)
Turbine Locations	6.67	0.62	6.05
Access Roads/Collector System <sup>1</sup>	12.53	3.00	9.53
Existing Trail Upgrades	0	0	0
Substation <sup>2</sup>	0.06	0.06	0
Operation and Maintenance Facility	0	0	0
Laydown Area	0	0	0
Permanent Meteorological Towers	0	0	0
<b>Total<sup>3</sup></b>	<b>19.31</b>	<b>3.68</b>	<b>15.63</b>

Notes:

- 1 Collector lines will be installed underground within the access right-of-way.
- 2 The substation will be built in an approximately 12 m by 5 m area.
- 3 Some numbers are rounded for presentation purposes; totals may not equal the sum of the individual values.

In accordance with the C&R Directive, the Proponent will conduct a pre-disturbance site assessment (PDSA) prior to construction to identify site-specific mitigation measures for soil and vegetation management. Reclamation efforts will be designed and implemented to stabilize and revegetate disturbed areas associated with the temporary Project construction footprint that are not required for safe operations.

Site preparation will consist of vegetation removal (where required), stripping/salvaging topsoil, grading subsoil, subsurface compaction and/or infill of a suitable base (if required). During construction topsoil and subsoil will be stored separately a minimum of 1 m apart and following construction, subsoil will be recontoured and then topsoil will be replaced. Interim monitoring site assessments will be conducted for a minimum of three growing seasons following Project construction.



**49. Provide the proposed construction schedule for the project.**

The Project is expected to receive all of the required permits by summer of 2023. Because the Project footprint is small, construction activities are expected to be completed expeditiously. The following schedule is expected for the Project:

- Pre-Construction activities: March 2024
- Civil works (roads, pads and foundations): April 2024
- Turbine deliveries and erection work: April to May 2024
- Site clean-up and reclamation activities: May 2024
- Commissioning of the site: June to July 2024

**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.**

In addition to the mitigation discussed in the responses to several of the previous questions, the following mitigation methods will be used to comply with the Standards and Best Management Practices (BMP) outlined in the Directive (AEP 2018):

- Construction activities will be scheduled to avoid sensitive periods for wildlife (Standard 100.3.2). No native grassland habitat is expected to be disturbed for construction of the Project, and therefore, the risk to grassland breeding birds is considered to be low. Site preparation and clearing activities will be scheduled outside the breeding bird activity period of April 1 to July 15, if possible, otherwise pre-disturbance nest sweeps of work sites on the cultivated/irrigated land would be completed to identify active nests and establish appropriate no-disturbance buffers. No other time restrictions are planned for construction of the Project, given the intensive agricultural land use (i.e., chronic disturbance) and the field survey results. Nevertheless, if sensitive species are found during the pre-construction nest sweeps, appropriate mitigation will be developed in consultation with AEPA;
- Construction activities will minimize habitat disturbance through the use of matting, reduced soil stripping, frozen construction, and minimizing fencing and road grades (Standard 100.3.4);
- Tubular turbine towers, rather than lattice towers, will be used to minimize bird perching and nesting opportunities (Standard 100.3.13);
- Operational personnel will be minimized on site during the restricted wildlife time periods (BMP 200.3.1);
- The Project will comply with the *Weed Control Act* and all equipment and vehicles will arrive on site clean of mud and vegetative materials that could facilitate the spread of invasive species (BMP 200.3.2);
- Lighting for on-ground infrastructure will be reduced, down-shielded, and controlled by proximity sensors where possible (BMP 200.3.3);
- The Project will be designed to minimize new access roads (BMP 200.3.4);



- The Project will be designed to have the smallest construction and operational footprints possible (200.3.4).
- If construction is scheduled during the migratory bird nesting period, nest searches will be performed by an experienced wildlife biologist to identify breeding birds or their nests. If breeding activity is identified then appropriate setback buffers will be applied to the suspected nest location to minimize the risk of disturbing birds, nests or eggs in accordance with the *Migratory Bird Convention Act* and the *Alberta Wildlife Act*.
- Wildlife sweeps, as per AEP's Wildlife Sweep Protocols (2020), will be conducted within 7 days of the start of construction for Project activities occurring during the migratory bird nesting period.

With the implementation of these mitigation measures, the effects on wildlife and wildlife habitat are expected to be minimal.

**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.**

Not applicable.

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

Not applicable.

**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.**

Not applicable.

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

Not applicable.



## 11 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. State that the post-construction surveys will be completed as directed by the AEP “Post-Construction Survey Protocols for Wind and Solar Energy Projects”?**

Post-construction surveys will be completed as directed by the AEP “Post Construction Survey Protocols for Wind and Solar Energy Projects” (AEP 2020b).

**56. 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.**

If mortalities are higher than acceptable by AEPA-WM, the Project representative will notify and consult with the AEPA-WM Wildlife Biologist on mitigation measures outlined in the *Bat Mitigation Framework for Wind Power Development* (AEP 2013) and discuss other adaptive management practices. Mitigation measures will be specific to the nature and location of mortalities and will be informed by post-construction surveys. Mitigation options may include seasonal shutdowns, shutdowns at night, increasing wind cut-in speed, and feathering or altering the pitch of the turbine blades. Mitigation measure will be approved by the AEPA-WM Wildlife Biologist prior to implementation and follow up surveys will be conducted to assess the effectiveness of mitigation measures.



## 12 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.

**57. Map and a KMZ file 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).

This map is included in this submission as Figure 2 in Section 2. The KMZ will be attached electronically.

**58. Map and a KMZ file 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).

These maps are included in the submission as Figure 4 (Bird Migration Survey Points) in Section 6, Figure 5 (Breeding Bird Survey Points) in Section 6, Figure 6 (Raptor Nests) in Section 6, Figure 7 (Bat Survey Points) in Section 6, Figure 15 (Burrowing Owl Survey Points) in Section 7, and Figure 16 (Sharp-tailed Grouse Survey Points) in Section 7. The KMZs will be attached electronically.

**59. Map and a KMZ file 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, collections 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).

This map is included in this submission as Figure 1 in Section 1. The KMZ will be attached electronically.

**60. Map and a KMZ file 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).

This map is included in this submission as Figure 3 in Section 3. The KMZ will be attached electronically.



**61. Map and a KMZ file 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).

This map is included in this submission as Figure 6 in Section 6. The KMZ will be attached electronically.

**62. Other associated maps and figures: (insert jpeg/pdf map file).** Provide any other maps referenced by the proponent in the body of this submission. Additional maps or figures must be provided as a KMZ file, in addition to a figure in the 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).

## 13 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.

**63. 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).**

Based on the wildlife surveys conducted, there were no wildlife features (i.e., nests, burrows, leks) identified within setback distances to Project infrastructure (Figure 6). The closest wildlife feature to the Project is the Red-tail Hawk nest RTHA01 located in SE 26-9-19 W4M, 730 m southwest of the proposed crane disturbance area for Turbine 5 in SW 25-9-19 W4M.

As mentioned in Section 1, the Project Area is composed of a majority of cultivated habitat (133.68 ha and 75% of the overall land cover) with a lack of diverse natural habitat (e.g., Native Grassland, Wetlands, Aspen Forest) preferred by most wildlife species. A total of 12.31 ha of industrial and developed habitat, including the McCain Coaldale processing plant and associated infrastructure (i.e., parking lots) is located within the Project Area, and the land surrounding the plant is zoned as industrial park in Lethbridge County.

Based on the survey results and the land cover (see representative photos in Appendix A), the Project Area (and 1,000 m buffer) is considered to have a low suitability for wildlife and the majority of the wildlife use in the Project Area was associated with man-made habitat features such as the Stafford Reservoir irrigation canal and the McCain plant wastewater pond. The nearest natural habitat available for wildlife use is located 8.5 km north of the Project Area associated with the Oldman River valley and 4.5 km southeast of the Project Area, associated with Chin Lakes. Considering the proactive planning for the Project, the results of the surveys, and the proposed mitigation, the potential for adverse effects on wildlife and wildlife habitat is expected to be low.



## 14 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.

*I, Samson Vayssieres, as an authorized representative of Valeco Énergie Québec Inc., 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: \_\_\_\_\_

Date: 22/12/2022

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.



## 15 REFERENCES

- Alberta Environment and Parks (AEP). 2013a. Sensitive Species Inventory Guidelines. (<https://open.alberta.ca/publications/sensitive-species-inventory-guidelines>). Accessed December 15, 2021.
- Alberta Environment and Parks (AEP). 2013b. Bat Mitigation Framework for Wind Power Development. (<https://open.alberta.ca/publications/bat-mitigation-framework-for-wind-power-development>). Accessed December 15, 2021.
- Alberta Environment and Parks (AEP). 2016. Guide for Assessing Permanence of Wetland Basins. Land Policy Branch, Policy and Planning Division. 28 pp.
- Alberta Environment and Parks (AEP). 2018. Conservation and Reclamation Directive for Renewable Energy Operations. (<https://open.alberta.ca/publications/9781460141359>). Accessed December 15, 2021.
- Alberta Environment and Parks (AEP). 2020a. Bird Migration Survey Protocol. (<https://open.alberta.ca/publications/bird-migration-survey-protocol>). Accessed December 15, 2021.
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- Alberta Environment and Parks (AEP). 2020c. Wild Species Status Search. (<https://extranet.gov.ab.ca/env/wild-species-status/default.aspx>). Accessed December 15, 2021.
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- Alberta Environment and Sustainable Resource Development (AESRD). 2015. Alberta Wetland Classification System. Water Policy Branch, Policy and Planning Division, Edmonton, Alberta. 54 pp.
- AltaLIS Ltd. 2017. 20K Base Features. (<https://www.altalis.com/map?id=120>). Accessed December 15, 2021.
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- Government of Alberta. 2021a. Aerial Photographic Record System. (<https://securexnet.env.gov.ab.ca/aprs/inquiry.jsp>). Accessed December 15, 2021.



- Government of Alberta. 2021b. Alberta Climate Information Service. (<https://agriculture.alberta.ca/acis/township-data-viewer.jsp>). Accessed December 15, 2021.
- Lausen C, Baerwald E, Gruver J, and R Barclay. 2010. Appendix 5: Bats and Wind Turbines. Pre-siting and Pre-Construction survey protocols. An Appendix to: Handbook of Inventory Methods and Standard Protocols for Surveying Bats in Alberta. (<https://open.alberta.ca/publications/4795089>). Accessed December 15, 2021
- Power Line Sentry. 2021. Line Markers. (<https://powerlinesentry.com/product-category/line-markers/>). Accessed December 15, 2021.
- Natural Resources Canada. 2022. Geographical Names Data. (<https://www.nrcan.gc.ca/earth-sciences/geography/download-geographical-names-data/9245>)
- Vonhoff, M. 2002. Handbook of Inventory Methods and Standard Protocols for Surveying Bats in Alberta. (<https://open.alberta.ca/publications/4795089>). Accessed December 15, 2021.



# APPENDICES



## APPENDIX A PHOTOS



Photo 1. Looking north at Tame Grassland habitat between cultivation and the Stafford Reservoir irrigation canal in NW 25-9-19 W4M; June 2021.



Photo 2. Looking west at Tame Grassland habitat surrounding the McCain wastewater pond in NW 25-9-19 W4M; June 2021.



Photo 3. Looking north at Hayland habitat approximately 400 m west of the McCain plant in SW 25-9-19 W4M; June 2021.



Photo 4. Looking south towards the McCain plant at cultivated habitat in NE 25-9-19 W4M; June 2021.



Photo 5. Looking north at cultivated habitat in NE 25-9-19 W4M; June 2021.



Photo 6. Looking southwest towards the McCain plant at cultivated habitat in E 1/2 36-9-19 W4M; June 2021.



Photo 7. Looking northwest from the southeast corner of the McCain wastewater pond; August 2021.



Photo 8. Looking south at the Stafford Reservoir irrigation canal from a train bridge crossing in SW 25-9-19 W4M; June 2021.



Photo 9. Looking northeast at the Stafford Reservoir Irrigation canal in NW 36-9-19 W4M; June 2021.



Photo 10. Looking southwest at the Stafford Reservoir Irrigation canal from the Highway No. 3 crossing in SW 25-9-19 W4M; June 2021.



Photo 11. Looking east at the McCain plant in S ½ 25-9-19 W4M; June 2021.



Photo 12. Looking north at industrial land cover in SW 30-9-18 W4M and the Highway No. 3 intersection; June 2020.



Photo 13. Looking south at industrial land cover (left) and the town of Chin (right) from the southeast corner of NE 25-9-19 W4M; June 2020.



Photo 14. Looking south at bat survey location Bat 01 in SW 36-9-19 W3M; April 2021.



Photo 15. Looking northwest at bat survey location Bat 02 in NW 25-9-19 W3M; April 2021.



Photo 16. Looking south at bat survey location Bat 03 in SW 25-9-19 W3M; April 2021.



Photo 17. Looking north at bat survey location Bat 04 in NE 25-10-19 W3M; April 2021.

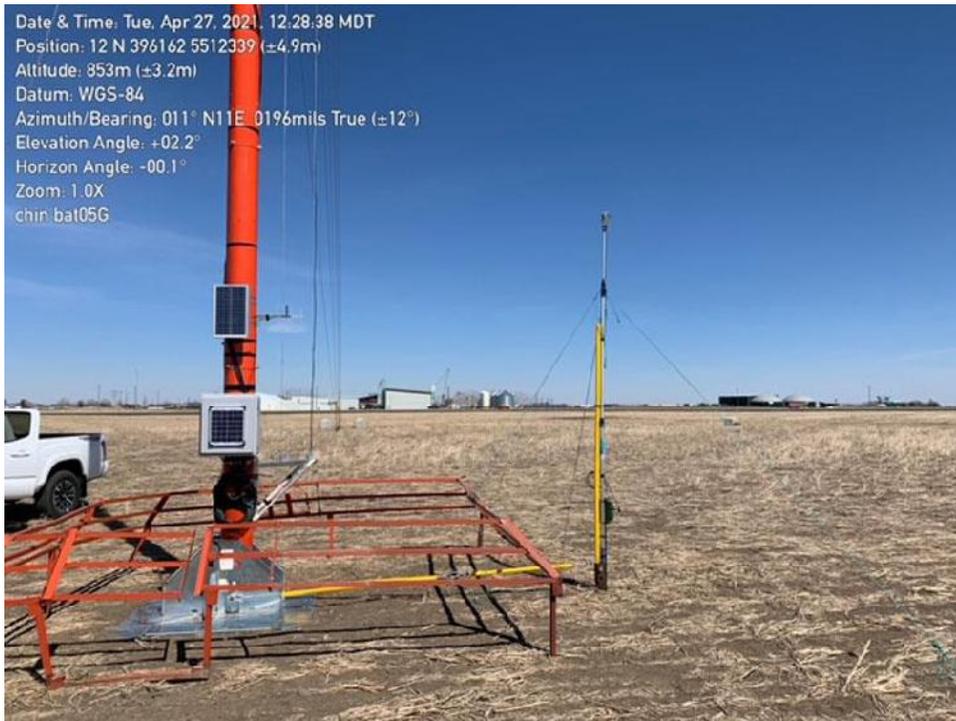


Photo 18. Looking north at bat survey location Bat 05G installed at the base of the MET in NW 19-9-18 W4M; April 2021.



Photo 19. Looking south at bat survey location Bat 05T installed on the MET in NW 19-9-18 W4M; April 2021.



Photo 20. Looking up at the microphone for bat survey location Bat 05T in NW 19-9-18 W4M raised to 30 m on the MET; April 2021.

**Appendix D. Renewable Energy Referral Report**

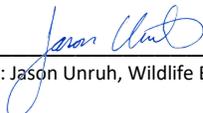
# Alberta Environment and Protected Areas - Fish and Wildlife Stewardship Renewable Energy Referral Report

The Coaldale Wind Farm (the Project) proposed by McCain Foods Ltd. (the Proponent) was reviewed by the Alberta Environment and Protected areas – Fish and Wildlife Stewardship (EPA-FWS) regional wildlife contact for renewable energy projects. EPA-FWS has reviewed the proposed location, mitigation strategies, including associated infrastructure and construction plans, and post-construction monitoring and mitigation program. Project information was presented by the Proponent in a submission dated December 2022 and accepted by EPA-FWS on January 31, 2023.

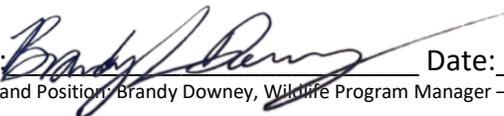
The EPA-FWS review of the Coaldale Wind Farm was guided by the EPA-FWS policy document, *Wildlife Directive for Alberta Wind Projects* (September 2018; hereafter called the *Directive*) and the *Post-Construction Survey Protocols for Wind and Solar Energy Projects* (January 2020; hereafter called the *PCMP Protocol*). The Proponent must follow the *Directive* and *PCMP Protocol* for requirements on siting, pre-construction surveys, construction, operation, and post-construction monitoring and mitigation plans.

This referral report summarizes the review undertaken by EPA-FWS that was restricted to reviewing information provided in the submitted documents, completed by EDI Environmental Dynamics Inc. on behalf of the Proponent, and applying the wildlife standards and best management practices for the siting, construction, and operation of the wind facility. This office undertook no independent on-site assessment. This Renewable Energy Referral Report is not intended to relieve any party from any liability if there are detrimental effects to wildlife or wildlife habitat during construction or operation that were not identified and mitigated for in the documents submitted. It is the responsibility of the Proponent to ensure compliance under all other policy and legislation, including but not limited to the *Alberta Wetland Policy*, *Water Act*, *Code of Practice for Watercourse Crossings*, *Environmental Protection and Enhancement Act*, *Alberta Wildlife Act*, *Migratory Bird Convention Act*, and *Species at Risk Act*. Federal requirements may differ from EPA-FWS policy, therefore additional consultation may be necessary. EPA-FWS review does not eliminate the need for review by other branches of the Environment and Protected Areas Department, Government of Canada, or other governing bodies. This referral report summarizes the potential risks to wildlife and wildlife habitat based on the information provided to EPA-FWS.

EPA-FWS has determined the Coaldale Wind Farm proposed by McCain Foods Ltd., poses a moderate risk to wildlife and wildlife habitat, based on based on Project siting, avoidance of sensitive wildlife habitat and features, wildlife use in the area, and commitments made by the Proponent to mitigate and monitor wildlife impacts. This EPA-FWS Renewable Referral Report expires on September 20, 2028.

Signature:  Date: October 4, 2023  
Printed Name and Position: Jason Unruh, Wildlife Biologist, Red Deer, South Region

Signature:  Date: October 4, 2023  
Printed Name and Position: Scott Stevens, Senior Wildlife Biologist, Red Deer, South Region

Signature:  Date: October 5, 2023  
Printed Name and Position: Brandy Downey, Wildlife Program Manager – South Region, Lethbridge, AB

## Referral Report Summary

<i>Project Information</i>	<i>Project Details</i>
Project Name	Coaldale Wind Farm
Municipality/County	Lethbridge County, Municipal District of Taber
Project MW	31 MW
Proponent Name	McCain Foods Ltd.
Consultant Name	EDI Environmental Dynamics Inc.
Project Documents Submitted <sup>1</sup>	<ul style="list-style-type: none"><li>22C0543_Valeco_Coaldale_AEP_Submission_20221223</li></ul>
Date of Referral Report Expiry	September 20, 2023
Overall Risk Ranking	Moderate Risk

<sup>1</sup> Note: various clarifications and edits of the original documents are discussed in the subsequent files and these changes are to supersede the original documents.

## PROJECT SITING

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### Native and Critical Habitats

Risk Ranking:  Not Applicable  Low  Moderate  High  High Unmitigated

### Lakes/Large Waterbodies

Risk Ranking:  Not Applicable  Low  Moderate  High  High Unmitigated

### Wetlands

Risk Ranking:  Not Applicable  Low  Moderate  High  High Unmitigated

## WILDLIFE FEATURES

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### Raptor Nests (Sensitive and Non-Sensitive)

Risk Ranking:  Low  Moderate  High  High Unmitigated

### Sharp-tailed Grouse

Risk Ranking:  Low  Moderate  High  High Unmitigated

### Burrowing Owl

Risk Ranking:  Low  Moderate  High  High Unmitigated

### Snakes (Hibernacula & Habitat)

Risk Ranking:  Low  Moderate  High  High Unmitigated

## BIRD RISK

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### Breeding Birds

Risk Ranking:  Low  Moderate  High  High Unmitigated

### Bird Risk

Risk Ranking:  Low  Moderate  High  High Unmitigated

## BAT RISK

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### Bat Risk

Risk Ranking:  Low  Moderate  High  High Unmitigated

## Other Wildlife Risks

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### Guy Wires

Risk Ranking:  Not Applicable  Low  Moderate  High  High Unmitigated

### Collection Lines

Risk Ranking:  Low  Moderate  High  High Unmitigated

## Post Construction Monitoring Plan

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Risk Ranking:  Low  High  High Unmitigated

## Post Construction Mitigation Plan

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Risk Ranking:  Low  Moderate  High  High Unmitigated