

# Horse Creek Biophysical Impact Assessment



Prepared by:

**Westhoff  
Engineering  
Resources, Inc.**

---

*Land & Water Resources Management Consultants*

# Horse Creek Biophysical Impact Assessment

Draft Report  
October 14, 2021

Prepared for:

**UrbanStar Horse Creek Development Ltd.**

File: WER118-18

Prepared by:

## **Westhoff Engineering Resources, Inc.**

Suite 601  
1040 – 7th Avenue SW  
Calgary, Alberta T2P 3G9

Phone: 403.264.9366

Fax: 403.264.8796

Email: [werinc@westhoff.ab.ca](mailto:werinc@westhoff.ab.ca)

### Corporate Authorization

This document entitled Horse Creek Biophysical Impact Assessment was prepared by Westhoff Engineering Resources, Inc. It is intended for the use of UrbanStar Horse Creek Development Ltd. and approval authorities for which it has been prepared. The contents of the report represent the best judgment of Westhoff Engineering Resources, Inc. based on information available at the time of preparation. Any use a third party makes of the report, or reliance on or decisions made based on it, are the responsibilities of such third parties. Westhoff Engineering Resources, Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on the report.

Duplication or distribution of this report or any portion hereof is forbidden without approval from Westhoff Engineering Resources, Inc.

Unauthorized use of the concepts and strategies reported in this document and any accompanying drawings and/or figures is forbidden. They are the sole intellectual property of the author.



Report prepared by: Andrea Zemrau, B.Sc., P. Ag.  
Environmental Specialist



Report reviewed by: Karen Oldershaw, M. E. Des., P. Biol., QWSP  
Authenticating Professional in Wetland Science

## Executive Summary

Westhoff Engineering Resources Inc. (Westhoff) was retained by UrbanStar Horse Creek Development Ltd. (UrbanStar) to prepare a Biophysical Impact Assessment (BIA) for the Horse Creek Project Site in Rocky View County, AB (SE-32-26-04 W5M and NE-29-26-04 W5M).

### Existing Conditions

The Project Site is located within the Parkland Natural Region and Foothills Parkland Natural Subregion. Terrain conditions are variable with a considerable escarpment on the western boundary. Two vegetated draws transect the western slopes while sandstone bedrock outcrops are exposed near the crest of the escarpment. The majority of the Site to the east is agricultural fields on relatively flat terrain.

A residence and associated out-buildings are visible in the earliest historical photograph from 1966; these buildings remain on-site under current conditions. Two access roads are visible along the western slopes as early as 1966. The upland plateau has been cultivated extensively since the earliest historical photographs.

We identify five upland plant communities within the Project Site: Disturbed, Native Grassland, Non-Native Grassland/Pasture, Draw, and Wetlands. The Disturbed community includes the residence and access roads. More natural conditions persist on the western slopes. Two rare plant species occur along the rock outcrop topping the western slopes of the Project Site. The two observed species are sandhill cinquefoil (*Potentilla lasiodonta*) and Macoun's cinquefoil (*Potentilla macounii*). Multiple introduced plants species were recorded including two Noxious weeds: perennial sow-thistle and creeping thistle.

We identify two wetlands within the Project Site totaling 0.30 ha. The wetlands are classified as temporary graminoid marshes. The provincial wetland functional assessment results indicate that the two wetlands are moderate in value. One ephemeral water body (0.13 ha) was also recorded as well as one dug out at the northern Project Site boundary. Alberta Public Lands indicates none of the waterbodies within the Project Site are claimed by the Crown.

A number of wildlife species have the potential to occur within the Project Site of which 11 were observed during field surveys. The Sprague's pipit was identified within the Project Site, which favors brush grassland and is less tolerant of heavily grazed areas (Semenchuck 1992). Sprague's pipit is listed as Sensitive in Alberta due to habitat alteration and loss.

We describe landscape connectivity based on the extent of connected natural habitats present within and adjacent to the Project Site. Wildlife are expected to move freely within the Project Site although hiding and security cover in the uplands is limited. Horse Creek Road and Weedon Trail are likely to create a sensory barrier and potential collision hazard for wildlife travelling between the Project Site and surrounding areas. Wildlife are likely to travel between the Project Site and areas to the west where natural landscapes and associated habitats persist along Horse Creek.

We applied provincial criteria to evaluate whether any Environmentally Significant Areas occur within the Project Site. The western slopes of the Project Site are identified as an ESA as this area maintains its natural character and hosts a diversity of plant species including rare plants. None of the wetlands within the Project Site are identified as ESAs.

### **Potential Impacts and Mitigation**

The potential impacts of the Horse Creek development on identified biophysical conditions were determined with reference to the Conceptual Scheme prepared by Township Planning + Design Inc. May 12, 2021. Potential impacts include loss or alteration of wetlands, soil, terrain, native vegetation and rare plants as well as potential loss or disturbance of wildlife and wildlife habitat.

The following mitigation measures will be implemented to reduce, eliminate, or control the potential negative impacts of the proposed development.

- Retention of the majority of the west-facing escarpment, which is identified as an ESA;
- Erosion and Sediment Control (ESC) Plan to limit or control deleterious substances leaving the Site or entering area water bodies;
- Environmental Construction Operation Plan (ECO) to manage potential environmental impacts resulting from construction;
- Landscape and Weed Management Program to reduce post-development impacts to native plant communities and wildlife habitat;
- Stormwater management strategies; and,
- Timing construction to avoid critical time periods for wildlife (April 1 to August 31, for owls as early as February 1

### **Predicted Residual Impacts**

The potential impacts associated with the proposed development that we predict will persist after mitigation measures are impacts to wetlands, rare plants and wildlife.

The two Project Site wetlands will be permanently lost or altered as a result of the proposed development. Wetland loss will be mitigated by providing wetland replacement through existing provincial approval processes under the Alberta Wetland Policy which is an accepted approach to managing loss of wetlands on both provincial and municipal scales. The residual impact to wetlands is not significant provided wetland loss is off set through applying Alberta Wetland Policy replacement strategies.

We anticipate that some individual rare plants may be permanently lost as a result of the proposed development. Efforts will be made to mitigate this loss through strategies such as transplantation, soil salvage of seed collection. However, there is some uncertainty regarding the outcome of these mitigation efforts and individual specimens may not successfully re-establish.

At the time this BIA was prepared, there was no formal process, or available provincial or municipal criteria, for determining what qualifies as a significant residual loss of rare plants. The current concept plan retains and integrates a considerable portion of the rare plants and associated topography within the area.

Timing the stripping and grading activities to occur outside the sensitive breeding season for most wildlife, including owls (Feb 1 to August 31), will significantly reduce the risk of wildlife fatality but will not eliminate it. The loss of a listed species due to stripping and grading would be a significant residual impact.

We expect the fatality risk to listed species is low given that site clearing will be restricted to the building envelope for each Lot and associated roadways as well as the stormwater pond. Construction activities will occur outside the breeding season or only after active nest/burrow sweeps are completed and associated Best Management Practices are implemented.

### **Potential Cumulative Effects**

We considered the potential for cumulative effects on wetlands resulting from the proposed development. We propose that the cumulative effects of development on wetlands will be mitigated primarily through the Province's compensation (replacement program) as per the Alberta Wetland Mitigation Directive (Alberta Environment and Parks 2015).

Wetlands are identified as a conservation priority within the Rocky View County Wetland Conservation and Management Policy (Rocky View County 2010). The Wetland Conservation and Management Policy does, however, allow for development of wetlands where it can be shown that it is not practical to avoid impacts (Rocky View County 2010).

Retention of the two wetlands would likely prove unsuccessful as the catchment area feeding the wetlands will be developed as part of the proposed project. Further, the Project Site wetlands have been subject to past disturbances including cultivation and weed invasion which has reduced their value.

Overall, we anticipate that the cumulative effects of past, current and future land use and activity in this region will be managed through the retention of priority wetlands coupled with the application of provincially approved wetland compensation (replacement) measures.

**Table of Contents**

**1 Introduction .....1**

    1.1 Purpose .....1

**2 Methods .....1**

    2.1 Review of Existing Information .....1

        2.1.1 Alberta Conservation Information Management System (ACIMS).....1

        2.1.2 Previous Wildlife Observations .....3

        2.1.3 Historical Aerial Photographs and Precipitation Data .....3

        2.1.4 Agricultural Region of Alberta Soil Inventory Database .....4

        2.1.5 Surface Hydrology .....4

    2.2 Field Sampling.....4

        2.2.1 Wildlife Field Surveys .....5

        2.2.2 Upland Plant Communities.....5

        2.2.3 Rare Vascular Plants and Rare Ecological Communities.....5

        2.2.4 Wetland Identification and Delineation .....5

        2.2.5 Wetland Classification .....6

        2.2.6 Wetland Functional Assessment .....6

    2.3 Environmentally Significant Areas .....6

    2.4 Historic Resources Assessment .....7

    2.5 Identification of Impacts.....7

    2.6 Mitigation Measures.....7

    2.7 Determining Significance of Residual Impacts.....7

    2.8 Monitoring .....7

    2.9 Description of Cumulative Effects .....7

**3 Existing Environment.....8**

    3.1 Natural Region .....8

    3.2 Landform, Hydrology and Soils .....8

    3.3 Historical Disturbance and Land Use .....8

    3.4 Upland Plant Communities .....8

    3.5 Rare Plants and Rare Ecological Communities .....11

    3.6 Introduced Plants.....11

    3.7 Wetlands and Waterbodies .....12

        3.7.1 Wetland Inventory.....12

        3.7.2 Ephemeral Waterbodies.....12

        3.7.3 Wetland Disturbance.....12

    3.8 Wetland Functional Assessment.....14

    3.9 Crown Claimed Water Bodies .....14

    3.10 Wetland Hydrology .....14

    3.11 Wildlife.....14

    3.12 Landscape Connectivity .....18

3.13	Environmentally Significant Areas .....	18
3.14	Historical Resources.....	18
<b>4</b>	<b>Identification of Impacts.....</b>	<b>20</b>
4.1	Impacts to Soils and Terrain .....	20
4.2	Loss or Alteration of Wetlands .....	22
4.3	Loss or Alteration of Rare Plants, Native Plants and Plant Communities .....	22
4.4	Loss or Disturbance of Wildlife and Wildlife Habitat.....	22
<b>5</b>	<b>General Mitigation Measures .....</b>	<b>24</b>
5.1	Erosion and Sediment Control .....	24
5.2	Environmental Construction Operation Plan.....	24
5.3	Landscape Plan and Weed Management Program.....	24
5.4	Rare Plants Mitigation Plan .....	25
5.5	Stormwater Management Strategies .....	25
5.6	Timing of Construction .....	25
5.7	Monitoring.....	26
<b>6</b>	<b>Wetland Mitigation Measures .....</b>	<b>26</b>
6.1	Wetland Decision Framework .....	26
6.2	Wetland Replacement Strategy.....	27
<b>7</b>	<b>Residual Impacts and Significance.....</b>	<b>27</b>
7.1	Wetlands.....	27
7.2	Rare plants.....	27
7.3	Wildlife.....	27
<b>8</b>	<b>Description of Cumulative Effects .....</b>	<b>28</b>
<b>9</b>	<b>References .....</b>	<b>29</b>
<b>Appendix A</b>	<b>Historical Aerial Photographs.....</b>	<b>31</b>
<b>Appendix B</b>	<b>Rare Plant &amp; ACIMS Database Search Results .....</b>	<b>41</b>
<b>Appendix C</b>	<b>Wetland and Waterbody Data.....</b>	<b>74</b>
<b>Appendix D</b>	<b>ABWRET – A Wetland Functional Assessment.....</b>	<b>82</b>
<b>Appendix E</b>	<b>Public Lands Correspondence.....</b>	<b>84</b>
<b>Appendix F</b>	<b>Potential Wildlife Species.....</b>	<b>87</b>
<b>Appendix G</b>	<b>FWMIS Report .....</b>	<b>93</b>
<b>Appendix H</b>	<b>Aquatic Environmentally Significant Areas (AESAs).....</b>	<b>96</b>

**List of Figures**

Figure 1: Project Location .....2  
Figure 2: Plant Communities .....10  
Figure 3: Wetlands and Waterbodies .....13  
Figure 4: Sub-Catchment Areas .....15  
Figure 5. Historical Resource Values.....19  
Figure 6: Outline Plan .....21  
Figure 7: Wetland and Waterbody Impacts.....23

**List of Tables**

Table 1: Representative Plant Species by Community .....9  
Table 2: Invasive Plants within the Project Site .....11  
Table 3: Wetland and Waterbody Area and Classification .....12  
Table 4: Observed Wildlife Species.....16

## **1 Introduction**

UrbanStar Horse Creek Development Ltd. (UrbanStar) is planning for the development of SE-32-26-04 W5M and NE-29-26-04 W5M in Rocky View County, AB (Figure 1). The Project Site is bordered by country residences to the north and south, Range Road 44 to the east, Horse Creek Road to the west. The Project Site consists of approximately 114 ha of agricultural lands with natural features including an escarpment and natural wetlands.

### **1.1 Purpose**

Westhoff Engineering Resources Inc. (Westhoff) was retained to prepare a Biophysical Impact Assessment (BIA) for Horse Creek. On a municipal level, BIAs are commonly requested when development is proposed that may impact natural landscape features. We prepared this BIA with reference to the 2013 County Servicing Standards (Rocky View County 2013).

The objectives of this BIA are to:

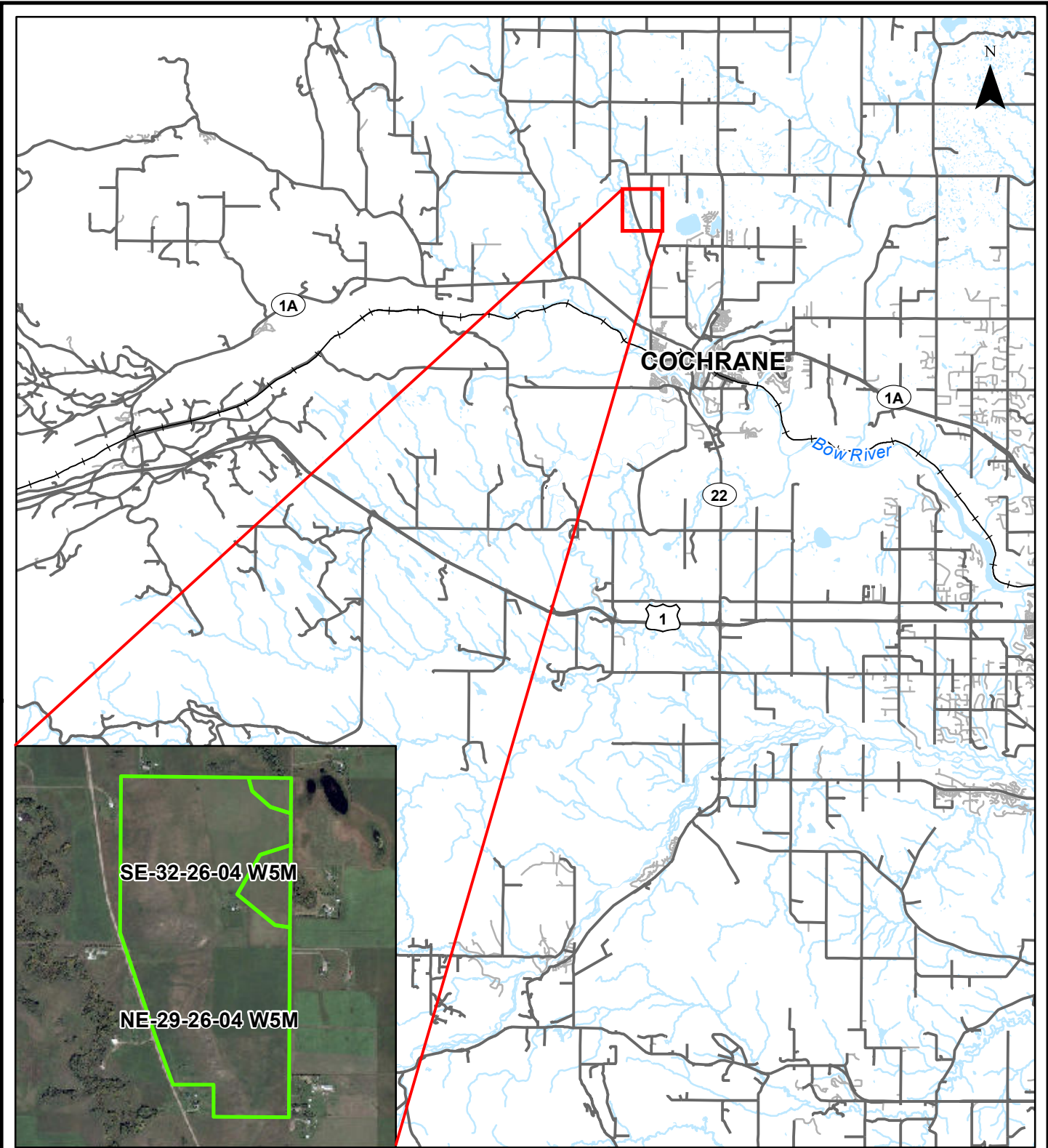
- describe existing environmental conditions within and adjacent to the Project Site;
- describe the proposed Project with reference to a final concept plan;
- predict the possible impacts of the Project on existing environmental conditions;
- recommend mitigation measures to reduce, eliminate or compensate for these potential impacts;
- identify possible residual impacts of the Project and evaluate the significance of these impacts; and
  - describe the possible cumulative effects associated with the Project.

## **2 Methods**

### **2.1 Review of Existing Information**

#### **2.1.1 Alberta Conservation Information Management System (ACIMS)**

Alberta Conservation Information Management System (ACIMS) is a provincial government organization that maintains a database and tracks information on species, communities, and sites of conservation interest (Alberta Environment and Parks 2021). We completed an ACIMS database search to identify any past observations of provincially listed plant species on or in the vicinity of the Project Site.



**LEGEND**

- Project Site
- Major Road
- Minor Road
- + Railway
- Water Body

Client: <b>URBANSTAR</b>			
Project: <b>HORSE CREEK BIA</b>			
Title: <b>PROJECT LOCATION</b>			
Date: 10-12-2021	Project No.: WER118-18	Scale: 1:250,000	<b>FIGURE: 1</b>

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants

### **2.1.2 Previous Wildlife Observations**

We compiled wildlife observations from the Fisheries and Wildlife Management Information System (FWMIS). FWMIS is a Government of Alberta fisheries and wildlife database administered by Alberta Environment and Parks (AEP). We completed a 3 km radius FWMIS database search to determine whether any federally listed Species At Risk or provincial species identified as Sensitive, May Be At Risk, or At Risk have been previously observed on or in the vicinity of the Site (Alberta Environment and Parks 2021).

We also compiled wildlife observations from eBird, an online database that is associated with Cornell University Lab of Ornithology. Birders submit their location specific observations to this database where they are compiled and made available for public use (The Cornell Lab of Ornithology 2015). An eBird location at Cochrane Lake, approximately 1.5 km southeast of the Project Site, was included as species from this location have the potential to be encountered on Site, with the exception of aquatic species.

We reviewed Alberta wildlife field guides to develop a list of amphibian, reptile, mammal and bird species that may potentially inhabit areas within the Project Site (Smith 1993, McGillivray and Semenchuk 1998, Pattie and Fisher 1999, Russel and Bauer 2000, Stebbins 2003, Semenchuk 1992). Federal and provincial wildlife databases also provided information on the general distribution of wildlife species federally-listed as Species At Risk under the Species At Risk Act (SARA) (Government of Canada 2002) or provincially identified as Sensitive, May Be At Risk or At Risk as per the General Status of Alberta Wild Species (Alberta Environment and Parks 2017).

### **2.1.3 Historical Aerial Photographs and Precipitation Data**

We refer to the Alberta Wetland Identification and Delineation Directive, 2015, No.4 (Alberta Environment and Parks 2015), to provide guidelines on the approach to our historical review. We reviewed historical aerial photographs prior to and following field surveys. Photographs were accessed through Alberta Environment and Parks (AEP) and Google Earth™. A sub-set of AEP photographs was chosen based on the following criteria:

- photographs taken from multiple years over several decades;
- photographs taken in multiple seasons; and
- photographs representing the best available scale, clarity of image and availability.

The clearest photographs available on Google Earth™ were also reviewed as they provide information on the recent conditions of the Project Site.

We selected the following aerial photographs from AEP and Google Earth™ images (Appendix A):

- August 15, 1966
- June 8, 2011
- June 12, 1974
- August 22, 2015

- June 2, 1995
- May 13, 2002
- September 28, 2008
- September 8, 2016
- August 17, 2019

The historical review provides an indication of changes in environmental conditions over time as well as the distribution and extent of any detectable waterbodies or wetlands. We also used the photographs to document variation in surface water conditions in observed waterbodies and wetlands.

As part of the historical review process described in the Wetland Identification and Delineation Directive, precipitation data is required to correlate with the historical photographs and aid in determining wetland class (Alberta Environment and Parks 2015). We compiled precipitation data from Alberta Agriculture and Forestry to document the total amount of precipitation relative to each day, month, and year that historical aerial photographs were available (Alberta Agriculture and Forestry 2016). This data provides insight into historical environmental conditions and whether available photographs may be associated with wet, dry, or average precipitation year. Average annual precipitation levels from 1955 to 2019 was calculated to be 484 mm. To determine whether photographs were from dry, average, or wet years, we calculated the upper and lower 25% quartile. A dry year is represented by precipitation levels below or at 424 mm and a wet year has levels at or above 531 mm.

#### **2.1.4 Agricultural Region of Alberta Soil Inventory Database**

The Agricultural Region of Alberta Soil Inventory Database (AGRASID) identifies soil classes and groups that have been mapped throughout the province. We performed a database search to determine the types of soils that have been mapped on the Project Site (Alberta Agriculture and Rural Development 2016).

#### **2.1.5 Surface Hydrology**

The Alberta Wetland Assessment and Impact Report Directive (Alberta Environment and Parks 2017) requests that general information on the local surface water catchments be provided to support the evaluation of any area wetlands identified within the Site. Catchments mapping for the Project Site was determined using the Spatial Analyst function in ArcGIS. The Spatial Analyst hydrology tool set was used to model the flow of water across the surface of the Project Site, allowing for watershed delineation.

### **2.2 Field Sampling**

We completed the following field surveys at the Project Site:

- Amphibian survey: May 14, 2018;
- Breeding bird survey: June 13, 2018;
- Rare plant and rare ecological communities and upland plant communities survey: July 21, 24 and August 31, 2018; and

- Wetland and functional assessment survey: September 21, 2018.

Details regarding specific survey methods are provided below.

### **2.2.1 Wildlife Field Surveys**

Spring amphibian call surveys were completed at random locations at each observed water body or wetland. Survey protocol followed Sensitive Species Inventory Guidelines methodology recommended by Alberta Sustainable Resources Development (Alberta Government 2013). April/May is within the approximate breeding season for frog and toad species with the potential to occur within the Project Site. Cool evenings are common in the Project area; therefore, these surveys will not be conducted after sunset, but rather during the day (between approximately 10:00 am and 4:00 pm) to accommodate greater call detection.

A breeding bird call survey was conducted by Accipiter Ecological Management (avian specialist sub-consultant) between 06:00 – 08:15 am. Accipiter used standard procedures at multiple locations representing available habitats. Birds were identified by male territorial breeding songs and by visual observation.

Incidental wildlife observations were recorded while completing all formal surveys. All wildlife observations are presented relative to the wetlands where species were recorded.

### **2.2.2 Upland Plant Communities**

Zanshin Environmental Networks Inc. (Zanshin) prepared a list of upland plant species observed within the Project Site (Appendix B). Westhoff applied the field data and available contour information to develop a map of plant communities within the Project Site.

### **2.2.3 Rare Vascular Plants and Rare Ecological Communities**

Information on rare vascular plants and rare ecological communities was derived from background research and field surveys conducted by Zanshin. Zanshin followed the standardized rare plant survey methodology developed by the Alberta Native Plant Council (Alberta Native Plant Council 2000).

### **2.2.4 Wetland Identification and Delineation**

We identified and delineated wetlands and ephemeral water bodies within the Project Site. A wetland is defined as land saturated with water long enough to promote the formation of water altered soils, growth of water tolerant vegetation and various kinds of biological activity that are adapted to the wet environment (Alberta Environment and Sustainable Resource Development 2013). We referred to the Alberta Wetland Identification and Delineation Directive 2015 for guidelines on wetland identification and delineation (Alberta Environment and Parks 2015).

The Province also defines ephemeral water bodies (Alberta Environment and Parks 2015). These are areas where the terrain is by the water table near, at or above the ground surface for a short period of days. However, water is not present long enough to promote the formation of water altered soils within 30 cm of the ground surface or a dominance of water tolerant vegetation.

The 2015 Alberta Identification and Delineation Directive provides methods to identify and delineate wetlands based on various combinations of desktop delineation and field verification (Alberta Environment and Parks 2015). We then delineated wetland boundaries based on wetland versus upland field indicators (terrain, vegetation, and soils). Once identified, we surveyed the boundaries of Project Site wetlands with a Trimble Geo7X GPS unit. Raw GPS data was differentially corrected with data from the CAN-NET system.

The Appendix 7 field form, obtained from the Alberta Wetland Identification and Delineation Directive, was completed for each wetland. We also recorded dominant plant species at sample plots (with a radius of 2.5 m) in each representative wetland zone. Observations of previous wetland disturbance such as roadways, ditches, or previous land use activities, such as cultivation, were recorded for all wetlands.

### **2.2.5 Wetland Classification**

We applied the information gained through the historical aerial photograph review, combined with field surveys, to classify observed wetlands with reference to the Alberta Wetland Classification System (AWCS). The class is determined by the type of vegetation zone occurring in the central or deepest part of the wetland. This deepest vegetation zone must be 25% or more of the total wetland area.

### **2.2.6 Wetland Functional Assessment**

An ABWRET–A form was completed for all the Project Site wetlands and submitted to AEP for review. The results of this submission provide a value rating for each wetland.

## **2.3 Environmentally Significant Areas**

The Environmentally Significant Areas in Alberta: 2014 Update report identifies Environmentally Significant Areas (ESAs) on a provincial scale (Fiera Biological Consulting Ltd. 2014). The report identifies four general criteria used to assess whether an area is an ESA. The criteria are:

1. Areas that contain focal species, species groups or their habitats;
2. Areas that contain rare, unique or focal habitat, such as natural springs, Class A and B rivers and waterfowl staging areas;
3. Areas with ecological integrity, including undisturbed upland or wetland habitat; and
4. Areas that contribute to water quality.

We applied these criteria to evaluate whether any ESAs occur within the Project Site.

We also referred to the criteria presented in the Province’s Aquatic Environmentally Significant Area (AESA) report, completed in 2010 (Fiera Biological Consulting Ltd. 2010), to assess the significance of any identified wetlands.

## **2.4 Historic Resources Assessment**

A formal assessment of historical resources was not prepared as part of this BIA. This is being completed under a separate cover by a qualified professional.

## **2.5 Identification of Impacts**

We identify the predicted impacts of the proposed Horse Creek development with reference to the concept plan provided by Township Planning + Design Inc. May 12, 2021. This BIA Report does not include a comprehensive evaluation of surface or ground water conditions or an assessment of potential impacts on these water resources as a result of the proposed development.

## **2.6 Mitigation Measures**

Mitigation measures are measures applied to eliminate, reduce, or control the predicted negative impacts of a particular project (Government of Canada 1992). We present mitigation measures that could eliminate, reduce, or control the predicted negative impacts of the Project.

## **2.7 Determining Significance of Residual Impacts**

We identify the environmental impacts associated with the proposed project that we predict will persist after mitigation measures are implemented. We apply professional judgment in evaluating the significance of any residual impacts. The magnitude of the predicted residual impact was weighed against any positive effects of the proposed project activities.

## **2.8 Monitoring**

Recommendations for follow-up monitoring, field surveys, or reporting are provided, as needed.

## **2.9 Description of Cumulative Effects**

Cumulative effects are the changes to the environment caused by all past, present and reasonably foreseeable future human activities (Alberta Environment 2009). We describe the possible changes in the environment caused by the proposed development when combined with other past, present and reasonably foreseeable future human activities. We describe these cumulative effects in the context of the broader region.

The information and resources available for this study do not permit the assessment of cumulative impacts of the Project to be undertaken using “best practice” Cumulative Effects Assessment (CEA) methodology (Hegmann, et al. 1999). Instead, our approach is to adopt elements of CEA standard methodology in a description of possible cumulative effects by first selecting Valued Ecosystem Components (VECs) that we expect may be sensitive to these impacts. A VEC is defined as any part of the environment that is considered important by the proponent, public, scientists, or government. The importance of a VEC may be determined on the basis of cultural values or scientific concern (Hegmann, et al. 1999).

## **3 Existing Environment**

### **3.1 Natural Region**

Alberta is divided into six Natural Regions based on patterns in climate, topography, soils and vegetation (Natural Regions Committee 2006). The Project Site is located within the Parkland Natural Region and Foothills Parkland Natural Subregion. The Foothills Parkland represents a transition between prairie grasslands in the southeast and the boreal and montane forests in the north and west portions of the province (Natural Regions Committee 2006).

### **3.2 Landform, Hydrology and Soils**

Terrain conditions within the Project Site are variable with a considerable escarpment on the western boundary. The majority of the Site to the east is agricultural fields on relatively flat terrain. Two vegetated draws transect the western slopes: one in central portion of the escarpment and another outside the southeast Site boundary. Sandstone bedrock outcrops are exposed near the crest of the west escarpment.

Within the Project Site, Dunvargan soils are dominant throughout the agricultural fields, consisting of Orthic Black Chernozems. Orthic Humic Gleysols are present in area depressions. The western slopes are dominated by Dunvargan soils with a sub-component of Hatfield soils represented by of Orthic Black Chernozems (Alberta Agriculture and Rural Development 2017).

### **3.3 Historical Disturbance and Land Use**

Our review of the historical aerial photographs reveals patterns in human activities and development in and around the Project Site. A residence and associated out-buildings are visible in the earliest historical photograph from 1966; the residence remains on-Site under current conditions. Two access roads are visible along the western slopes as early as 1966. The upland plateau of the Site has been cultivated extensively since the earliest historical photograph.

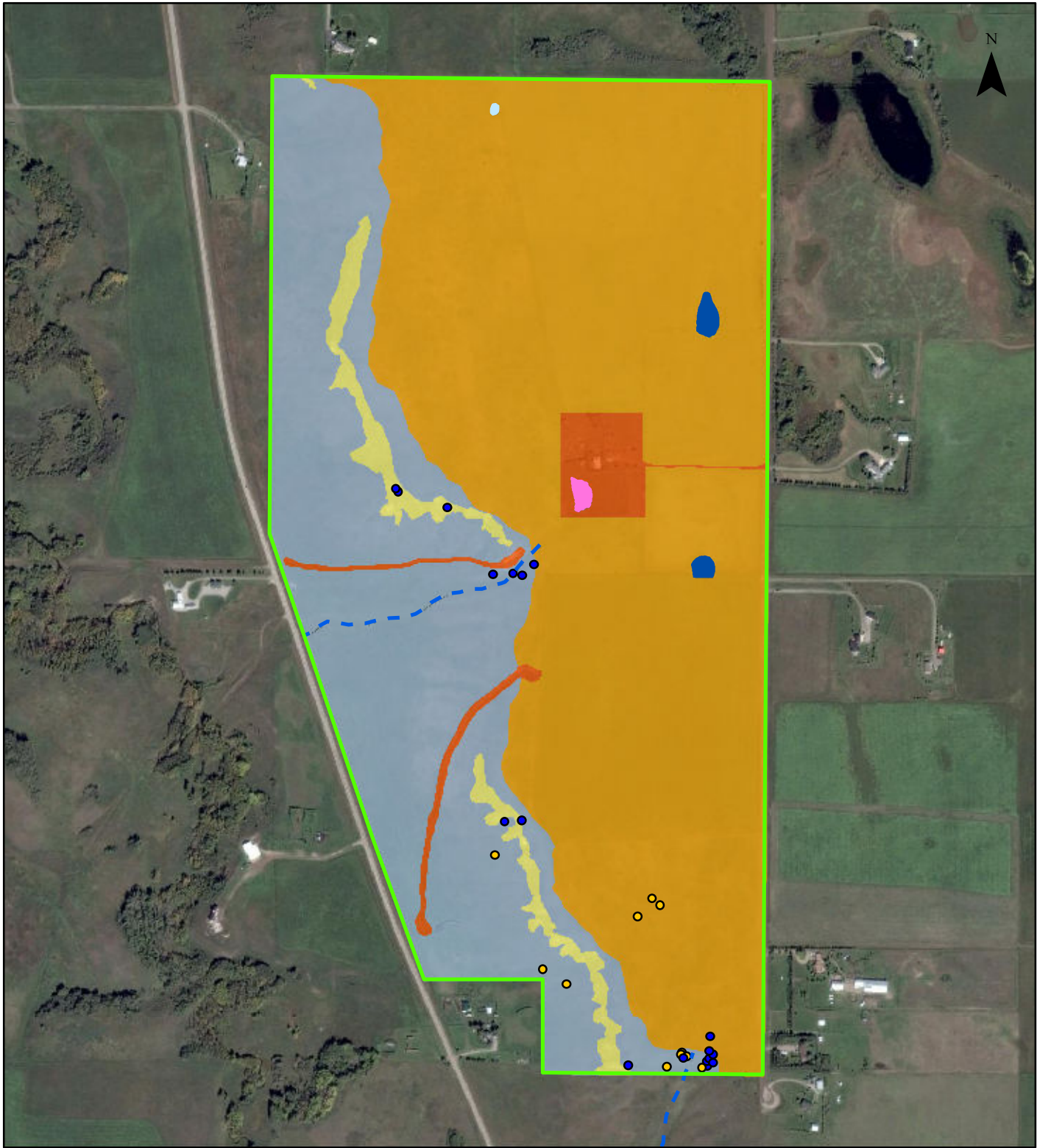
### **3.4 Upland Plant Communities**

Field findings from Zanshin and Westhoff indicate there are five upland plant communities within the Project Site: Disturbed, Native Grassland, Non-Native Grassland/Pasture, Draw, and Wetlands. The Disturbed community includes the residence and access roads. More natural conditions persist on the western slopes. Wetland conditions are further described in Section 3.7.

Representative plant community species are summarized in Table 1. The general distribution of the plant communities is presented in Figure 2. Species lists are presented in Appendix B (includes scientific names).

**Table 1: Representative Plant Species by Community**

Plant Community	Representative Plant Species	Area (%)
Disturbed	smooth brome	3
	Kentucky bluegrass	
	creeping thistle	
	Manitoba maple	
	trembling aspen	
Non-Native Grassland/Pasture	slender wheatgrass	61
	timothy	
	Kentucky bluegrass	
	common dandelion	
Native Grassland	common yarrow	34
	prairie crocus	
	harebell	
	Parry oat grass	
	mountain rough fescue	
	shrubby cinquefoil	
	creeping juniper	
	Canada buffaloberry	
Draws	silverweed	1
	narrow-leaved dock	
	smooth brome	
	timothy	
	Kentucky bluegrass	
	shrubby cinquefoil	
	northern gooseberry	
	buckbrush	
Wetlands	silverweed	1
	sloughgrass	
	foxtail barley	
	marsh hedge nettle	



**LEGEND**

- Project Site
- Dugout
- Ephemeral Water Body
- Temporary Marsh
- Draw
- Disturbed
- Approximate Bedrock Outcrop
- Non-Native Grassland/Pasture
- Native Grassland

**Rare Plants**

- Macoun's cinquefoil
- Sandhills cinquefoil

Imagery Source: Google Earth™

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

Client:	URBANSTAR		
Project:	HORSE CREEK BIA		
Title:	PLANT COMMUNITIES		
Date:	Project No.:	Scale:	<b>FIGURE: 2</b>
10-13-2021	WER118-18	1:9,000	

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants

### 3.5 Rare Plants and Rare Ecological Communities

We completed an ACIMS database search, which did not identify any past observations of provincially listed plant species on or in the vicinity of the Project Site. ACIMS database search results are presented in Appendix B.

Zanshin completed an early and late season rare plant and rare ecological community survey on July 21, 24 and August 31, 2018. Results of the survey indicate two rare plant species occur along the rock outcrop topping the western slopes of the Project Site. The two observed rare plants are sandhill cinquefoil (*Potentilla lasiodonta*) and Macoun’s cinquefoil (*Potentilla macounii*). No rare ecological communities were observed (Zanshin Environmental Networks Inc. 2018). Zanshin’s full report is presented in Appendix B.

### 3.6 Introduced Plants

Introduced plants are species not native to Alberta. Introduced plants observed by Zanshin and Westhoff within the Project Site are summarized in Table 2 along with their *Weed Act* status (Government of Alberta 2010).

**Table 2: Invasive Plants within the Project Site**

<b>Common Name (<i>Latin name</i>)</b>	<b>Weed Act Status</b>
Alfalfa ( <i>Medicago sativa</i> )	not regulated
alsike clover ( <i>Trifolium hybridum</i> )	not regulated
common caragana ( <i>Caragana arborescens</i> )	not regulated
common dandelion ( <i>Taraxacum officinale</i> )	not regulated
common goat’s-beard ( <i>Tragopogon dubius</i> )	not regulated
common toadflax ( <i>Linaria vulgaris</i> )	not regulated
creeping thistle ( <i>Cirsium arvense</i> )	<b>Noxious</b>
Flixweed ( <i>Descurainia sophia</i> )	not regulated
Kentucky bluegrass ( <i>Poa pratensis</i> )	not regulated
lamb’s-quarters ( <i>Chenopodium album</i> )	not regulated
Peking cotoneaster ( <i>Cotoneaster lucidus</i> )	not regulated
perennial sow-thistle ( <i>Sonchus asper</i> )	<b>Noxious</b>
red clover ( <i>Trifolium pratense</i> )	not regulated
smooth brome ( <i>Bromus inermis</i> )	not regulated
Stinkweed ( <i>Thlaspi arvense</i> )	not regulated
Timothy ( <i>Phleum pratense</i> )	not regulated

### 3.7 Wetlands and Waterbodies

#### 3.7.1 Wetland Inventory

We identify two wetlands within the Project Site based on our review of historical aerial photographs, field surveys and historical precipitation data (Figure 3). The total wetland area is 0.30 ha. The wetlands are classified as temporary graminoid marshes. A summary of Project Site wetlands and water bodies is presented in Table 3 including results from the historical review. More detailed data on wetlands is presented in Appendix C.

#### 3.7.2 Ephemeral Waterbodies

We identified one ephemeral water body within the Project Site totaling 0.13 ha. Historical aerial photographs show the ephemeral water body is visible in 5 of 9 historical aerial photographs. Evidence collected during field investigations indicates that some wetland vegetation is present, but soils indicate upland conditions.

One dug out was also identified at the northern Project Site Boundary. Field investigation confirmed the dugout is not associated with a natural waterbody.

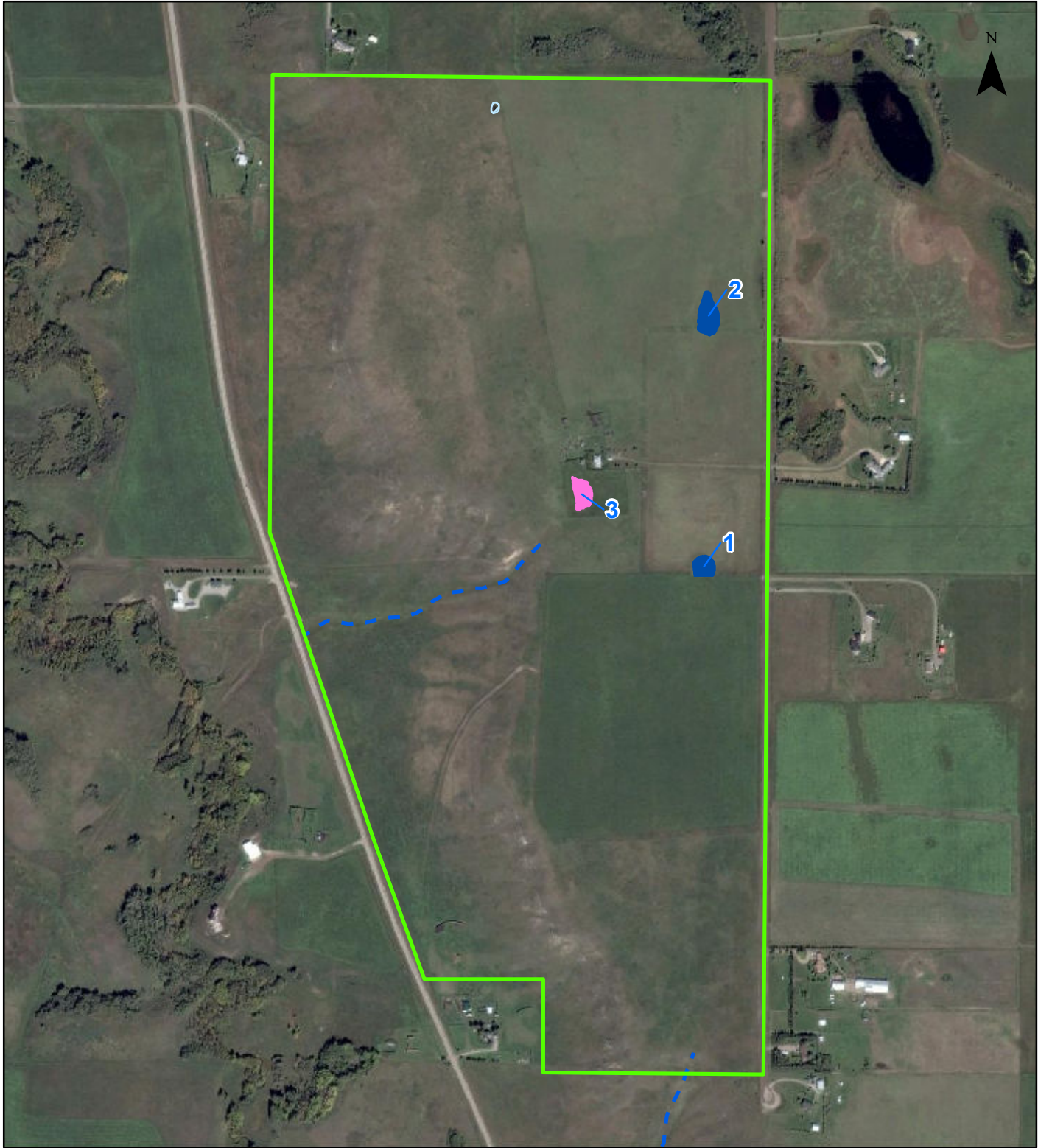
**Table 3: Wetland and Waterbody Area and Classification**

ID	Area (ha)	Alberta Wetland Classification	Observed Characteristics		
			Total Years Visible*	Years Surface Water Visible	Representative Plants
1	0.11	Temporary Marsh	8	1	slender wheatgrass, marsh hedge nettle, northern bedstraw
2	0.19	Temporary Marsh	9	3	sedge sp., slough grass, silverweed, fowl bluegrass
3	0.13	Ephemeral Water Body	5	1	slender wheatgrass, biennial wormwood, fowl bluegrass

\*Total number of photographs out of 9 that the water body is visible

#### 3.7.3 Wetland Disturbance

We reviewed a series of historical aerial photographs to document any disturbance events that may have influenced the nature of waterbody conditions within the Project Site. The identified wetlands and waterbodies have been disturbed through agricultural practices from 1966 to present day.



**LEGEND**

- Project Site
- Dugout
- Ephemeral Water Body
- Temporary Marsh
- Draw

Imagery Source: Google Earth™

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

Client: <b>URBANSTAR</b>			
Project: <b>HORSE CREEK BIA</b>			
Title: <b>WETLANDS AND WATER BODIES</b>			
Date: 10-13-2021	Project No.: WER118-18	Scale: 1:9,000	<b>FIGURE: 3</b>

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants

### **3.8 Wetland Functional Assessment**

The Alberta Wetland Policy recognizes that not all wetlands are equal. Some provide more value than others in terms of how they impact water quality, groundwater, biodiversity, and human uses. The wetland value classes are:

- Low (D)
- Moderately low (C)
- Moderate (B)
- High (A)

The ABWRET–A results from AEP are presented in Appendix D. Wetlands 1 and 2 are identified as “B” value wetlands.

### **3.9 Crown Claimed Water Bodies**

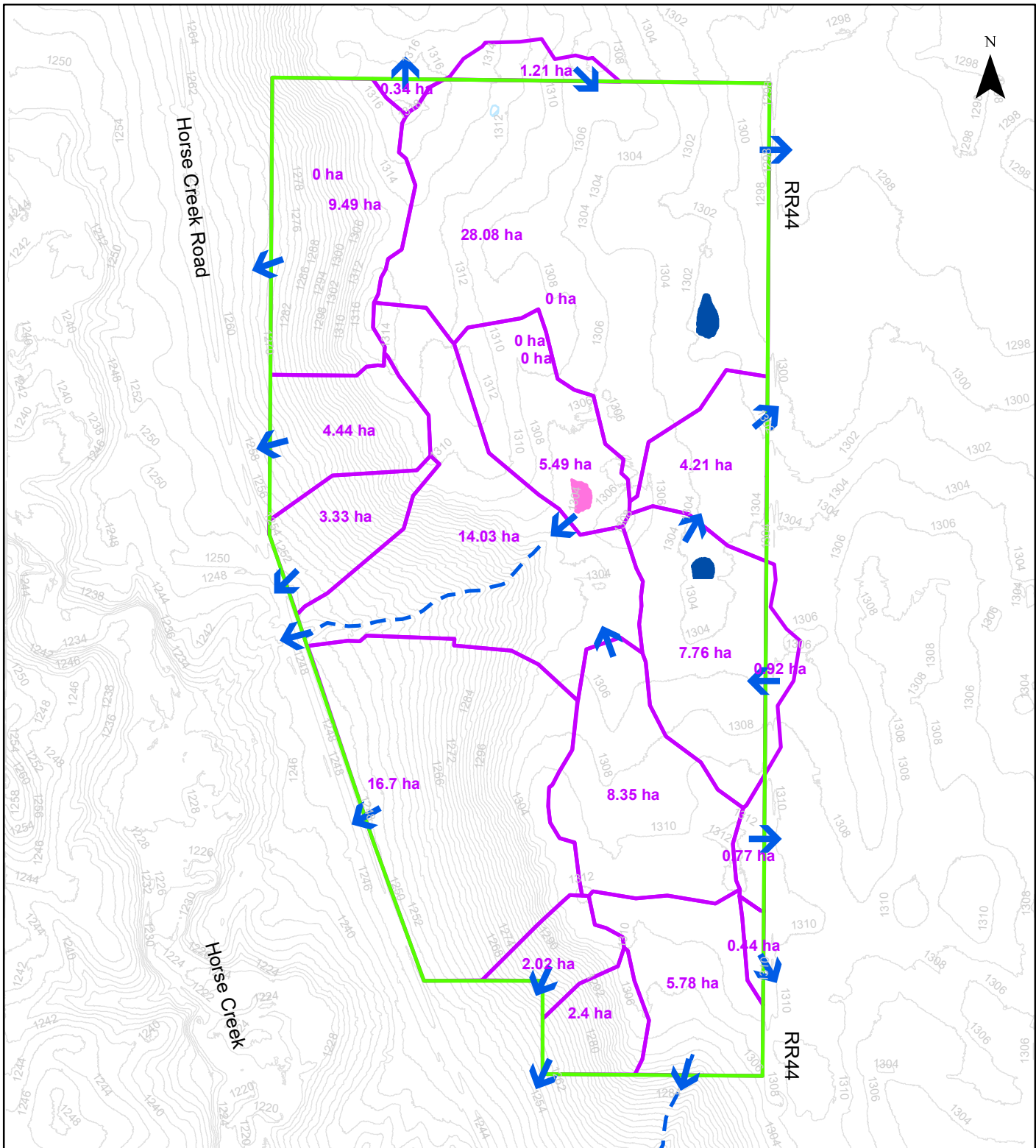
All Project Site waterbodies were submitted for review at the Water Boundaries Division of Public Lands on December 7, 2018. We received correspondence from Ricardo Barbosa with AEP Water Boundaries Division stating none of the waterbodies within the Project Site are claimed by the Crown (Appendix E).

### **3.10 Wetland Hydrology**

Catchments within the Project Site were determined using the Spatial Analyst function in ArcGIS. The Spatial Analyst hydrology tools set was used to model the flow of water across the surface of the Project Site, allowing for catchment delineation (Figure 4). Sixteen (16) sub-catchments were identified overlapping the Project Site with surface flow from south to north. Generally, the Project Site drains towards the southwest corner of the property and to Horse Creek.

### **3.11 Wildlife**

We identify a total of approximately 161 birds, 32 mammals, 4 reptiles, and 5 amphibians that may potentially occur within the Project Site based on species distribution and habitat preferences (Appendix F, includes scientific names). A number of these potential species have been provincially identified and/or federally listed as species of conservation concern. Table 4 lists the species observed within the Project Site during 2018 field surveys. Wetland-specific species observations are recorded on each wetland datasheet provided in Appendix C.



**LEGEND**

- Project Site
- Subcatchment
- Drainage Direction
- Drainage
- Contour
- Dugout
- Ephemeral Water Body
- Temporary Marsh

Client: <b>URBANSTAR</b>			
Project: <b>HORSE CREEK BIA</b>			
Title: <b>SUBCATCHMENT AREAS</b>			
Date: 10-13-2021	Project No.: WER118-18	Scale: 1:9,000	<b>FIGURE: 4</b>

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants

**Table 4: Observed Wildlife Species**

Species Common	Alberta General Status	Accipiter	Westhoff
<b>Amphibians</b>			
boreal chorus frog	Secure	✓	✓
<b>Birds</b>			
American crow	Secure		✓
cedar waxwing	Secure	✓	
clay-colored sparrow	Secure	✓	✓
coyote	Secure		✓
deer sp.	Secure		✓
house wren	Secure		✓
Nelson's sparrow	Secure	✓	
savannah sparrow	Secure	✓	✓
Sprague's pipit	SEN	✓	
Swainson's hawk	Secure	✓	✓
tree swallow	Secure	✓	
vesper sparrow	Secure	✓	
western kingbird	Secure	✓	
western meadowlark	Secure	✓	

The Sprague's pipit was identified within the Project Site. It favors brush grassland and is less tolerant of heavily grazed areas (Semenchuck 1992). Sprague's pipit is listed as Sensitive in Alberta. This grassland-dependent species has declined in all of Alberta range and most of North American range since 1966. The Primary threat to the species is habitat alteration (Alberta Environment and Parks 2021).

We completed a 3 km radius database search of FWMIS (Appendix G). The FWMIS database documents the occurrence of eleven species:

- Bald eagles (*Haliaeetus leucocephalus*) prefer forested areas near large bodies of water for nesting and tall, mature coniferous or deciduous trees with wide views for perching (Cornell University 2015). Habitat for bald eagles is low within the Project Site. Bald eagles are listed as Sensitive under the General Status of Alberta Wild Species (Alberta Environment and Parks 2021).
- Baltimore oriole (*Icterus galbula*) prefers leafy deciduous trees near open woodlands, forest edges, riverbanks, and small groves of trees (Cornell University 2015). Habitat for Baltimore orioles is not present within the Project Site under current conditions.

- Cougars (*Felis concolor*) prefer remote, wooded, and rocky areas generally in the mountain and foothill regions for habitat (Alberta Environment and Parks 2014). Although FWMIS records a citing of cougar in the broader region, such sightings are expected to be relatively rare. Habitat for cougars is considered low because of the lack of tree and shrub cover. Cougars are listed as Secure under the General Status of Alberta Wild Species (Alberta Environment and Parks 2015).
- Eastern kingbird (*Tyrannus tyrannus*) prefers fields with scattered shrubs and trees; they are drawn to water and nest in trees overhanging rivers or lakes (Cornell University 2015). The Project Site has limited shrub and tree areas, thus the habitat potential for eastern kingbird is low. Eastern kingbird is listed as Sensitive under the General Status of Alberta Wild Species (Alberta Environment and Parks 2015).
- Great blue herons (*Ardea herodias*) prefer freshwater or saltwater habitats where they hunt fish, amphibians, small mammals, insects, and other birds (The Cornell Lab of Ornithology 2019). Habitat for the great blue heron is potentially present within the Project Site. The great blue heron is listed as Sensitive under the General Status of Alberta Wild Species (Alberta Environment and Parks 2015).
- Grizzly bear (*Ursus arctos*) habitat spans a wide range of different plant communities. Forage species are available at different times throughout the growing season and reflect bear movement, from lower to higher elevations throughout alpine environments (Government of Canada 2002). The Project Site is on the eastern edge of a broader area that provides suitable seasonal habitat for grizzly bears. Therefore, only rarely are grizzly bears likely to be encountered within the Project Site.
- Least flycatchers (*Empidonax minimus*) are most commonly found in deciduous and mixed forests. Nesting takes place in deciduous trees (The Cornell Lab of Ornithology 2015). Habitat for least flycatcher is not present within the Project Site under current conditions.
- Piping plovers (*Charadrius melodus*) prefer lakeshores, rivers, and alkali wetlands. They nest above the high-water line in sandy areas with sparse vegetation including marshes, reservoirs, alkali lakes and rivers (The Cornell Lab of Ornithology 2017). Habitat for piping plovers is not present within the Project Site under current conditions.
- Sora (*Porzana carolina*) prefers shallow wetlands with abundant emergent vegetation, preferably cattails (The Cornell Lab of Ornithology 2017). Habitat for sora is not present within the Project Site under current conditions.
- Trumpeter swans (*Cygnus buccinators*) prefer shallow, undisturbed bodies of freshwater with abundant aquatic plants. These heavy-bodied birds also need at least 100 yards of open water for their running take-offs, and muskrat or beaver dens or small islands on which to nest (The Cornell Lab of Ornithology 2017). Habitat for trumpeter swans is not present within the Project Site under current conditions.
- Western wood-pewees (*Contopus sordidulus*) prefer open woodlands, forest edges, and forests near streams for breeding habitat. They commonly use forests with larger tree, open understories, and standing dead trees that include cottonwood, aspen, and spruce

(The Cornell Lab of Ornithology 2015). Habitat for western wood-pewee is not present within the Project Site under current conditions.

We cross-referenced the potential species list with one eBird hotspot located at Cochrane Lake approximately 1.5 km southeast of the Project Site. Species observed at Cochrane Lake are included in the potential species list in Appendix F.

### **3.12 Landscape Connectivity**

Landscape connectivity is a scientific term that refers to the degree to which a landscape facilitates or impedes the movements of organisms among resource patches (Taylor, et al. 1993). In other words, landscape connectivity refers to the degree to which a landscape functions to provide organisms, such as wildlife, access to preferred habitats. Physical landscape connections between habitat patches can either be corridors (a strip of land connecting habitat patches), or stepping stones (small habitat patches in a row) (Forman 1995).

We describe landscape connectivity based on the extent of connected natural habitats present within and adjacent to the Project Site. On a local scale, wildlife are expected to move freely within the Project Site although hiding and security cover in the uplands is limited.

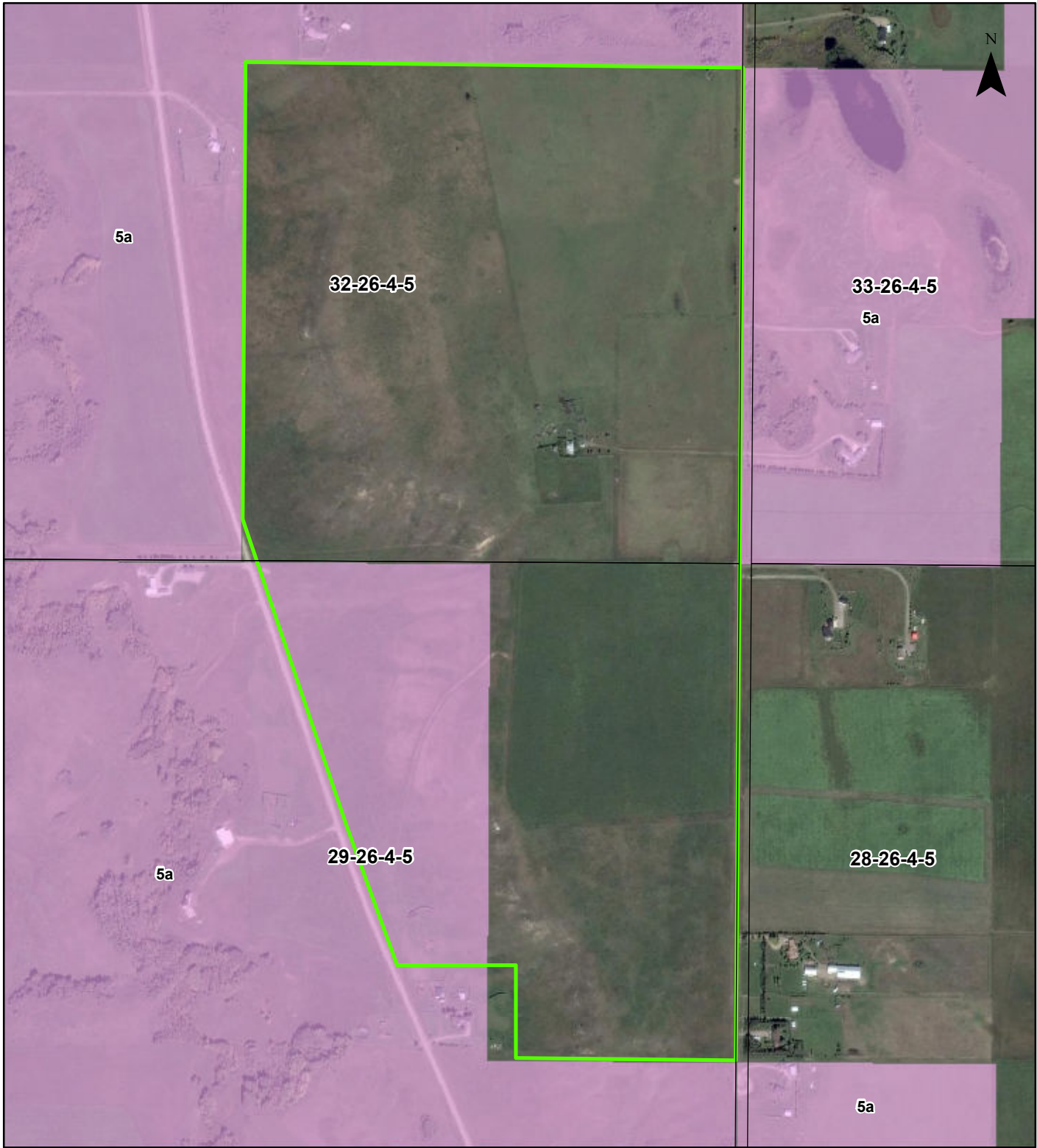
On a regional scale, the Project Site is surrounded by country residential development and agricultural fields. To the west and north, Horse Creek Road and Weedon Trail are likely to create a sensory barrier and potential collision hazard for wildlife travelling between the Project Site and surrounding areas. However, traffic may be mostly limited to locals and the sensory disturbances associated with the roadway may be relatively low. Wildlife are likely to travel between the Project Site and areas to the west where natural landscapes and associated habitats persist along Horse Creek.

### **3.13 Environmentally Significant Areas**

We applied provincial criteria to evaluate whether any Environmentally Significant Areas (ESAs) occur within the Project Site. The western slopes of the Project Site are identified as an ESA as this area maintains its natural character and hosts a diversity of plant species including rare plants. The slopes may also provide suitable habitat for species that may inhabit the unique outcrop formations, which have high potential for snake hibernacula although none were identified during field surveys.

### **3.14 Historical Resources**

We overlaid the Listing of Historic Resources on the Project Site in ArcGIS. The Listing indicates areas that have high potential to contain historic resources are within the southwest area of the Site (Alberta Culture and Status of Women 2021). The western half of NE-29-26-4 W5 has a 5a designation which indicates a high potential to contain an archaeological historic site (Alberta Culture and Status of Women 2021). A formal assessment of historical resources is not included as part of this BIA.



**LEGEND**

- Historic Resource Value**
- 1
  - 3
  - 4
  - 5
- Project Site**
- SectionGrid**

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

Client:				URBANSTAR			
Project:				HORSE CREEK			
Title:				HISTORICAL RESOURCE VALUE			
Date:	Project No.:	Scale:	<b>FIGURE: 5</b>				
10-13-2021	WER118-18	1:9,000					

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants

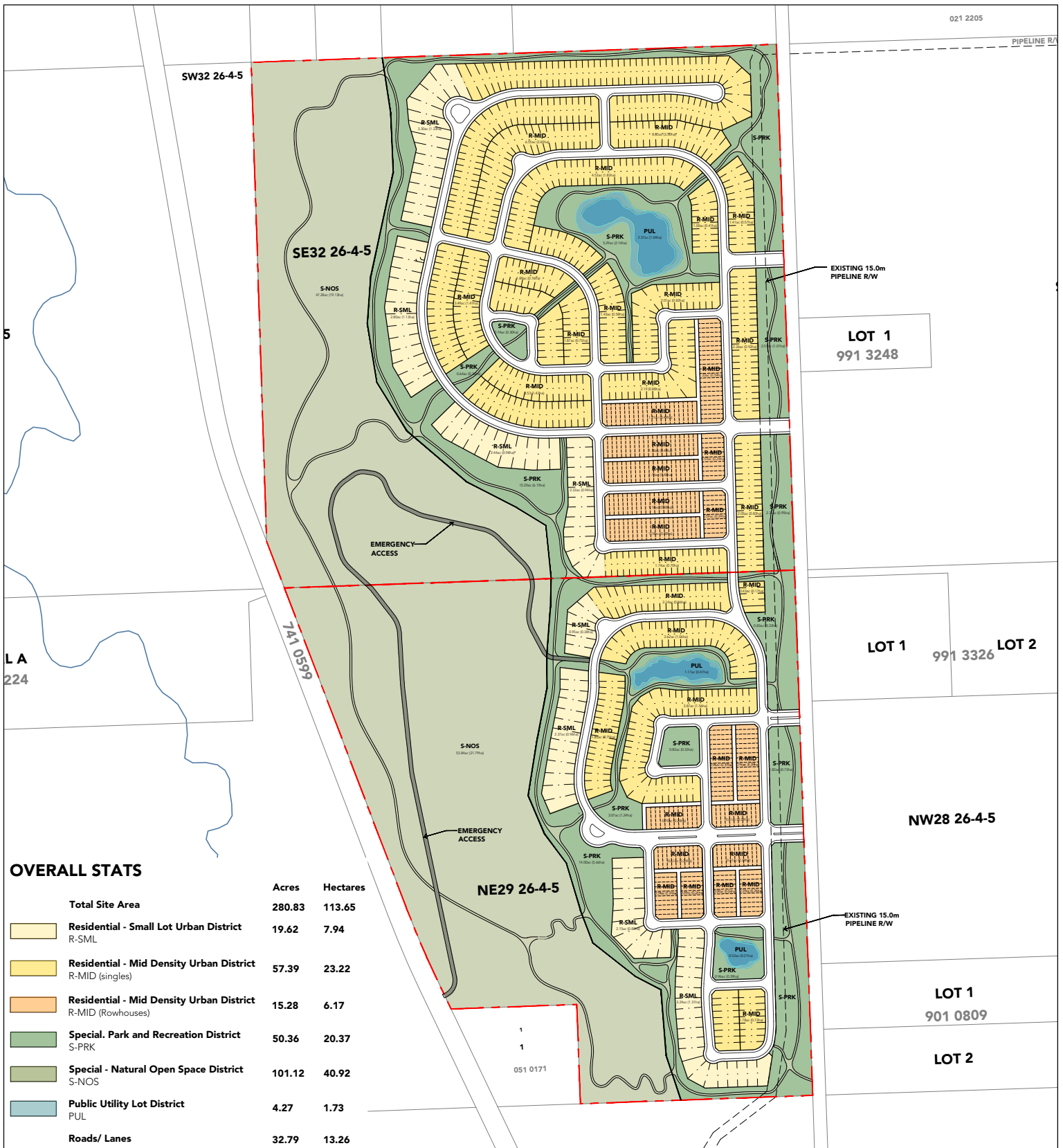
## **4 Identification of Impacts**

The potential impacts of the Horse Creek development on identified biophysical conditions were determined with reference to the Conceptual Scheme prepared by Township Planning + Design Inc. May 2021 (Figure 6). The Concept includes residential lots to the east and open space on the west side of the proposed development including the west escarpment, which is identified as an ESA. Range Rd 44 is proposed to provide access to the development while an emergency access route will be established on the west escarpment. Three storm ponds are located within the central areas of development lots in the upper plateau.

### **4.1 Impacts to Soils and Terrain**

Building footprints within lots will be stripped and graded resulting in the local loss or alteration of native soils and associated terrain. Within building footprints and construction zones, impacts to soil include soil removal, loss, compaction, erosion, and admixing. Where the Site is stripped of topsoil and/or subsoil, this material should be stockpiled and re-used, if possible, at varying depths in areas to be landscaped (i.e., residential lots, parks, and other open spaces).

There is the potential for soil erosion and sedimentation due to surface runoff and wind unless proper control measures are applied. There will also be changes to surface drainage patterns and surface water conditions as a result of the proposed development. These changes may result in erosion and sedimentation and the potential to impact water quality in off-site water bodies.



# UrbanStar - Horse Creek

## Outline Map

#### **4.2 Loss or Alteration of Wetlands**

The two identified wetlands and one ephemeral water body will be lost as a result of the proposed development (Figure 7). Development of the Site will also alter the surface water drainage patterns that support these wetlands.

#### **4.3 Loss or Alteration of Rare Plants, Native Plants and Plant Communities**

A number of individual sandhills cinquefoil and Macoun's cinquefoil plants will be lost as a result of the proposed development if not transplanted to other locations not proposed for development.

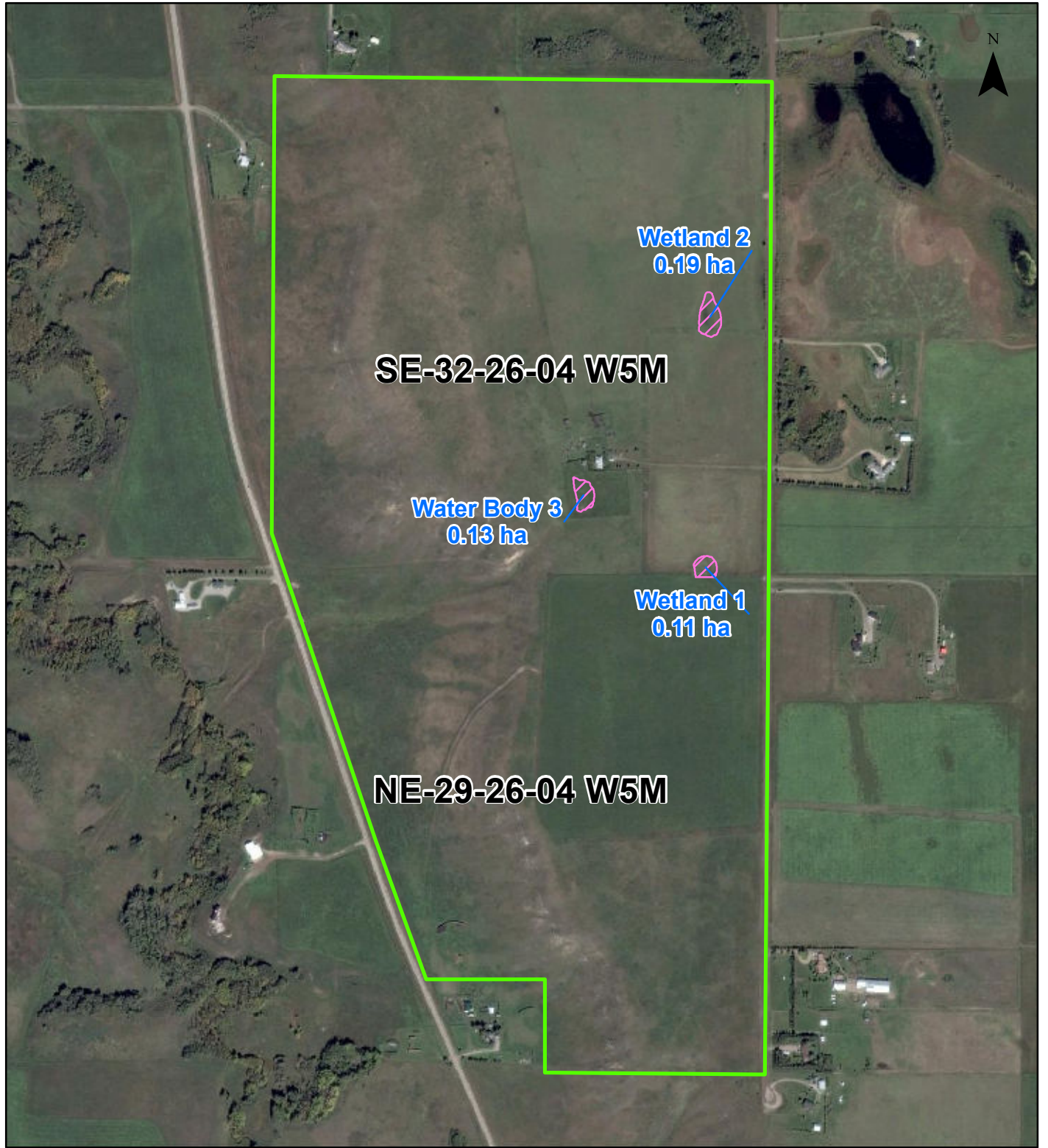
The proposed development will also result in localized loss or alteration of native vegetation, primarily within designated building footprints and roadways. The loss is primarily restricted to the upland plateau with the majority of the west facing escarpment being retained. The west escarpment is identified as an ESA. There is an emergency access road, a walking path and minimal landscaping being proposed for the west escarpment area. Therefore, the majority of the ESA is being retained.

Native grassland vegetation on the escarpment may be impacted through weed invasion. Weeds may be transported to the Site on construction equipment or through wind dispersal, potentially altering the species composition of native plant communities. Native vegetation outside but adjacent the Project Site is also susceptible to weed invasion during construction and residential occupation of the development.

#### **4.4 Loss or Disturbance of Wildlife and Wildlife Habitat**

The cultivate uplands will be lost as a result of development; these areas provide less habitat potential than the western escarpment, which will primarily be retained within the development. Wildlife tolerant of human developments and activities are likely to continue to use available habitat; however, the area may be avoided by species more sensitive to human disturbance.

The proposed construction activities may result in local sensory disturbance and damage or disturbance of individual wildlife species and their residences (active nests and/or burrows). This potential impact is of concern during the breeding season, which for many species is between approximately April 1 and August 31. This sensitive time period will vary based on yearly shifts in climatic conditions. For owl species, this critical breeding period can start in February.



**LEGEND**

- Project Site
- Wetland and Water Body Impacts

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

Imagery Source: Google Earth™

Client:				URBANSTAR			
Project:				HORSE CREEK BIA			
Title:				WETLAND AND WATER BODY IMPACTS			
Date:	Project No.:	Scale:	<b>FIGURE: 7</b>				
10-13-2021	WER118-18	1:9,000					

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants

## **5 General Mitigation Measures**

Mitigation measures are measures applied to eliminate, reduce, or control the predicted negative impacts of a particular project (Government of Canada 1992). Mitigation measures for wetlands and other natural landscape features are presented below.

### **5.1 Erosion and Sediment Control**

An Erosion and Sediment Control Plan (ESC Plan) will be developed as per current Rocky View County or equivalent guidelines. The design and implementation of site-specific erosion and sediment control measures will be completed prior to, during, and following the completion of each phase of the proposed development. The purpose of the ESC Plan is to provide measures to limit or control the potential for deleterious substances, like sediments in runoff, from leaving the Site, entering regional waterbodies, or disturbing retained natural open space such as the west-facing escarpment.

### **5.2 Environmental Construction Operation Plan**

Environmental Construction Operations (ECO) Best Management Practices will be prepared as per Rocky View County or equivalent guidelines. BMPs will include vegetation protection, dust control measures, management of mud-tracking off-site, designated stockpile storage, designated re-fueling areas, waste management and recycling. BMPs will be identified and implemented prior to construction.

### **5.3 Landscape Plan and Weed Management Program**

A landscape plan will be implemented that emphasizes the establishment of vegetation typical of the Natural Subregion. The landscape plan will be supported with a weed management program developed and implemented for all areas within the Project Site.

Weed management activities will be implemented as per the Weed Control Act Regulations (Government of Alberta 2010). Any problem species (Prohibited Noxious or Noxious) will be managed to current standards using recommended prescriptions of mechanical, chemical, or biological controls. Herbicide control of invasive plants shall follow the Environmental Code of Practices for Pesticides (Government of Alberta 2010).

The weed management program will be initiated prior to stripping and grading and monitoring for weeds will be completed as phases of the development progress. If Noxious or Prohibited Noxious weeds are identified, the proponent will implement controls as per provincial standards.

Control of weeds will be conducted repeatedly and over multiple growing seasons. We also recommend that, during construction, all vehicles and equipment be cleaned so that seeds from off-site sources are not introduced to the Project Site.

#### **5.4 Rare Plants Mitigation Plan**

The majority of the rare plants will be avoided, although some individual rare plants overlap with the proposed lots in the southern portion of the site. Where avoidance is not possible, it is recommended that the loss of these specimens be compensated by re-introducing the plant via seed collection, seed bank salvage, transplant or other propagule techniques into a suitable habitat nearby. This approach to compensation will be documented in a rare plant mitigation plan to be prepared upon approval of the BIA.

#### **5.5 Stormwater Management Strategies**

Westhoff anticipates that stormwater management strategies are identified in a Stormwater Management Plan prepared by a qualified professional under a separate cover.

#### **5.6 Timing of Construction**

We recommend that stripping and grading be completed outside the critical time period for many wildlife species: approximately April 1 to August 31 (Environment Canada 2014). This is the primary breeding period for many wildlife species that may be encountered within the work site (Stebbins 2003, Smith 1993, McGillivray and Semenchuk 1998). Nesting can be influenced by micro-climatic conditions in specific areas as well as inter-annual variation due to factors such as an early spring or cold, wet summer (Environment Canada 2014). Therefore, this nesting period may vary by Project location. If owls are anticipated to nest within or adjacent the Project Site, this critical time period should be extended to February 1.

If stripping and grading is to take place within the February 1 to August 31 period, a pre-construction wildlife survey should be completed prior to stripping and grading commencing. The wildlife survey will support the avoidance of sensitive wildlife features including active burrows or nests.

The following steps will be followed:

1. A qualified biologist will complete the survey of the area four days prior to any activities commencing.
2. If active breeding activity is observed, no construction activities using heavy machinery can occur until mitigation measures are applied. These mitigation measures may include a construction setback designated around the breeding site. The Canadian Wildlife Service will be consulted to determine the required width of the setback.
3. The construction setback will be in effect as long as breeding activity occurs.
4. If construction stops for four or more consecutive days, the area will be surveyed again for active breeding activity before commencing works with heavy machinery.
5. A qualified biologist will re-survey the area to determine if breeding activity is still present.

6. Once breeding activity is no longer present, the setback can be removed, and construction activities can begin.

This surveying will facilitate compliance with the *Migratory Birds Convention Act* (Government of Canada 1994), the *Species at Risk Act* (Government of Canada 2002), and the *Alberta Wildlife Act* (Government of Alberta 1997).

## **5.7 Monitoring**

A monitoring program will be initiated during construction to document the implementation and success of the ESC Plan, ECO Plan and rare plant mitigation plan.

## **6 Wetland Mitigation Measures**

### **6.1 Wetland Decision Framework**

Alberta Environment and Parks requires that proponents of development provide a rationale for why wetlands cannot be avoided. Referring to the Alberta Wetland Mitigation Directives, we note the following:

- no wetlands within the Project Site are claimed by the Crown under the Public Lands Act;
- the Project Site is not located within lands designated under the *Provincial Parks Act*, *Wilderness Areas*, *Ecological Reserves*, *Natural Areas and Heritage Rangelands Act* and the *Willmore Parks Act*;
- there are no records of any wetland-dependent species in the wetlands that are listed as endangered species under the *Wildlife Act*, *Wildlife Regulation* (Schedule 6) or the *Species At Risk Act*;
- there are no known conflicts in regard to wetland management objectives within the Alberta Land Stewardship Act Regional Plans or nested Sub-Regional Plans; and
- there are no known conflicts in regard to wetland management objectives within any other statutory plan or legislation.

The wetlands to be lost have been subject to past disturbance from cultivation and weed invasion. The overall value of area wetlands is expected to be low compared to other off-site wetlands situated in more natural landscapes where past and current land uses have not adversely affected wetland health and function. Retention of a wetland that is already marginalized through current land use can prove unsuccessful, particularly when the wetlands catchment area is modified with development. Retained wetlands can require intensive management and monitoring to maintain their wetland functions to Provincial standards as identified under the Alberta Wetland Policy and associated Directives.

The plan is to conserve the majority of the Environmentally Significant Area that includes the native grassland and bedrock outcrop on the west-facing escarpment within the Project Site. In doing so, only a concentrated area is left that is available for development. To maximize the

lands remaining for development, there is little opportunity for the retention of the two temporary wetlands. As indicated above, these wetlands have been disturbed through cultivation and are not considered Environmentally Significant.

## **6.2 Wetland Replacement Strategy**

All lost wetlands will be compensated for (i.e. in-lieu replacement payment) through standard procedures under the provincial *Water Act*. The ephemeral water body is not subject to compensation and is therefore not included in the replacement strategy.

## **7 Residual Impacts and Significance**

We predict that the proposed development will have residual impacts after the above mitigation measures are implemented. These residual impacts are the loss of wetlands, rare plants and individual wildlife.

### **7.1 Wetlands**

Wetlands will be permanently lost or altered as a result of the proposed development. Wetland loss will be mitigated by providing wetland replacement through existing provincial approval processes under the Alberta Wetland Policy. Wetland replacement is an accepted approach to managing loss of wetlands on both provincial and municipal scales.

At the time this report was prepared, there were no available provincial or municipal criteria for determining what qualifies as a significant residual impact to wetlands. We conclude this residual impact to wetlands is not significant provided wetland loss is off set through applying Alberta Wetland Policy replacement strategies.

### **7.2 Rare plants**

The rare plant mitigation plan will identify strategies for minimizing the overall impact of development on the observed population of rare plants. However, there will still be individual plants that will be permanently lost if mitigation strategies are not successful.

Currently, there were no available provincial or municipal criteria for determining what qualifies as a significant residual impact to rare plants. Also, there are no provincial or municipal policies or regulations for their protection. With the absence of available criteria, policies or regulations, we conclude that this residual impact is not significant. The rare plant mitigation plan will substantially reduce the potential loss of representatives of the two species.

### **7.3 Wildlife**

Timing the stripping and grading activities to occur outside the sensitive breeding season for most wildlife will significantly reduce the risk of wildlife fatality but will not eliminate it. The loss of a listed species due to stripping and grading would be a significant residual impact.

We expect the fatality risk to listed species is negligible given that stripping and grading will occur outside the breeding season or only after active nest/burrow sweeps are completed and associated Best Management Practices are implemented.

## **8 Description of Cumulative Effects**

Cumulative effects are the changes to the environment caused by all past, present and reasonably foreseeable future human activities (Alberta Environment 2009). The information and resources available for this study do not permit the assessment of cumulative impacts of the Project to be undertaken using “best practice” Cumulative Effects Assessment (CEA) methodology (Hegmann, et al. 1999). Instead, our approach is to adopt elements of CEA standard methodology in a description of possible cumulative effects by first selecting Valued Ecosystem Components (VECs) that we expect may be sensitive to these impacts. A VEC is defined as any part of the environment that is considered important by the proponent, public, scientists or government. The importance of a VEC may be determined on the basis of cultural values or scientific concern (Hegmann, et al. 1999).

Wetlands are recognized federally as a VEC because of their important ecological functions and associated socio-economic values (Hanson, et al. 2008). The Alberta Wetland Policy emphasizes the conservation, restoration, protection and management of wetlands to sustain the benefits they provide (Alberta Environment and Sustainable Resource Development 2013). The cumulative effects of rapid population and economic growth in Alberta have been the loss and degradation of two thirds of the wetlands in settled areas of the Province (Alberta Environment and Sustainable Resource Development 2013).

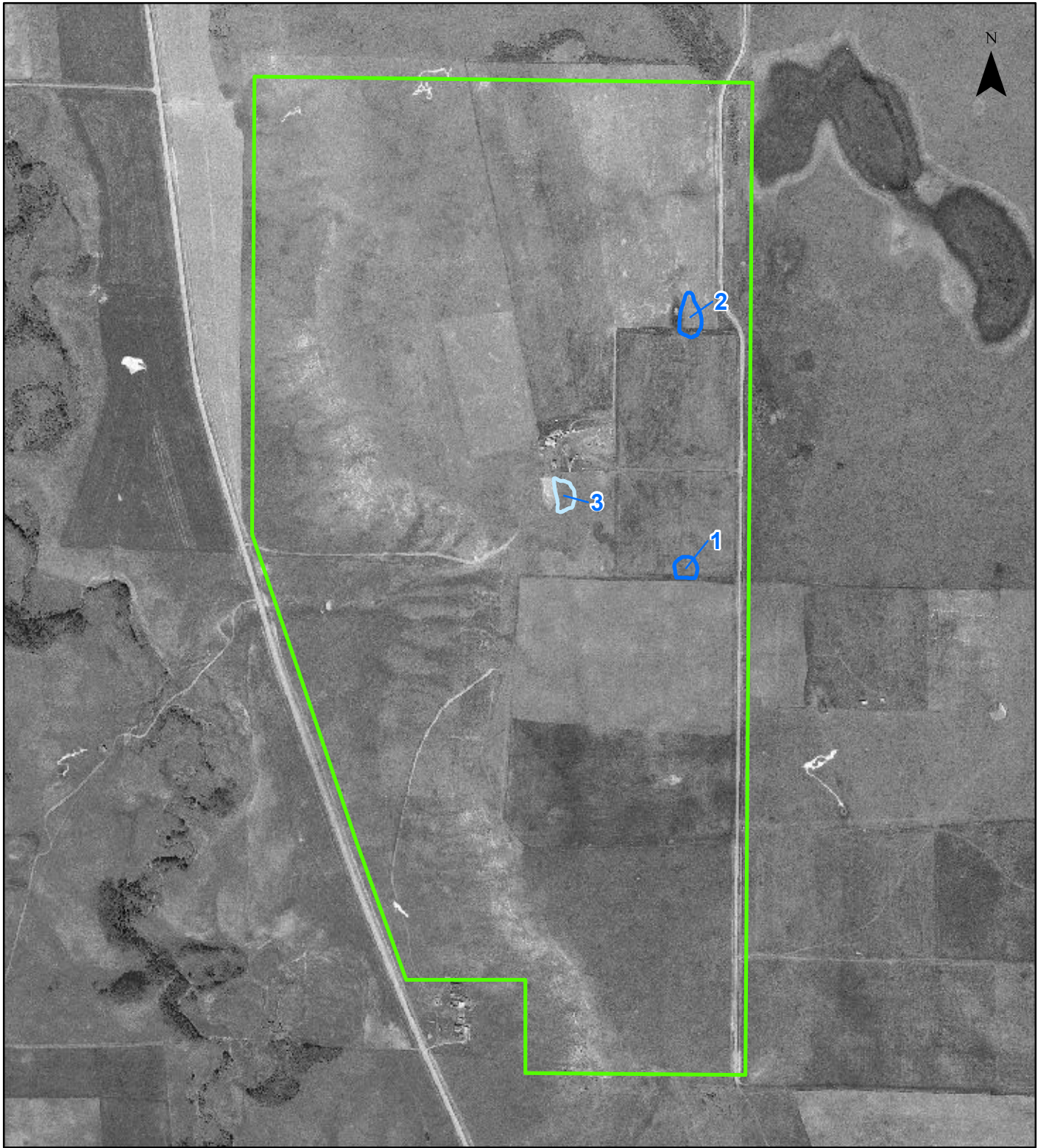
Wetland losses will be incurred as a result of the proposed development. Currently, the cumulative effects of development on wetlands are mitigated primarily through the Alberta Wetland Policy wetland replacement program. Overall, we anticipate that the cumulative effects on wetlands in this region will be managed through the retention of priority wetlands outside the Project Site coupled with the application of provincially approved wetland replacement measures.

## 9 References

- Alberta Agriculture and Forestry. 2016. "AgroClimatic Information Service (ACIS)."
- Alberta Agriculture and Rural Development. 2017. *aGRISID*. Accessed February 1, 2017. <http://www4.agric.gov.ab.ca/agrasidviewer>.
- . 2016. *aGRISID*. Accessed October 11, 2016. <http://www4.agric.gov.ab.ca/agrasidviewer>.
- Alberta Culture and Status of Women. 2021. "Listing of historic resources." *Alberta Culture and Tourism*. September. Accessed October 13, 2021. <https://www.alberta.ca/listing-historic-resources.aspx>.
- Alberta Culture and Status of Women. 2021. *Listing of Historic Resources: Instructions for Use*. Alberta Culture and Status of Women. <https://www.alberta.ca/listing-historic-resources.aspx#jumplinks-5>.
- Alberta Environment and Parks. 2017. *Alberta Wetland Assessment and Impact Report Directive*. Edmonton, AB: Alberta Environment and Parks.
- Alberta Environment and Parks. 2015. *Alberta Wetland Assessment and Impact Report Directive*. Edmonton, AB: Alberta Environment and Parks.
- Alberta Environment and Parks. 2015. *Alberta Wetland Classification System*. Edmonton AB: Alberta Government.
- Alberta Environment and Parks. 2015. *Alberta Wetland Identification and Delineation Directive*. Edmonton: Government of Alberta, Water Policy Branch.
- Alberta Environment and Parks. 2015. "Alberta Wetland Mitigation Directive." Edmonton.
- . 2017. *Alberta Wild Species General Status Listing 2015*. March 01. Accessed 07 23, 2021. <https://extranet.gov.ab.ca/env/wild-species-status/default.aspx>.
- . 2021. *Fish and Wildlife Management Information System (FWMIS) Internet Mapping Tool*. [https://maps.alberta.ca/FWIMT\\_Pub/Viewer/?TermsOfUseRequired=true&Viewer=FWIMT\\_Pub](https://maps.alberta.ca/FWIMT_Pub/Viewer/?TermsOfUseRequired=true&Viewer=FWIMT_Pub).
- . 2021. *Search ACIMS Data*. <https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/search-acims-data/>.
- . 2015. *The General Status of Alberta Wild Species*. Accessed July 12, 2019. [https://extranet.gov.ab.ca/env/wild-species-status/?utm\\_source=redirector](https://extranet.gov.ab.ca/env/wild-species-status/?utm_source=redirector).
- Alberta Environment and Parks. 2021. *Wild Species Status Search*. Alberta Environment and Parks.
- Alberta Environment and Sustainable Resource Development. 2013. *Alberta Wetland Policy*. Edmonton, AB: Government of Alberta.
- Alberta Environment. 2009. *Towards Environmental Sustainability. Proposed Regulatory Framework for Managing Environmental Cumulative Effects*. Edmonton, AB.: Alberta Environment.
- Alberta Government. 2013. *Sensitive Species Inventory Guidelines*. Edmonton: Government of Alberta.
- Alberta Native Plant Council. 2000. *ANPC Guidelines for Rare Plant Surveys in Alberta*. Edmonton, AB.: Alberta Native Plant Council.
- Cornell University. 2015. "All About Birds." Accessed 05 2016. <https://www.allaboutbirds.org>.
- Environment Canada. 2014. *General Nesting Periods of Migratory Birds in Canada*. March 24. [http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=4F39A78F-1#\\_tab01](http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=4F39A78F-1#_tab01).
- Fiera Biological Consulting Ltd. 2010. *Aquatic Environmentally Significant Areas in Alberta*. Edmonton, AB.: Fiera Biological Consulting Ltd.
- Fiera Biological Consulting Ltd. 2014. *Environmentally Significant Areas in Alberta: 2014 Update*. Edmonton, AB: Government of Alberta.

- Forman, R. 1995. "Some general principles of landscape and regional ecology." *Landscape Ecology* 10 133-142.
- Government of Alberta. 2010. *Environmental Code of Practices for Pesticides*. Edmonton, AB.: Government of Alberta.
- Government of Alberta. 2008. *Weed Control Act*. Edmonton, AB.: Alberta Queen's Printer.
- Government of Alberta. 2010. *Weed Control Regulation*. Edmonton, AB.: Alberta Queen's Printer.
- Government of Alberta. 1997. *Wildlife Act*. Edmonton, AB.: Alberta Queen's Printer.
- Government of Canada. 1992. *Canadian Environmental Assessment Act*. Ottawa, ON.: Minister of Justice.
- Government of Canada. 1994. *Migratory Birds Convention Act*. Ottawa, ON.: Queen's Printer.
- . 2002. *Species at Risk Act*. Ottawa, ON.
- . 2002. *Species at Risk Public Registry - Species Profile*. Accessed 09 2016. [http://www.registrelep-sararegistry.gc.ca/species/speciesDetails\\_e.cfm?sid=139](http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=139).
- Hanson, A., L. Swanson, D. Ewing, G. Grabas, S. Meyer, L. Ross, M. Watmough, and J. Kirkby. 2008. *Wetland ecological functions assessment: An overview of approaches*. Ottawa, ON: Canadian Wildlife Service.
- Hegmann, G. C., C. Cocklin, R. Creasey, S. Dupuis, A. Kennedy, A. Kingsley, W. Ross, H. Spaling, and D. Stalker. 1999. *Cumulative Assessment Practitioners Guide*. Hull, QC.: AXYS Environmental Consulting Ltd. and the CEA Working Group for the Canadian Environmental Assessment Agency.
- McGillivray, W. B., and G. P. Semenchuk. 1998. *The Federation of Alberta Naturalists: Field Guide to Alberta Birds*. Edmonton, AB: Federation of Alberta Naturalists.
- Natural Regions Committee. 2006. *Natural Regions and Subregions of Alberta*. Edmonton, AB.: Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta. Pub. No. T/852.
- Pattie, D., and C. Fisher. 1999. *Mammals of Alberta*. Edmonton, AB: Lone Pine Publishing.
- Rocky View County. 2013. *2013 County Servicing Standards*. Rocky View County.
- Rocky View County. 2010. "Wetland Conservation and Management."
- Russel, A. P., and A. M. Bauer. 2000. *The Amphibians and Reptiles of Alberta. A Field Guide and Primer of Boreal Herpetology*. Calgary, AB: University of Calgary Press.
- Semenchuck, G.P. (Editor). 1992. *The Atlas of Breeding Birds of Alberta*. Edmonton, AB: Federation of Alberta naturalists.
- Smith, H.C. 1993. *Alberta Mammals: An Atlas and Guide*. Edmonton, AB.: Lone Pine Publishing.
- Stebbins, R.C. 2003. *Western Reptiles and Amphibians, Third Edition*. New York, NY: Houghton Mifflin Company.
- Taylor, P. D., L. Fahrig, K. Henein, and G. Merriam. 1993. "Connectivity is a vital element of landscape structure." *Oikos* 68 571-572.
- The Cornell Lab of Ornithology. 2015. *The Cornell Lab of Ornithology*. Accessed September 1, 2016. [https://www.allaboutbirds.org/guide/Great\\_Blue\\_Heron/lifehistory](https://www.allaboutbirds.org/guide/Great_Blue_Heron/lifehistory).
- . 2017. *The Cornell Lab of Ornithology*. Accessed August 23, 2018. <https://www.allaboutbirds.org/guide/>.
- . 2019. *The Cornell Lab of Ornithology*. Accessed June 1, 2020. <https://www.allaboutbirds.org/>.
- Zanshin Environmental Networks Inc. 2018. *Rare Vascular Plant and Rare Ecological Community Survey Horse Creek Development Project NE-29 & SE-32-26-4 W5M*. Calgary: Zanshin Environmental Networks Inc.

**Appendix A Historical Aerial Photographs**



**LEGEND**

- Project Site
- Ephemeral
- Temporary Marsh

Imagery Source: AEP

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

Client:		URBAN STAR	
Project:		HORSE CREEK	
Title:		AUGUST 15, 1966	
Date:	Project No.:	Scale:	<b>APP A</b>
10-13-2021	WER118-18	1:9,000	

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants



**LEGEND**

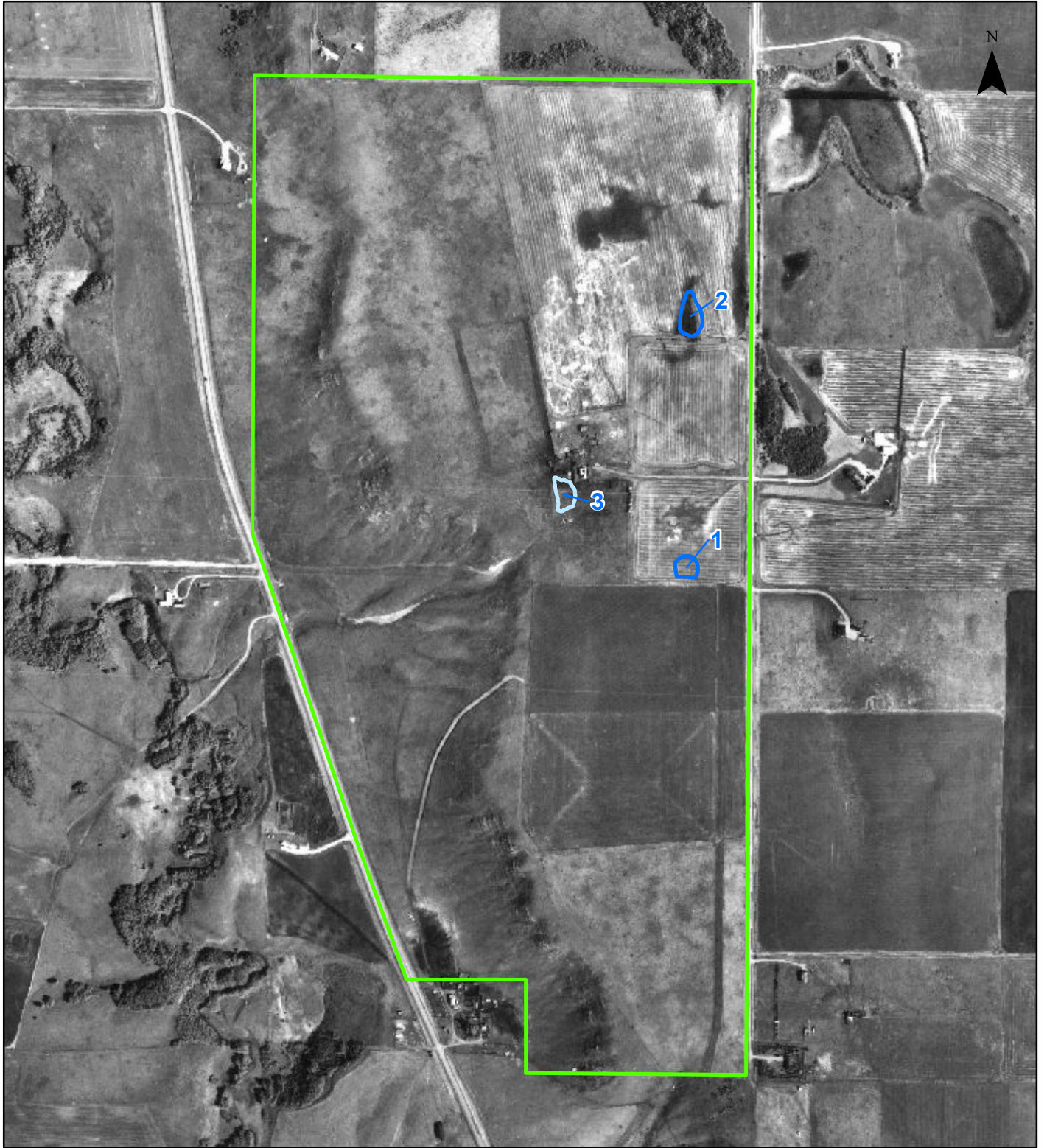
- Project Site
- Ephemeral
- Temporary Marsh

Imagery Source: AEP

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

Client:		URBAN STAR	
Project:		HORSE CREEK	
Title:		JUNE 12, 1974	
Date:	Project No.:	Scale:	<b>APP A</b>
10-13-2021	WER118-18	1:9,000	

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants



**LEGEND**

- Project Site
- Ephemeral
- Temporary Marsh

Imagery Source: AEP

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

Client:		URBAN STAR	
Project:		HORSE CREEK	
Title:		JUNE 2, 1995	
Date:	Project No.:	Scale:	<b>APP A</b>
10-13-2021	WER118-18	1:9,000	

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants



**LEGEND**

- Project Site
- Ephemeral
- Temporary Marsh

Imagery Source: Google Earth™

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

<b>Client:</b>	URBAN STAR		
<b>Project:</b>	HORSE CREEK		
<b>Title:</b>	MAY 13, 2002		
<b>Date:</b>	<b>Project No.:</b>	<b>Scale:</b>	<b>APP A</b>
10-13-2021	WER118-18	1:9,000	

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants



**LEGEND**

- Project Site
- Ephemeral
- Temporary Marsh

Imagery Source: AEP

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

Client:		URBAN STAR	
Project:		HORSE CREEK	
Title:		SEPTEMBER 28, 2008	
Date:	Project No.:	Scale:	<b>APP A</b>
10-13-2021	WER118-18	1:9,000	

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants



**LEGEND**

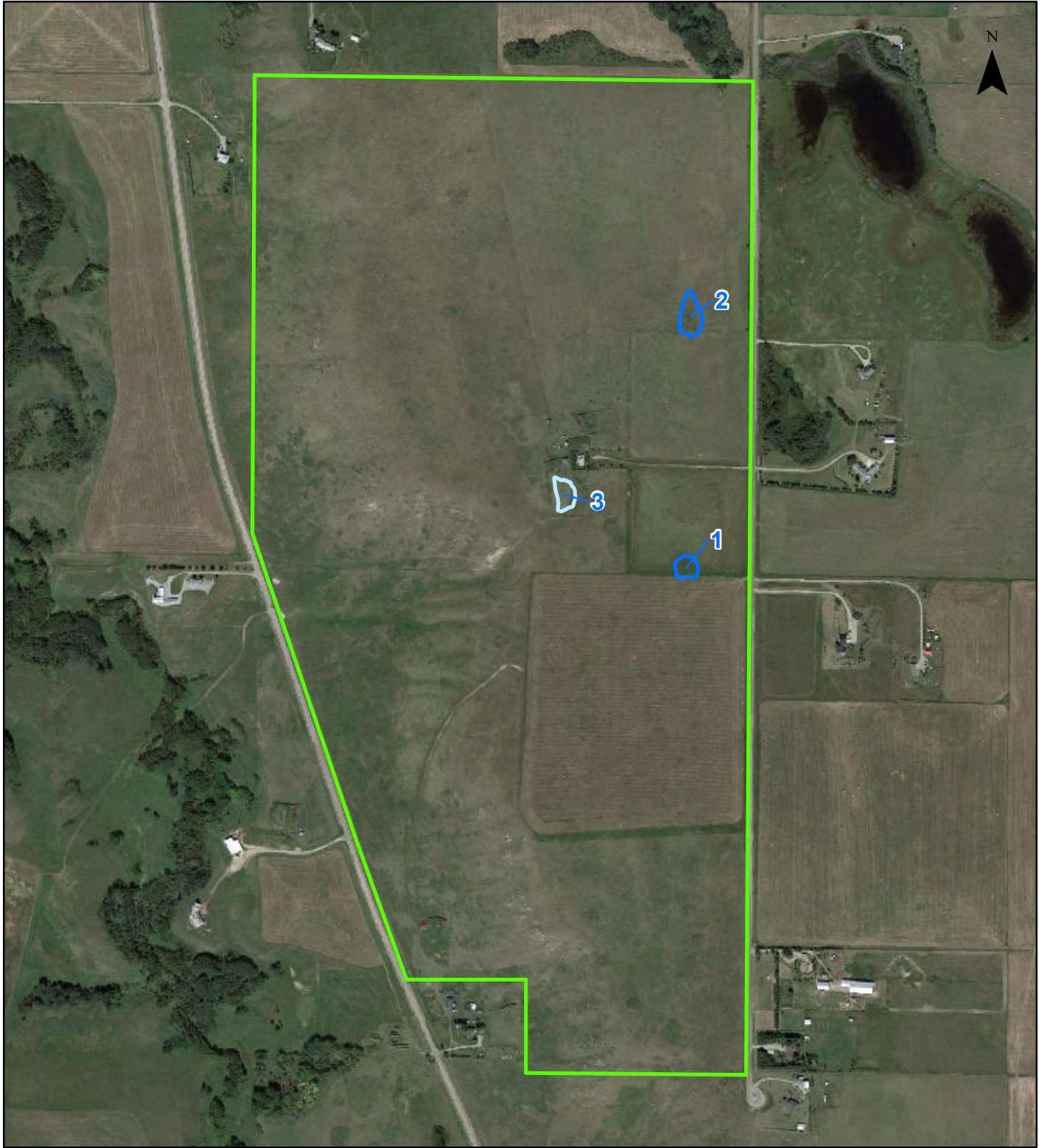
- Project Site
- Ephemeral
- Temporary Marsh

Imagery Source: Google Earth™

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

<b>Client:</b>	URBAN STAR		
<b>Project:</b>	HORSE CREEK		
<b>Title:</b>	JUNE 8, 2011		
<b>Date:</b>	<b>Project No.:</b>	<b>Scale:</b>	<b>APP A</b>
10-13-2021	WER118-18	1:9,000	

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants



**LEGEND**

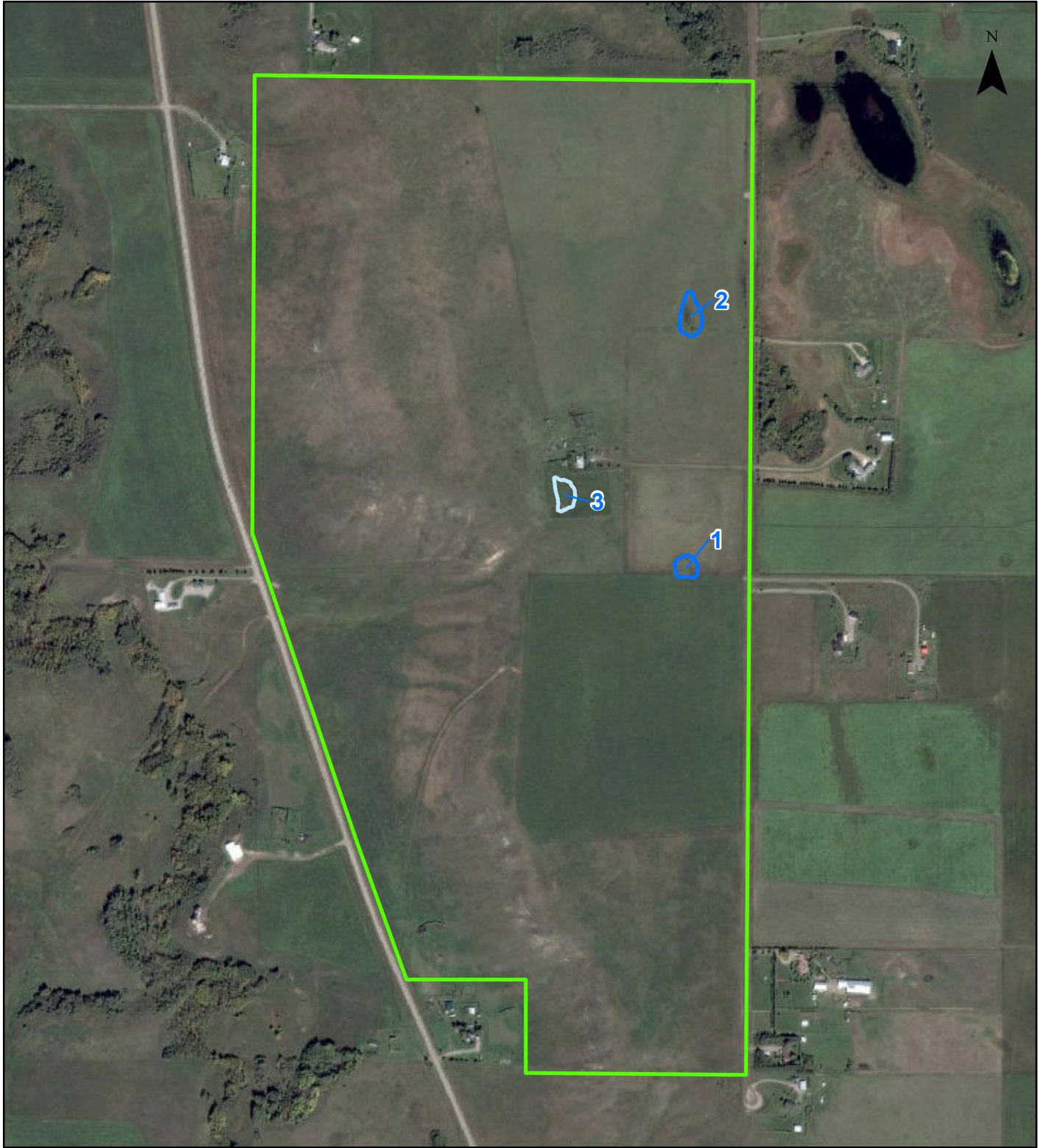
- Project Site
- Ephemeral
- Temporary Marsh

Imagery Source: Google Earth™

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

Client:		URBAN STAR	
Project:		HORSE CREEK	
Title:		AUGUST 22, 2015	
Date:	Project No.:	Scale:	<b>APP A</b>
10-13-2021	WER118-18	1:9,000	

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants



**LEGEND**

- Project Site
- Ephemeral
- Temporary Marsh

Imagery Source: Google Earth™

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

Client:		URBAN STAR	
Project:		HORSE CREEK	
Title:		SEPTEMBER 8, 2016	
Date:	Project No.:	Scale:	<b>APP A</b>
10-13-2021	WER118-18	1:9,000	

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants



**LEGEND**

- Project Site
- Ephemeral
- Temporary Marsh

Imagery Source: Google Earth™

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

Client:		URBAN STAR	
Project:		HORSE CREEK	
Title:		AUGUST 17, 2019	
Date:	Project No.:	Scale:	<b>APP A</b>
10-13-2021	WER118-18	1:9,000	

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants

**Appendix B Rare Plant & ACIMS Database Search Results**

# Rare Vascular Plant and Rare Ecological Community Survey

## Horse Creek Development Project NE-29 & SE-32-26-4 W5



Prepared by:

**Zanshin Environmental Networks Inc.**

Prepared for:

Westhoff Engineering Resources, Inc.

December 2018

Project #ZEN00068

## Executive Summary

Zanshin Environmental Networks Inc. (ZEN) was retained by Westhoff Engineering Resources, Inc. to conduct a rare vascular plant and rare ecological community survey, in support of Westhoff's Biophysical Impact Assessment for the Horse Creek Development Project, located at NE-29 & SE-32-26-4 W5 in Rocky View County, AB.

A rare vascular plant and rare ecological community survey was conducted in the Horse Creek Development survey area on June 21, 24 and August 31, 2018, following the Alberta Native Plant Council's *Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update*. During the survey two rare plant species and no rare ecological communities were observed. The two rare plant species: sandhills cinquefoil and Macoun's cinquefoil, were found along the rock outcrop, which runs north/south through the west third of the survey area.

Avoidance is the preferred mitigation measure for these plants; however, depending on the development design further mitigations may be required. Furthermore, upon approval of this development, it is recommended that digital information on these observations is submitted to ACIMS.

## Table of Contents

1.0	INTRODUCTION.....	1
1.1	Scope and Purpose.....	1
1.2	Survey Area.....	1
1.3	Environmental Setting .....	3
2.0	METHODS.....	4
2.1	Rare Plants .....	4
2.1.1	Desktop Review .....	4
2.1.2	Field Methods .....	5
2.2	Rare Ecological Communities.....	5
2.2.1	Desktop Review .....	5
2.2.2	Field Methods .....	5
3.0	RESULTS.....	6
3.1	Rare Plants .....	6
3.2	Rare Ecological Communities.....	9
4.0	RECOMMENDATIONS .....	10
5.0	CONCLUSIONS.....	10
6.0	QUALITY ASSURANCE.....	11
7.0	REFERENCES.....	12

### List of Figures

Figure 1. Survey area and survey tracks.....	2
Figure 2. Survey area (red dot) in the Foothills Parkland Natural Subregion. ....	3
Figure 3. Location of rare plant observations. ....	6

### List of Tables

Table 1. Summary of provincial, national and global conservation ranks.....	4
Table 2. Summary of area surveyed and number of plant species observed.....	6

### List of Photos

Photo 1. Sandhills cinquefoil, showing cauline leaf and congested inflorescence, with inset showing the bractlets longer than the sepals.....	7
Photo 2. Sandhills cinquefoil habitat in the southeast corner of the study area, facing southwest. ....	7
Photo 3. Macoun’s cinquefoil. ....	8
Photo 4. Macoun’s cinquefoil habitat along the southern portion of the rock outcrop in the survey area. ....	8

### List of Appendices

Appendix A. List of Potential Rare Vascular Plant Species in the Survey Area.....	14
Appendix B. Lists of Plant Species Observed During the Rare Plant Survey.....	16
Appendix C. List of Potential Rare Ecological Communities in the Foothills Parkland Natural Subregion .....	25
Appendix D. Laurie Hamilton – Rare Plant Specialist Summary.....	26

## **1.0 INTRODUCTION**

Zanshin Environmental Networks Inc. (ZEN) was retained by Westhoff Engineering Resources, Inc. to conduct a rare vascular plant and rare ecological community survey at the Horse Creek Development site located in Rocky View County at NE-29 & SE-32-26-4 W5.

### **1.1 Scope and Purpose**

The scope of this survey was to conduct a floristic rare vascular plant and rare ecological community (REC) survey, within the survey area in support of a Biophysical Impact Assessment (BIA) (Westhoff Project No. WER 118-18), following the Alberta Native Plant Council's (ANPC) *Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update (Guidelines)* (ANPC 2012). The purpose of the survey was to document all vascular plant species observed within the survey area, to provide details of any rare plant species observed, and to provide recommendations as needed.

ANPC's *Guidelines* identify that the purpose of a floristic survey is not to develop a full list of the plant species in the survey area but rather to ensure that all species encountered are identified as being either rare or not rare (ANPC 2012). Furthermore, a rare plant survey can confirm the presence of a rare plant species but cannot confirm the absence of one, for a variety of reasons, such as detectability, response of species to climatic conditions, etc. (ANPC 2012).

### **1.2 Survey Area**

The survey area is located in NE-29 & SE-32-26-4 W5, and is bounded along the west by Horse Creek Road, along the east by Range Road 44, along the south by the continuation of grasslands and rock outcrop, and to the north by a homestead, tame pasture land, including several wetlands, grasslands and the continuation of the rock outcrop.

Land use in the survey area consists of a homestead, tame pasture land, a couple of small wetlands, native grassland, a dry, rock outcrop along the west of the survey area, and a moist draw bisecting the rock outcrop (Figure 1).

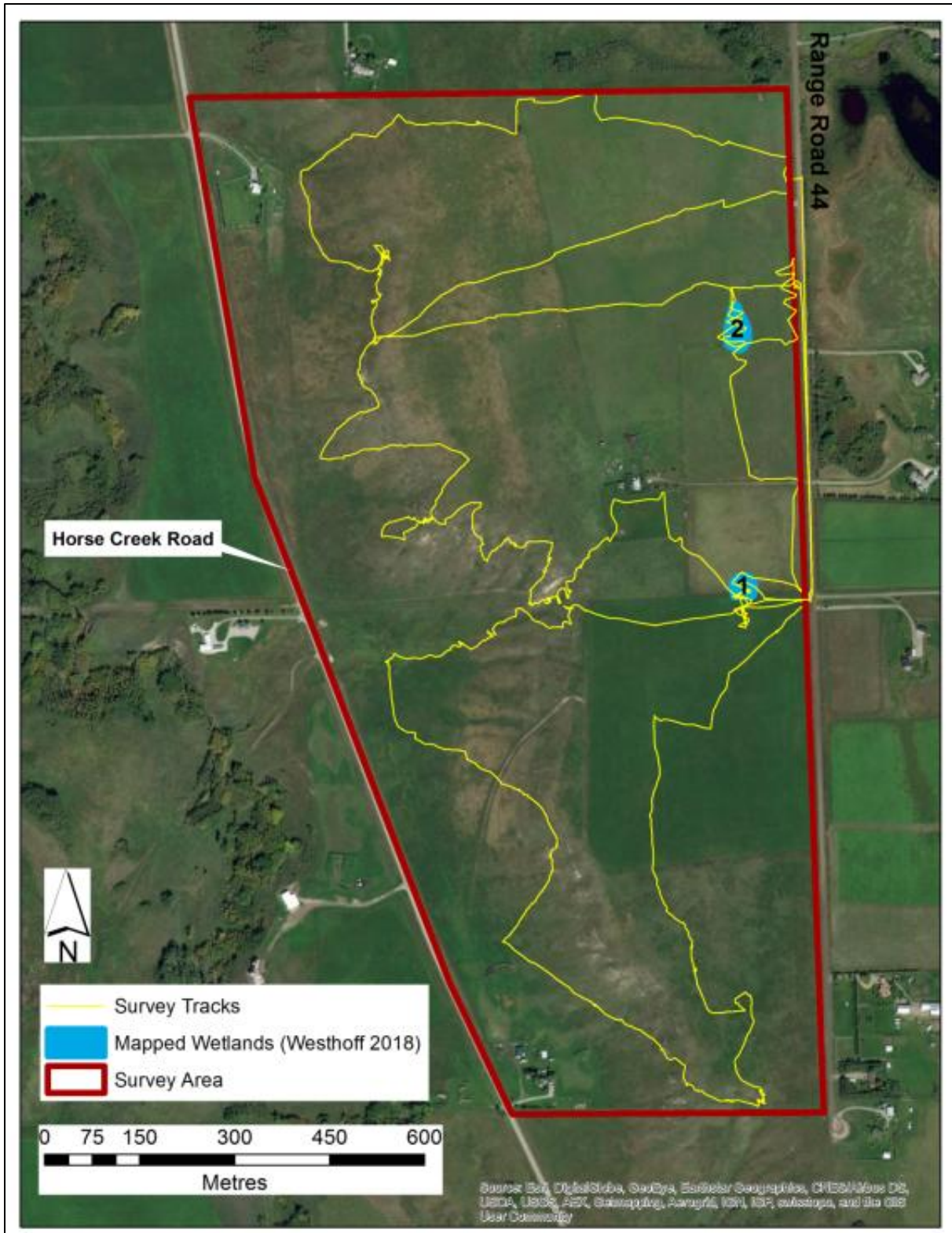
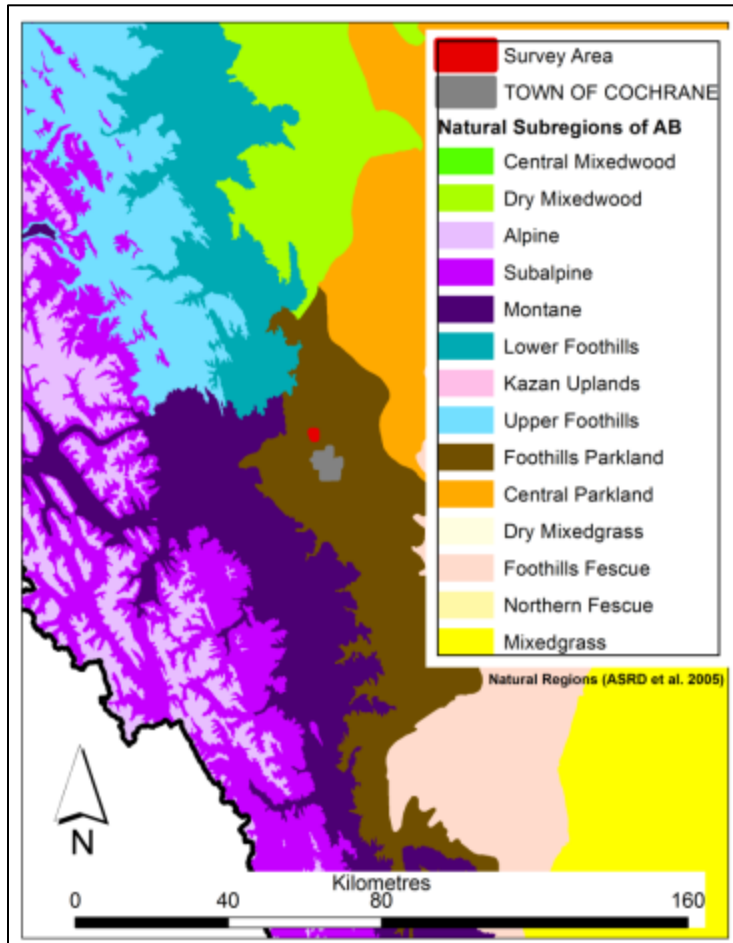


Figure 1. Survey area and survey tracks.

### 1.3 Environmental Setting



**Figure 2. Survey area (red dot) in the Foothills Parkland Natural Subregion.**

The Project area is located in the Parkland Natural Region, Foothills Parkland Natural Subregion of Alberta (ASRD *et al.* 2005) (Figure 2). The Foothills Parkland Natural Subregion is a discontinuous subregion along the foothills of the Rocky Mountains (Natural Regions Committee 2006). The southern portion extends from the Alberta–Montana border and the northern portion extends from approximately Willow Creek to about 50 km north of Calgary. Changes in elevation influence the climate, with marked changes in elevation creating a correspondingly rapid climate change in places. This subregion experiences cooler summers and shorter growing seasons, but warmer winters and more precipitation than other subregions in the Parkland Natural Region.

Black Chernozems and Dark Gray Chernozems are typical soils. The landscape consists of undulating to rolling terrain, with some hayland and cultivation. Vegetation on drier sites includes mountain rough fescue–bluebunch fescue grasslands. Vegetation on moister sites includes aspen forests or willow shrublands.

Open water occupies less than one percent of the land, with the Bow River being the largest watercourse. Very few small lakes occur, and wetlands are uncommon and occupy about four percent of the total area.

## 2.0 METHODS

The following methods include definitions, as well as desktop and field survey methods for identifying rare vascular plant species and rare ecological communities.

### 2.1 Rare Plants

For the purposes of this survey, rare plants were defined as vascular plant species that are:

- Listed in the current Alberta Conservation Information Management System’s (ACIMS) *List of Tracked Elements in Alberta by Natural Subregion* (ACIMS 2017a),
- Provincially regulated as ‘Endangered’, ‘Threatened’, or ‘Special Concern’ under the *Alberta Wildlife Act*, or
- Federally-listed species.

Tracked species listed by ACIMS are either considered rare or of conservation concern for other reasons, such as rapid population decline or habitat loss. Watch list species are those species that ACIMS is currently collecting information on population trends to determine their distribution within Alberta. Conservation ranks are assigned to track and watch listed species, with descriptions of the ranks summarized in Table 1 (ACIMS 2018a). If a species is assigned a combination of two ranks (e.g., S2S3), it reflects uncertainty between them. Some of these species may be further regulated under the *Alberta Wildlife Act* or the federal *Species at Risk Act*. If regulated rare plants were observed, details were included in the *Results* section of this report.

**Table 1. Summary of provincial, national and global conservation ranks.**

Alberta (S) /National (N) /Global (G) Rank <sup>1</sup>	Description	Summary
S1/N1/G1	Critically Imperiled	<5 occurrences, or only a few remaining individuals in Alberta
S2/N2/G2	Imperiled	6-20 occurrences, or with many individuals but with fewer occurrences in Alberta
S3/N3/G3	Vulnerable	21-100 occurrences, or may be rare or local throughout its range, or in restricted range in Alberta
S4/N4/G4	Apparently Secure	>100 occurrences, but may be fewer with many large populations
S5/N5/G5	Secure	>100 occurrences, but may be rare in parts of its range

<sup>1</sup> Provincial, national and global ranks are not always the same

#### 2.1.1 Desktop Review

The list of rare plant species potentially occurring in the survey area consisted of tracked and listed vascular plant elements identified as occurring in the Foothills Parkland Natural Subregion (ACIMS 2017a) and vascular plants that have been observed within 10 km of the survey area through a search of vascular plant element occurrences in the ACIMS database (ACIMS 2017b).

Descriptions of the morphology, phenology, and typical habitat of potential rare plants were reviewed, as well as photos and drawings of rare plants (www.E-floras.org 2018, Kershaw and Allen 2018, Kershaw et al. 2001, Moss 1983) prior to the field survey. Species nomenclature for scientific and common names of plants follows those listed by ACIMS (ACIMS 2018b).

### 2.1.2 Field Methods

The survey area was surveyed using a purposeful meander survey technique, while recording all plant species observed. Areas with higher rare plant potential, such as the wetlands, and rock outcrop were surveyed with greater effort. The rare plant survey followed the Alberta Native Plant Council's (ANPC) *Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update* (ANPC 2012). Voucher specimen collection followed *ANPC's Plant Collection Guidelines for Researchers, Students and Consultants* (ANPC 2006).

## 2.2 Rare Ecological Communities

Rare ecological communities are defined as ecological communities listed on ACIMS' *Ecological Community Tracking List* (Allen 2014) for the purposes of this survey. These communities appear to have a restricted distribution in Alberta (Allen 2014). Information is being collected by ACIMS to establish trends in community dynamics. These communities are ranked similarly to rare plant species (Table 1).

### 2.2.1 Desktop Review

A list of rare ecological communities potentially occurring in the survey area was compiled through a review of tracked ecological communities listed to occur in the Foothills Parkland Natural Subregion (Allen 2014), and ecological communities that have been observed within 10 km of the survey area through a search of ecological community element occurrences in the ACIMS database (ACIMS 2018b).

Potentially occurring rare ecological community descriptions, detailed in ACIMS' *Ecological Community Tracking List* (Allen 2014), were reviewed prior to fieldwork.

### 2.2.2 Field Methods

Reference rare ecological community lists, as described above, were compared with observations of the vegetation communities during the rare plant survey.

### 3.0 RESULTS

A rare vascular plant and rare ecological community survey was conducted on June 21, 24 and August 31, 2018 within the survey area.

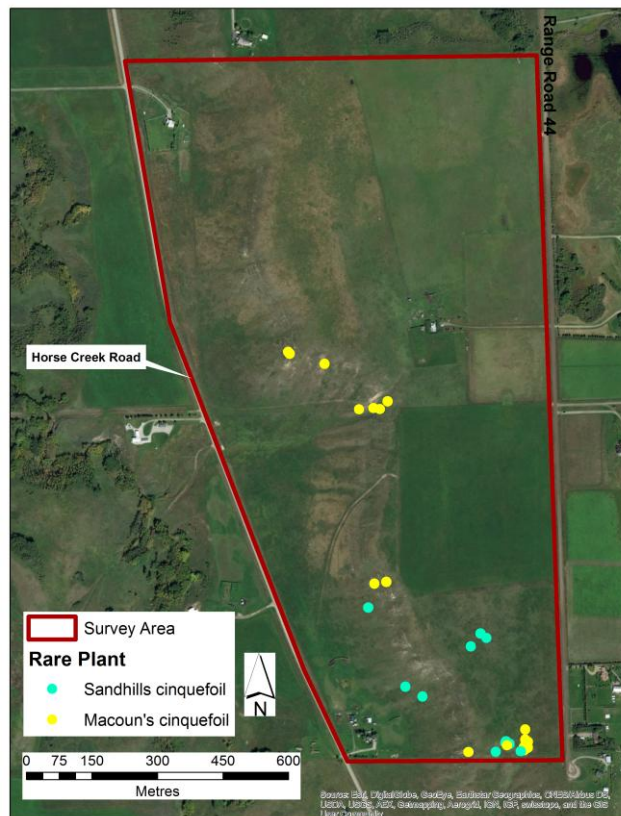
#### 3.1 Rare Plants

A total of 54 potential rare vascular plant species were identified as potentially occurring within the survey area (Appendix A). Through a search of ACIMS' element occurrence database, eight rare plant species at 16 locations were identified within 10 km of the project, not within the survey area.

A list of observed plant species was compiled for the upland areas, the draw and wetland areas within the survey area and summarized below (Table 2, Appendix B). During the survey, two rare plants were observed in the upland area (Figure 3): sandhills cinquefoil and Macoun's cinquefoil.

**Table 2. Summary of area surveyed and number of plant species observed.**

Areas	Number of Plant Species Observed
Upland	141
Draw	19
Wetland 1	32
Wetland 2	32



**Figure 3. Location of rare plant observations.**

**Sandhills cinquefoil (*Potentilla lasiodonta* Rydberg)**

Sandhills cinquefoil is a perennial herb in the rose family (Photo 1) that is currently being tracked by ACIMS. It is provincially ranked as S3 (vulnerable), nationally ranked as N3 (vulnerable), and globally ranked as G3 (vulnerable) (ACIMS 2018, NatureServe 2018).



**Photo 1. Sandhills cinquefoil, showing cauline leaf and congested inflorescence, with inset showing the bractlets longer than the sepals.**

During the survey, sandhills cinquefoil was found on slopes ranging from <2 to >15%, found along the crest and down the steep south and west facing slopes (Photo 2). Associated species include rough fescue (*Festuca campestris*), Kentucky bluegrass (*Poa pratensis*), Parry oat grass (*Danthonia parryi*), slender wheatgrass (*Elymus trachycaulus*) and pasture sagewort (*Artemisia frigida*). Twenty-four plants were counted within a 1500 m<sup>2</sup> area (Figure 3).



**Photo 2. Sandhills cinquefoil habitat in the southeast corner of the study area, facing southwest.**

**Macoun's cinquefoil (*Potentilla macounii* Rydberg)**

Macoun's cinquefoil is a perennial herb in the rose family (Photo 3) that is currently being tracked by ACIMS. It is provincially ranked as S1 (critically imperiled), nationally ranked as N1 (critically imperiled), and globally ranked as G3? (vulnerable with some level of uncertainty) (ACIMS 2018, Natureserve 2018).



**Photo 3. Macoun's cinquefoil.**

During the survey, Macoun's cinquefoil was found along the rock outcrop along the dry, south-, west- and southwest-facing upper to mid slopes (Photo 4). Locally, the plant was observed in abundance in the eroded areas (10 to 50% bare) above or near the exposed rock faces, and was associated with species such as early cinquefoil (*Potentilla concinna*), shrubby cinquefoil (*Dasiphora fruticosa*), Rocky Mountain fescue (*Festuca saximontana*), woodland strawberry (*Fragaria vesca*), pasture sage, slender wheatgrass, goldenbean (*Thermopsis rhombifolia*) and hay sedge (*Carex siccata*). One hundred and fifty-four plants were counted within a 2500 m<sup>2</sup> area (Figure 3).



**Photo 4. Macoun's cinquefoil habitat along the southern portion of the rock outcrop in the survey area.**

### **3.2 Rare Ecological Communities**

A total of eight potential rare ecological communities (RECs) were identified in the Foothills Parkland Natural Subregion (Appendix C). Through a search of ACIMS' element occurrence database, four rare ecological communities at seven locations were identified within 10 km of the project, not within the survey area.

During the survey, no rare ecological communities were observed.

## 4.0 RECOMMENDATIONS

Generally, when an impact to a rare plant population is identified, recommended mitigation measures are based on those identified by the California Native Plant Society Rare Plant Scientific Advisory Committee (1998), and implementation of mitigations are in following order of preference:

- (a) Avoiding the impact.
- (b) Minimizing impacts by limiting the spatial or temporal extent of the impact.
- (c) Creating a temporary impact and inevitably rehabilitating or restoring the impacted habitat and re-introducing the plant.
- (d) Compensating for the impact by introducing the plant via seed collection, seed bank salvage, transplant or other propagule techniques into a suitable habitat nearby.

Avoidance of the rock outcrop, where rare plants were observed, is the preferred mitigation measure. Depending on the concept design of the development plan, further mitigations may be required.

Recommendations further focus on preserving the information obtained during this survey by digitally submitting spatial location and observation details to the provincial conservation data centre, ACIMS. This allows ACIMS staff to continuously review and revise rarity status of plant species as part of the provincial land management strategy.

## 5.0 CONCLUSIONS

A rare vascular plant and rare ecological community survey was conducted in the Horse Creek Development survey area on June 21, 24 and August 31, 2018, during which two rare plant species and no rare ecological communities were observed.

The two rare plant species were found along the rock outcrop, which runs north/south through the west third of the survey area. Avoidance is the preferred mitigation measure for these plants; however, depending on the development design further mitigations may be required. Furthermore, upon approval of this development, it is recommended that digital information on these observations is submitted to ACIMS.

## 6.0 QUALITY ASSURANCE

This survey and report were conducted by a qualified rare plant biologist (Appendix D), as recommended in the Alberta Native Plant Council's *Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update* (ANPC 2012). Conclusions and recommendations presented in this report are based on observations, discussion with relevant personnel, and review of relevant information available at the time of the survey. The contents of this report are deemed appropriate for decision-making purposes for up to two years from the date of the report.

This report has been prepared for use by Westhoff Engineering Resources, Inc., and distribution as required for planning purposes. Should you have any questions or comments, please contact Laurie Hamilton via cell phone (403) 483-2476.

### Zanshin Environmental Networks Inc.

#### Prepared By:



**Laurie Hamilton, M.Sc., C.E.T., P. Biol., PWS  
Vegetation Ecologist**

## 7.0 REFERENCES

- Alberta Conservation Information Management System (ACIMS). 2018a. *Species Conservation Ranks webpage*. Accessed on September 22, 2018. Available at: <https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/tracking-watch-lists/species-conservation-ranks/>
- ACIMS. 2018b. *List of Elements in Alberta – Vascular Plants* – March 2018 version. Alberta Environment and Parks, Parks Division, Government of Alberta Edmonton Alberta.
- Alberta Conservation Information Management System. 2017a. List of Tracked Elements in Alberta by Natural Subregion. July 2017. Alberta Environment and Parks. Edmonton, Alberta. Website: <https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/download-data/>. Accessed: July 2018.
- Alberta Conservation Information Management System. 2017b. *Part 1: Non-sensitive and Part 2: Sensitive (by township) Element Occurrences Shapefiles-October 2017*. Alberta Environment and Parks. Edmonton, Alberta. Website: <https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/download-data/>. Accessed: July 2018.
- Alberta Native Plant Council (ANPC). 2006. *Plant Collection Guidelines for Researchers, Students and Consultants*. Alberta Native Plant Council, Edmonton, AB.
- ANPC. 2012. *Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update*. Alberta Native Plant Council. Edmonton, Alberta.
- Alberta Sustainable Resource Development (ASRD), Alberta Environment, Alberta Community Development and Agriculture and Agri-Food Canada. 2005. *2005 Natural Regions and Subregions of Alberta*. Accessed on September 30, 2017. Available at: <https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/download-data/>
- Allen, L. 2014. Alberta Conservation Information Management System Ecological Community Tracking List. Alberta Parks and Environment Division, Government of Alberta, Edmonton, Alberta.
- California Native Plant Society Rare Plant Scientific Advisory Committee. 1998. *CNPS Policy on Mitigation Guidelines Regarding Impacts to Rare, Threatened, and Endangered Plants*. California Native Plant Society, Sacramento, California.
- Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. 2016. Imagery for Project Area, dated 2016-09-09.
- Kershaw, L. and L. Allen. 2018. *Keys to Alberta Species*. Alberta Native Plant Council, Edmonton, AB. Available at: [https://anpc.ab.ca/?page\\_id=3089](https://anpc.ab.ca/?page_id=3089)
- Kershaw, L., Gould, J., Johnson, D. and J. Lancaster. 2001. *Rare Vascular Plants of Alberta*. The University of Alberta Press. Edmonton, Alberta.
- Moss, E.H. (revised by J.G. Packer). 1983. *Flora of Alberta*. University of Toronto Press. Toronto, Ontario.

Natural Regions Committee. 2006. *Natural Regions and Subregions of Alberta*. Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta. Pub. No. T/852.

Westhoff Engineering Resources Ltd. (Westhoff). 2018. Mapped Wetlands. unpublished. Transmitted via e-mail on October 17, 2018, from Donald Hodges, Westhoff.

www.E-floras.org. 2018. Flora of North America. Available at:  
[http://www.efloras.org/flora\\_page.aspx?flora\\_id=1](http://www.efloras.org/flora_page.aspx?flora_id=1).

## Appendix A. List of Potential Rare Vascular Plant Species in the Survey Area

Scientific Name	Common Name
<i>Arnica longifolia</i>	long-leaved arnica
<i>Artemisia borealis</i> ssp. <i>borealis</i>	northern wormwood
<i>Brickellia grandiflora</i>	large-flowered brickellia
<i>Bupleurum americanum</i>	thorough-wax
<i>Camassia quamash</i> var. <i>quamash</i>	blue camas
<i>Carex aperta</i>	open sedge
<b><i>Carex crawei</i></b>	<b>Crawe's sedge</b>
<b><i>Carex flava</i></b>	<b>yellow sedge</b>
<i>Carex vesicaria</i>	blister sedge
<i>Cirsium scariosum</i>	meadow thistle
<i>Conimitella williamsii</i>	conimitella
<i>Corispermum pallasii</i>	Pallas' bugseed
<i>Corispermum villosum</i>	hairy bugseed
<i>Cypripedium montanum</i>	mountain lady's-slipper
<i>Erigeron flagellaris</i>	creeping fleabane
<i>Festuca subulata</i>	bearded fescue
<i>Gentiana calycosa</i>	mountain gentian
<b><i>Gentiana fremontii</i></b>	<b>marsh gentian</b>
<i>Iliamna rivularis</i>	mountain hollyhock
<i>Iris missouriensis</i>	western blue flag
<i>Lithophragma parviflorum</i>	small-flowered rockstar
<i>Lithospermum occidentale</i>	Western false gromwell
<i>Lupinus minimus</i>	least lupine
<i>Machaeranthera tanacetifolia</i>	tansy aster
<i>Melica smithii</i>	Smith's oniongrass
<i>Melica spectabilis</i>	onion grass
<i>Mertensia lanceolata</i>	lance-leaved lungwort
<i>Montia linearis</i>	linear-leaved montia
<i>Nemophila breviflora</i>	small baby-blue-eyes
<i>Oenothera flava</i>	low yellow evening-primrose
<b><i>Pellaea gastonyi</i></b>	<b>Gaston's cliff brake</b>
<b><i>Pellaea glabella</i> ssp. <i>simplex</i></b>	<b>smooth cliff brake</b>
<i>Phlox alyssifolia</i>	blue phlox
<b><i>Pinus flexilis</i></b>	<b>limber pine</b>
<i>Polygonum bistortoides</i>	western bistort
<i>Polygonum engelmannii</i>	Engelmann's knotweed
<i>Polypodium hesperium</i>	western polypody
<i>Potamogeton nodosus</i>	longleaf pondweed
<i>Potentilla lasiodonta</i>	sandhills cinquefoil

Scientific Name	Common Name
<b>Potentilla macounii</b>	<b>Macoun's cinquefoil</b>
<i>Potentilla villosa</i>	hairy cinquefoil
<i>Prenanthes sagittata</i>	purple rattlesnakeroot
<i>Pseudognaphalium thermale</i>	white cudweed
<i>Pteridium aquilinum</i> var. <i>pubescens</i>	bracken fern
<i>Ribes inerme</i> var. <i>inerme</i>	mountain gooseberry
<b>Ruppia cirrhosa</b>	<b>widgeon-grass</b>
<i>Selaginella wallacei</i>	Wallace's little club-moss
<i>Senecio megacephalus</i>	large-flowered ragwort
<i>Suckleya suckleyana</i>	poison suckleya
<i>Torreyochloa pallida</i> var. <i>pauciflora</i>	few-flowered salt-meadow grass
<i>Trisetum canescens</i>	tall trisetum
<i>Trisetum cernuum</i>	nodding trisetum
<i>Trisetum wolfii</i>	awnless trisetum
<i>Viola glabella</i>	yellow wood violet

Note: **Bolded** species are those found within 10km of the survey area

## Appendix B. Lists of Plant Species Observed During the Rare Plant Survey

### Upland

Scientific Name*	Common Name	S Rank	G Rank
<b>Forbs</b>			
<i>Achillea millefolium</i>	common yarrow	S5	G5
<i>Agoseris glauca</i>	yellow false dandelion	S5	G5
<i>Anemone cylindrica</i>	long-fruited anemone	S5	G5
<i>Anemone multifida</i>	cut-leaved anemone	S5	G5
<i>Anemone patens</i>	prairie crocus	S5	G5
<i>Antennaria parvifolia</i>	small-leaved everlasting	S5	G5
<i>Apocynum androsaemifolium</i>	spreading dogbane	S5	G5
<i>Artemisia campestris</i>	plains wormwood	S5	G5
<i>Artemisia frigida</i>	pasture sagewort	S5	G5
<i>Artemisia ludoviciana</i>	prairie sagewort	S5	G5
<i>Astragalus agrestis</i>	purple milk vetch	S5	G5
<i>Astragalus cicer</i>	cicer milk vetch	SNA	G5
<i>Astragalus laxmannii</i> var. <i>robustior</i>	ascending purple milk-vetch	S5	G5T5
<i>Astragalus pectinatus</i>	narrow-leaved milk vetch	S5	G5
<i>Campanula rotundifolia</i>	harebell	S5	G5
<i>Cerastium arvense</i>	field mouse-ear chickweed	S5	G5
<i>Cerastium vulgatum</i>	common mouse-ear chickweed	SNA	GNR
<i>Chamaerhodos erecta</i>	chamaerhodos	S4	G5
<i>Chenopodium album</i>	lamb's-quarters	SNA	G5
<i>Cirsium arvense</i>	creeping thistle	SNA	GNR
<i>Comandra umbellata</i>	common comandra	S5	G5
<i>Cystopteris fragilis</i>	fragile bladder fern	S5	G5
<i>Dalea purpurea</i> var. <i>purpurea</i>	purple prairie-clover	S3	G5T5
<i>Descurainia sophia</i>	flixweed	SNA	GNR
<i>Dodecatheon conjugens</i>	mountain shooting star	S3	G5
<i>Drymocallis arguta</i>	white cinquefoil	S4	G5
<i>Erigeron compositus</i>	compound-leaved fleabane	S5	G5
<i>Erigeron glabellus</i>	smooth fleabane	S5	G5
<i>Eriogonum flavum</i>	yellow umbrella-plant	S5	G5
<i>Erysimum inconspicuum</i>	small-flowered rocket	S5	G5

Scientific Name*	Common Name	S Rank	G Rank
<i>Fragaria vesca</i>	woodland strawberry	S4	G5
<i>Gaillardia aristata</i>	gaillardia	S5	G5
<i>Galeopsis tetrahit</i>	hemp-nettle	SNA	GNR
<i>Galium boreale</i>	northern bedstraw	S5	G5
<i>Geranium bicknellii</i>	Bicknell's geranium	S5	G5
<i>Geum triflorum</i>	three-flowered avens	S5	G5
<i>Hedysarum alpinum</i>	alpine hedysarum	S5	G5
<i>Hedysarum boreale</i>	northern hedysarum	S5	G5
<i>Helianthus petiolaris</i> ssp. <i>petiolaris</i>	prairie sunflower	S3	G5T5
<i>Heterotheca villosa</i>	golden aster	S5	G5
<i>Lepidium densiflorum</i>	common pepper-grass	S5	G5
<i>Lilium philadelphicum</i>	western wood lily	S5	G5
<i>Linaria vulgaris</i>	common toadflax	SNA	GNR
<i>Linum lewisii</i>	wild blue flax	S5	G5
<i>Linum rigidum</i>	yellow flax	S4	G4G5
<i>Lithospermum ruderales</i>	woolly gromwell	S5	G5
<i>Lupinus pusillus</i>	annual lupine	S3	G5
<i>Maianthemum stellatum</i>	star-flowered Solomon's-seal	S5	G5
<i>Medicago sativa</i>	alfalfa	SNA	GNR
<i>Monarda fistulosa</i>	wild bergamot	S5	G5
<i>Mulgedium pulchellum</i>	common blue lettuce	S5	G5T5
<i>Musineon divaricatum</i>	leafy musineon	S3	G5
<i>Oenothera suffrutescens</i>	scarlet butterflyweed	S4	G5
<i>Oxytropis borealis</i>	boreal locoweed	S3	G5
<i>Oxytropis borealis</i> var. <i>viscida</i>	boreal locoweed	S3	G5T4?
<i>Oxytropis sericea</i>	early yellow locoweed	S5	G5
<i>Oxytropis splendens</i>	showy locoweed	S5	G5
<i>Packera cana</i>	prairie groundsel	S5	G5
<i>Paronychia sessiliflora</i>	creeping nailwort	S3	G5
<i>Penstemon nitidus</i>	smooth blue beardtongue	S5	G5
<i>Phlox hoodii</i>	moss phlox	S5	G5
<i>Physaria arenosa</i>	great plains bladderpod	S3	G5

Scientific Name*	Common Name	S Rank	G Rank
<i>Potentilla anserina</i>	silverweed	S5	G5
<i>Potentilla bipinnatifida</i>	plains cinquefoil	S4	G5?
<i>Potentilla concinna</i>	early cinquefoil	S4	G5?
<i>Potentilla gracilis</i>	graceful cinquefoil	S5	G5
<i>Potentilla hippiana</i>	woolly cinquefoil	S5	G5
<i>Potentilla</i> species	cinquefoil species	-	-
<b><i>Potentilla lasiodonta</i></b>	<b>sandhills cinquefoil</b>	<b>S3</b>	<b>G2G4Q</b>
<b><i>Potentilla macounii</i></b>	<b>Macoun's cinquefoil</b>	<b>S1</b>	<b>G1G2</b>
<i>Potentilla norvegica</i>	rough cinquefoil	S5	G5
<i>Potentilla ovina</i>	sheep cinquefoil	S3	G5?
<i>Potentilla pensylvanica</i>	prairie cinquefoil	S5	G5
<i>Ranunculus abortivus</i>	small-flowered buttercup	S4	G5
<i>Ranunculus pedatifidus</i>	northern buttercup	S4	G5
<i>Selaginella densa</i>	prairie selaginella	S5	G5
<i>Sisyrinchium montanum</i>	common blue-eyed grass	S5	G5
<i>Solidago altissima</i>	tall goldenrod	S5	GNR
<i>Solidago missouriensis</i>	low goldenrod	S5	G5
<i>Solidago simplex</i>	sticky goldenrod	S5	G5
<i>Sonchus arvensis</i>	perennial sow-thistle	SNA	GNR
<i>Stellaria longipes</i>	long-stalked chickweed	S5	G5
<i>Symphyotrichum falcatum</i>	creeping white prairie aster	S5	G5
<i>Symphyotrichum laeve</i>	smooth aster	S5	G5
<i>Taraxacum officinale</i>	common dandelion	SNA	G5
<i>Thalictrum venulosum</i>	veiny meadow rue	S5	G5
<i>Thermopsis rhombifolia</i>	golden bean	S5	G5
<i>Thlaspi arvense</i>	stinkweed	SNA	GNR
<i>Townsendia exscapa</i>	low townsendia	S3	G5
<i>Tragopogon dubius</i>	common goat's-beard	SNA	GNR
<i>Trifolium hybridum</i>	alsike clover	SNA	GNR
<i>Trifolium pratense</i>	red clover	SNA	GNR
<i>Vicia americana</i>	wild vetch	S5	G5
<i>Viola nuttallii</i>	yellow prairie violet	S3	G5

Scientific Name*	Common Name	S Rank	G Rank
<i>Viola species</i>	violet species		
<i>Zigadenus elegans</i>	white camas	S5	G5
<i>Zizia aptera</i>	heart-leaved Alexanders	S5	G5
<b>Grasses and Grass-like Plants</b>			
<i>Bromus inermis</i>	smooth brome	SNA	G5TNR
<i>Calamovilfa longifolia</i>	sand grass	S5	G5
<i>Carex filifolia</i>	thread-leaved sedge	S5	G5
<i>Carex inops</i>	sun-loving sedge	S5	GNR
<i>Carex siccata</i>	hay sedge	S5	G5
<i>Dactylis glomerata</i>	orchard grass	SNA	GNR
<i>Danthonia californica</i>	California oat grass	S5	G5
<i>Danthonia parryi</i>	Parry oat grass	S5	G5
<i>Elymus lanceolatus</i>	northern wheat grass	S5	G5
<i>Elymus trachycaulus</i>	slender wheatgrass	S5	G5
<i>Festuca campestris</i>	mountain rough fescue	S5	G5?
<i>Festuca ovina</i>	sheep fescue	SNA	GNR
<i>Festuca saximontana</i>	Rocky Mountain fescue	S5	G5
<i>Koeleria macrantha</i>	June grass	S5	G5
<i>Nassella viridula</i>	green needle grass	S5	G5
<i>Pascopyrum smithii</i>	western wheat grass	S5	G5
<i>Phleum pratense</i>	timothy	SNA	GNR
<i>Poa annua</i>	annual bluegrass	SNA	GNR
<i>Poa arida</i>	plains bluegrass	S4	G5
<i>Poa compressa</i>	Canada bluegrass	SNA	GNR
<i>Poa pratensis</i>	Kentucky bluegrass	S5	G5
<i>Poa secunda</i>	Sandberg bluegrass	S5	G5
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	S4	G5
<b>Shrubs</b>			
<i>Amelanchier alnifolia</i>	saskatoon	S5	G5
<i>Caragana arborescens</i>	common caragana	SNA	GNR
<i>Cotoneaster lucidus</i>	Peking cotoneaster	SNA	GNR
<i>Dasiphora fruticosa</i>	shrubby cinquefoil	S5	G5

Scientific Name*	Common Name	S Rank	G Rank
<i>Elaeagnus commutata</i>	silverberry	S5	G5
<i>Juniperus communis</i>	ground juniper	S5	G5
<i>Juniperus horizontalis</i>	creeping juniper	S5	G5
<i>Ribes oxycanthoides</i>	northern gooseberry	S5	G5
<i>Rosa acicularis</i>	prickly rose	S5	G5
<i>Rosa arkansana</i>	prairie rose	S5	G5
<i>Rosa woodsii</i>	common wild rose	S5	G5
<i>Rubus idaeus</i>	wild red raspberry	S5	G5
<i>Shepherdia canadensis</i>	Canada buffaloberry	S5	G5
<i>Symphoricarpos occidentalis</i>	buckbrush	S5	G5
<b>Trees</b>			
<i>Acer negundo</i>	Manitoba maple	SU	G5
<i>Picea glauca</i>	white spruce	S5	G5
<i>Populus tremuloides</i>	aspen	S5	G5
<b>Lichens</b>			
<i>Cladonia mitis</i>	reindeer lichen	S3S5	G5
<i>Usnea hirta</i>	bristly beard lichen	S3S5	G5
<i>Xanthomendoza fallax</i>	hooded sunburst lichen	S3S5	G5
<b>Mosses</b>			
<i>Abietinella abietina</i>	wiry fern moss	S4	G4G5

\*Species in **bold** are deemed being tracked by ACIMS

**Draw**

Scientific Name	Common Name	S Rank	G Rank
<b>Forbs</b>			
<i>Anemone cylindrica</i>	long-fruited anemone	S5	G5
<i>Cirsium arvense</i>	creeping thistle	SNA	GNR
<i>Drymocallis arguta</i>	white cinquefoil	S4	G5
<i>Geranium viscosissimum</i>	sticky purple geranium	S3	G5
<i>Geum aleppicum</i>	yellow avens	S5	G5
<i>Geum triflorum</i>	three-flowered avens	S5	G5
<i>Heuchera richardsonii</i>	Richardson's alumroot	S5	G5
<i>Potentilla anserina</i>	silverweed	S5	G5
<i>Potentilla bipinnatifida</i>	plains cinquefoil	S4	G5?
<i>Rumex triangulivalvis</i>	narrow-leaved dock	S5	G5
<i>Taraxacum officinale</i>	common dandelion	SNA	G5
<i>Thalictrum venulosum</i>	veiny meadow rue	S5	G5
<i>Thlaspi arvense</i>	stinkweed	SNA	GNR
<b>Grasses and Grass-like Plants</b>			
<i>Bromus inermis</i>	smooth brome	SNA	G5TNR
<i>Phleum pratense</i>	timothy	SNA	GNR
<i>Poa pratensis</i>	Kentucky bluegrass	S5	G5
<b>Shrubs</b>			
<i>Dasiphora fruticosa</i>	shrubby cinquefoil	S5	G5
<i>Ribes oxycanthoides</i>	northern gooseberry	S5	G5
<i>Symphoricarpos occidentalis</i>	buckbrush	S5	G5

**Wetland 1**

Scientific Name	Common Name	S Rank	G Rank
<b>Forbs</b>			
<i>Artemisia biennis</i>	biennial sagewort	S5	G5
<i>Astragalus cicer</i>	cicer milk vetch	SNA	G5
<i>Callitriche verna</i>	vernal water-starwort	S5	G5
<i>Chenopodium rubrum</i>	red goosefoot	S4	G5
<i>Collomia linearis</i>	narrow-leaved collomia	S5	G5
<i>Crepis runcinata</i>	scapose hawk's-beard	S5	G5
<i>Galeopsis tetrahit</i>	hemp-nettle	SNA	GNR
<i>Limosella aquatica</i>	mudwort	S4	G5
<i>Linaria vulgaris</i>	common toadflax	SNA	GNR
<i>Persicaria lapathifolia</i>	pale persicaria	S5	G5
<i>Potentilla anserina</i>	silverweed	S5	G5
<i>Potentilla norvegica</i>	rough cinquefoil	S5	G5
<i>Ranunculus macounii</i>	Macoun's buttercup	S5	G5
<i>Stachys palustris</i>	marsh hedge-nettle	S5	G5
<i>Taraxacum officinale</i>	common dandelion	SNA	G5
<i>Thlaspi arvense</i>	stinkweed	SNA	GNR
<i>Trifolium hybridum</i>	alsike clover	SNA	GNR
<i>Veronica peregrina</i>	hairy speedwell	S5	G5
<b>Grasses and Grass-like Plants</b>			
<i>Agropyron cristatum</i>	crested wheatgrass	SNA	G5
<i>Alopecurus aequalis</i>	short-awned foxtail	S5	G5
<i>Beckmannia syzigachne</i>	slough grass	S5	G5
<i>Bromus inermis</i>	smooth brome	SNA	G5TNR
<i>Carex atherodes</i>	awned sedge	S5	G5
<i>Carex utriculata</i>	small bottle sedge	S5	G5
<i>Elymus repens</i>	quackgrass	SNA	GNR
<i>Phleum pratense</i>	timothy	SNA	GNR
<i>Poa palustris</i>	fowl bluegrass	S5	G5
<i>Poa pratensis</i>	Kentucky bluegrass	S5	G5
<i>Poa secunda</i>	Sandberg bluegrass	S5	G5
<i>Puccinellia nuttalliana</i>	Nuttall's salt-meadow grass	S5	G5

**Wetland 2**

Scientific Name	Common Name	S Rank	G Rank
<b>Forbs</b>			
<i>Achillea millefolium</i>	common yarrow	S5	G5
<i>Alisma triviale</i>	broad-leaved water-plantain	S5?	G5
<i>Artemisia biennis</i>	biennial sagewort	S5	G5
<i>Astragalus agrestis</i>	purple milk vetch	S5	G5
<i>Cirsium arvense</i>	creeping thistle	SNA	GNR
<i>Melilotus officinalis</i>	yellow sweet-clover	SNA	GNR
<i>Persicaria amphibia</i>	water smartweed	S5	G5
<i>Persicaria amphibia var. emersa</i>	water smartweed	S4	G5T5
<i>Plagiobothrys scouleri</i>	Scouler's allocarya	S3	G5
<i>Plantago major</i>	common plantain	SNA	G5
<i>Polygonum aviculare</i>	prostrate knotweed	SNA	GNR
<i>Potentilla anserina</i>	silverweed	S5	G5
<i>Ranunculus macounii</i>	Macoun's buttercup	S5	G5
<i>Taraxacum officinale</i>	common dandelion	SNA	G5
<i>Thlaspi arvense</i>	stinkweed	SNA	GNR
<i>Trifolium hybridum</i>	alsike clover	SNA	GNR
<i>Trifolium repens</i>	white clover	SNA	GNR
<i>Vicia americana</i>	wild vetch	S5	G5
<b>Grasses and Grass-like Plants</b>			
<i>Alopecurus aequalis</i>	short-awned foxtail	S5	G5
<i>Beckmannia syzigachne</i>	slough grass	S5	G5
<i>Bromus inermis</i>	smooth brome	SNA	G5TNR
<i>Carex pellita</i>	woolly sedge	S5	G5
<i>Carex utriculata</i>	small bottle sedge	S5	G5
<i>Deschampsia cespitosa</i>	tufted hair grass	S5	G5
<i>Elymus repens</i>	quackgrass	SNA	GNR
<i>Hordeum jubatum</i>	foxtail barley	S5	G5
<i>Juncus balticus</i>	wire rush	S5	G5
<i>Koeleria macrantha</i>	June grass	S5	G5
<i>Phleum pratense</i>	timothy	SNA	GNR

<b>Scientific Name</b>	<b>Common Name</b>	<b>S Rank</b>	<b>G Rank</b>
<i>Poa palustris</i>	fowl bluegrass	S5	G5
<i>Poa pratensis</i>	Kentucky bluegrass	S5	G5
<b>Shrubs</b>			
<i>Salix bebbiana</i>	beaked willow	S5	G5

**Appendix C. List of Potential Rare Ecological Communities in the Foothills Parkland Natural Subregion**

Scientific Name	Common Name
<i>Betula occidentalis</i> grassland riparian shrubland	water birch grassland riparian shrubland
<b><i>Elymus lanceolatus</i> - <i>Hesperostipa comata</i> grassland</b>	<b>northern wheat grass - needle-and-thread grassland</b>
<i>Festuca idahoensis</i> - <i>Pseudoroegneria spicata</i> grassland	Idaho fescue - bluebunch wheat grass grassland
<i>Populus tremuloides</i> / <i>Rubus parviflorus</i> forest	aspen / thimbleberry forest
<b><i>Pseudotsuga menziesii</i> - <i>Pinus flexilis</i> / <i>Juniperus communis</i> / <i>Festuca campestris</i> woodland</b>	<b>Douglas-fir - limber pine / ground juniper / mountain rough fescue woodland</b>
<i>Salix bebbiana</i> / <i>Cornus stolonifera</i> shrubland	beaked willow / red-osier dogwood shrubland
<i>Salix bebbiana</i> / <i>Rubus idaeus</i> / <i>Geranium richardsonii</i> shrubland	beaked willow / wild red raspberry / wild white geranium shrubland
<b><i>Schizachyrium scoparium</i> - <i>Calamovilfa longifolia</i> grassland</b>	<b>little bluestem - sand grass grassland</b>

Note: **Bolded** RECs are those found within 10km of the survey area

## Appendix D. Laurie Hamilton – Rare Plant Specialist Summary

### Laurie Hamilton, M.Sc. CET, PWS, PBIOL, RPBIO

#### PERSONAL INFO

Address:  
509 8<sup>th</sup> St. NE  
Calgary, AB T2E 4H1  
Email: laurie@zanshinenv.com  
Phone: (403) 483-2476

#### RARE PLANT SPECIALITIES

- Rare Plant Species Surveys
- Rare Ecological Community Surveys
- Habitat Mapping
- Rare Species Distribution Modelling
- Rare Plant Management Plans
- Rare Plant Monitoring
- Bryophyte and Lichen Collection
- Plant Identification Training

#### EDUCATION

2015 Master of Science  
Department of Geography,  
University of Calgary

2004 Bachelor of Science  
Biological Sciences,  
University of Calgary

2000 Environmental  
Technology Certificate  
Mount Royal University, Calgary

1994 Environmental  
Technology Diploma  
Camosun College, Victoria, BC

#### AFFILIATIONS

- Alberta Society of Professional Biologists (Professional Biologist)
- Society of Wetland Scientists (Professional Wetland Scientist)
- Association of Science & Engineering Technology Professionals of Alberta (Certified Engineering Technologist)

#### RARE PLANT SPECIALIST OVERVIEW

Laurie Hamilton holds a M.Sc. in rare plant distribution modeling, and has over 24 years of experience conducting vegetation studies throughout western Canada. Laurie has participated in the production of several Alberta Species at Risk Recovery Plans, including whitebark pine, limber pine, slender mouse-ear-cress, tiny crypthanthe and small-flowered sand-verbena. She was the primary editor for the Alberta Native Plant Council's (ANPC) Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update and currently sits on the ANPC Board in the role of Vice President. Laurie has over 15 years of rare plant survey, impact assessment and mitigation experience, with over 1250 days conducting rare plant surveys during which she has discovered several rare ecological communities in Alberta not previously listed.

#### RELEVANT PROFESSIONAL ROLES

<b>Terrestrial &amp; Wetland Ecologist, Geomatics Specialist</b> Zanshin Environmental Networks Inc.	<b>2007 to present</b>
<b>Sessional Instructor of Ecology</b> Department of Earth and Environmental Science, Mount Royal University	<b>2016 to present</b>
<b>Director and Instructor</b> SALMTEC	<b>2014 to present</b>
<b>Manager of Terrestrial Ecology</b> IRIS Environmental Systems Inc.	<b>2006 to 2007</b>
<b>Vegetation Ecologist</b> AXYS Environmental Consulting Ltd.	<b>2003 to 2006</b>

#### SELECT PROJECTS

- Numerous Rare Plant and Rare Ecological Community Surveys for various projects in Alberta, Saskatchewan, NWT and BC. (2003-2018)  
Performed +1250 days of rare plant and rare ecological community surveys in Western Canada on many types of projects, from international pipelines to small rural developments.
- Limber Pine Management for activity on Public Lands. (2018)  
Surveyed baseline conditions and created limber pine management plan in support of disposition application.
- Teck Coal Mine Rare Plant Modelling. (2015)  
Modelled rare plant and lichen distribution within project area in east-central BC.
- Bellatrix Resources, Rare Plant Management Plans. (2014)  
Created three rare plant management plans (wood anemone, hairy wood-rush, and a habitat based approach [for managing golden saxifrage, snakeskin liverwort and Macloskey's violet]), to support land management within the project area.
- Alberta Society of Professional Biologists, Introduction to Plant Identification Workshop. (2004-2012, 2015)  
Course development and instruction for numerous plant identification workshops.

**Date:** 13/10/2021  
**Requestor:** Consultant  
**Reason for Request:** Environmental Assessment  
**SEC:** 29 **TWP:** 026 **RGE:** 04 **MER:** 4



■ Non-sensitive EOs (updated: October 2017)

---

**No Non-sensitive EOs Found: Next Steps - See FAQ (<https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/faqs.aspx#2> - Process).**

---

■ Sensitive EOs (updated: October 2017)

---

**No Sensitive EOs Found: Next Steps - See FAQ (<https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/faqs.aspx#2> - Process).**

---

■ Protected Areas (updated: October 2017)

---

**No Protected Areas Found**

---

■ Crown Reservations/Notations (updated: October 2017)

---

**No Crown Reservations/Notations Found**

---

**Date:** 13/10/2021  
**Requestor:** Consultant  
**Reason for Request:** Environmental Assessment  
**SEC:** 32 **TWP:** 026 **RGE:** 04 **MER:** 4



■ Non-sensitive EOs (updated: October 2017)

---

**No Non-sensitive EOs Found: Next Steps - See FAQ (<https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/faqs.aspx#2> - Process).**

---

■ Sensitive EOs (updated: October 2017)

---

**No Sensitive EOs Found: Next Steps - See FAQ (<https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/faqs.aspx#2> - Process).**

---

■ Protected Areas (updated: October 2017)

---

**No Protected Areas Found**

---

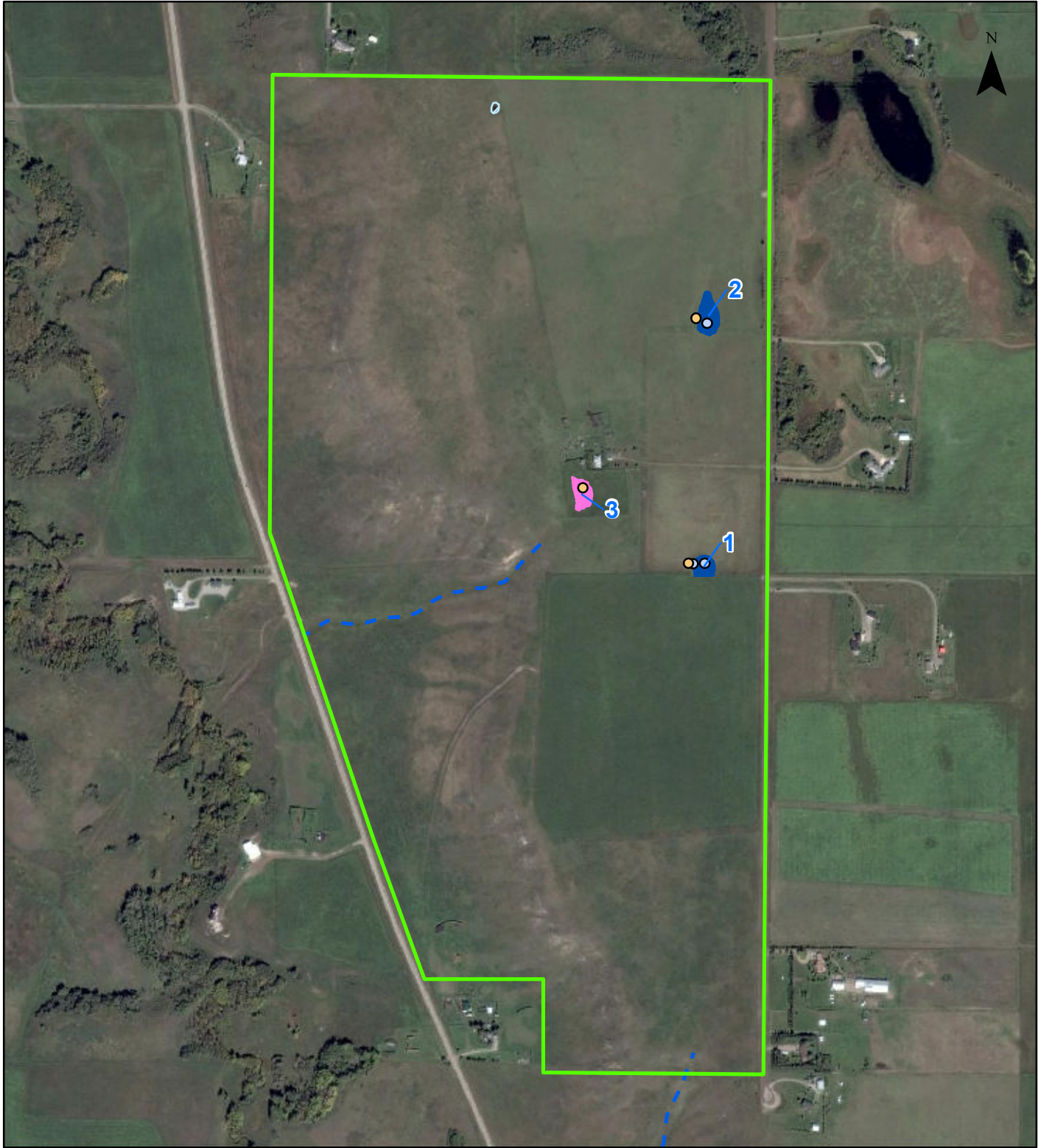
■ Crown Reservations/Notations (updated: October 2017)

---

**No Crown Reservations/Notations Found**

---

**Appendix C Wetland and Waterbody Data**



**LEGEND**

- Project Site
- Dugout
- Ephemeral Water Body
- Temporary Marsh
- Draw

Imagery Source: Google Earth™

- Upland soil plot
- Wetland soil plot

Note: The aerial photograph has been geo-referenced and is not 100% spatially accurate.

Client:		<b>URBANSTAR</b>	
Project:		<b>HORSE CREEK BIA</b>	
Title:		<b>WETLANDS SAMPLE PLOTS</b>	
Date:	Project No.:	Scale:	<b>APP C</b>
10-13-2021	WER118-18	1:9,000	

**Westhoff Engineering Resources, Inc.**  
Land & Water Resources Management Consultants

<b>Project</b>	<b>Date</b>	<b>Wetland</b>	<b>Location</b>
118-18	Sep 12, 2018	W01	
<b>Adjacent Landuse</b>	<b>Observer(s)</b>		<b>Wetland Class</b>
Cultivated	AZ/DH		Temporary
<b>Surface Water</b>	<b>% Tree Cover</b>	<b>% Shrub Cover</b>	<b>% Shallow Open Water</b>
N	0	0	0
<b>Wetland Vegetation Zone</b>			
<b>Zone</b>			<b>Deepest Zone % of Total Area</b>
Ephemeral zone			25
<b>Plants</b>			
<b>Plant Species</b>	<b>Plant Scientific Name</b>		<b>%</b>
American milk vetch	Astragalus americanus		10
alsike clover	Trifolium hybridum		15
common dandelion	Taraxacum officinale		15
northern bedstraw	Galium boreale		5
smooth brome	Bromus inermis		30
timothy	Phleum pratense		20
<b>Wetland Vegetation Zone</b>			
<b>Zone</b>			<b>Deepest Zone % of Total Area</b>
Temporary zone			75
<b>Plants</b>			
<b>Plant Species</b>	<b>Plant Scientific Name</b>		<b>%</b>
American milk vetch	Astragalus americanus		5
common dandelion	Taraxacum officinale		5
fowl bluegrass	Poa palustris		2
marsh hedge-nettle	Stachys palustris		2
northern bedstraw	Galium boreale		2
sedge	Carex sp.		10
slender wheatgrass	Elymus trachycaulus		60
stinkweed	Thlaspi arvense		2
timothy	Phleum pratense		15
<b>Comments (disturbance etc)</b>			
ephemeral area cultivated through  savannah sparrow clay colored sparrow deer pellets coyote scat			
<b>Photos: - -</b>			
<b>Photo #</b>	<b>Photo Description</b>	<b>Latitude</b>	<b>Longitude</b>

Figure 1: Landscape photo



**AMPHIBIAN SURVEY DATA**

*Land & Water Resources Management Consultants*

Date	Time	Observer(s)			Project
May 14, 2018	11:15	AZ, KO, DH			118-18
Wetland		Air Temp	Weather		Wind
W01		20	Clear		Light
<b>Visual:</b>					
Species	Adult	Sub Adult	Young of the Year	Larvae/Tadpole	Egg Mass
<b>Calls: Boreal Chorus Frog</b>					
Species	None heard	Individual counted - no overlapping calls (estimate 1-5 individuals)	Calls overlapping but individuals still distinguishable (estimate 6-10 individuals)	Numerous calls can be heard; chorus is constant and overlapping (estimate 10+ individuals)	
Boreal Chorus Frog	No	Yes	No	No	
<b>Wildlife Observations</b>					
Wildlife Common Name		Wildlife Latin Name			# Observed
Clay-colored Sparrow		Spizella pallida			1
Savannah Sparrow		Passerculus sandwichensis			1
<b>Comments</b>					
- Deer pellets and Coyote scat south of draw					

<b>Project</b>	<b>Date</b>	<b>Wetland</b>	<b>Location</b>
118-18	Sep 12, 2018	W02	
<b>Adjacent Landuse</b>	<b>Observer(s)</b>		<b>Wetland Class</b>
pasture	AZ/DH		Ephemeral
<b>Surface Water</b>	<b>% Tree Cover</b>	<b>% Shrub Cover</b>	<b>% Shallow Open Water</b>
N	0	0	0
<b>Wetland Vegetation Zone</b>			
<b>Zone</b>			<b>Deepest Zone % of Total Area</b>
Ephemeral zone			50
<b>Plants</b>			
<b>Plant Species</b>	<b>Plant Scientific Name</b>		<b>%</b>
alsike clover	Trifolium hybridum		40
common dandelion	Taraxacum officinale		10
Kentucky bluegrass	Poa pratensis		20
timothy	Phleum pratense		25
<b>Wetland Vegetation Zone</b>			
<b>Zone</b>			<b>Deepest Zone % of Total Area</b>
Temporary zone			50
<b>Plants</b>			
<b>Plant Species</b>	<b>Plant Scientific Name</b>		<b>%</b>
alsike clover	Trifolium hybridum		40
common dandelion	Taraxacum officinale		5
common plantain	Plantago major		25
fowl bluegrass	Poa palustris		5
foxtail barley	Hordeum jubatum		5
kentucky bluegrass	Poa pratensis		15
sedge	Carex sp.		5
silverweed	Potentilla anserina		10
slough grass	Beckmannia syzigachne		5
timothy	Phleum pratense		5
<b>Comments (disturbance etc)</b>			
pugging throughout wetland			
savannah sparrow house wren American crow			
<b>Photos: - -</b>			
<b>Photo #</b>	<b>Photo Description</b>	<b>Latitude</b>	<b>Longitude</b>

Figure 1: Landscape photo



AMPHIBIAN SURVEY DATA

Date	Time	Observer(s)			Project
May 14, 2018	12:55	DH/AZ			118-18
Wetland		Air Temp	Weather		Wind
W02		22	Clear		Light
<b>Visual:</b>					
Species	Adult	Sub Adult	Young of the Year	Larvae/Tadpole	Egg Mass
<b>Calls: Boreal Chorus Frog</b>					
Species	None heard	Individual counted - no overlapping calls (estimate 1-5 individuals)	Calls overlapping but individuals still distinguishable (estimate 6-10 individuals)	Numerous calls can be heard; chorus is constant and overlapping (estimate 10+ individuals)	
Boreal Chorus Frog	No	Yes	No	No	
<b>Wildlife Observations</b>					
Wildlife Common Name		Wildlife Latin Name			# Observed
American Crow		Corvus brachyrhynchos			1
House Wren		Troglodytes aedon			1
Savannah Sparrow		Passerculus sandwichensis			1
<b>Comments</b>					

**Appendix D ABWRET – A Wetland Functional Assessment**

Function (ABWRET-A Raw Score)	W02	W01
Surface Water Storage (WS)	6.21	6.01
Stream Flow Support (SFS)	0.00	0.00
Streamwater Cooling (WC)	0.00	0.00
Sediment & Toxicant Retention & Stabilization (SR)	10.00	10.00
Phosphorus Retention (PR)	10.00	10.00
Nitrate Removal & Retention (NR)	10.00	10.00
Organic Nutrient Export (OE)	0.00	0.00
Fish Habitat (FH)	0.00	0.00
Aquatic Invertebrate Habitat (INV)	4.99	5.00
Amphibian Habitat (AM)	2.55	2.56
Waterbird Habitat (WB)	4.16	4.20
Songbird, Raptor, & Mammal Habitat (SBM)	3.00	2.82
Pollinator & Native Plant Habitat (PH)	3.50	3.26
Human Use & Recognition (HU)	2.75	3.02
Function (ABWRET-A Normalized Score)	W02	W01
Surface Water Storage (WS)	0.86	0.82
Stream Flow Support (SFS)	0.00	0.00
Streamwater Cooling (WC)	0.00	0.00
Sediment & Toxicant Retention & Stabilization (SR)	1.00	1.00
Phosphorus Retention (PR)	1.00	1.00
Nitrate Removal & Retention (NR)	1.00	1.00
Organic Nutrient Export (OE)	0.00	0.00
Fish Habitat (FH)	0.00	0.00
Aquatic Invertebrate Habitat (INV)	0.49	0.50
Amphibian Habitat (AM)	0.32	0.32
Waterbird Habitat (WB)	0.28	0.28
Songbird, Raptor, & Mammal Habitat (SBM)	0.26	0.23
Pollinator & Native Plant Habitat (PH)	0.31	0.27
Human Use & Recognition (HU)	0.34	0.39
Normalized Score (ABWRET_A) Based on Wetlands in RWVAU	W02	W01
Normalized Hydrological Health (HH)	0.86	0.82
Normalized Water Quality (WQ)	1.00	1.00
Normalized Ecological Health (EH)	0.49	0.50
Normalized Human Use (HU)	0.34	0.39
RWVAU #	13	13
Normalized Value Score (ABWRET_a)	0.74	0.73
Value Category (a, b, c, d)	c	c
Abundance Factor	1	1
Final Score(A, B, C, D)	B	B

**Appendix E Public Lands Correspondence**

## Donald Hodges

---

**From:** AEP Water-Boundaries <Water.Boundaries@gov.ab.ca>  
**Sent:** Monday, December 10, 2018 9:57 AM  
**To:** Donald Hodges  
**Subject:** RE: Crown Claimed Wetlands in SE-32-26-04 W5M and NE-29-26-04 W5M

Greetings Donald,

This specified area does not appear to be affected by any water features that could potentially meet the criteria for Crown ownership of bed and shore under Section 3 of the Public Lands Act.

Note: The above assessment of the water bodies ownership should not be taken to mean that authority has been granted under the provincial Water Act to alter, infill, or drain a water body. Please contact your local Environment Office for additional information regarding approval requirements.

Have a nice day,



Ricardo Barbosa  
Waterbody/Boundary Research Analyst  
Provincial Wetlands & Water Boundaries Section  
Operations Division  
Provincial Programs Branch

2<sup>nd</sup> Floor, South Petroleum Plaza  
9915 – 108 Street NW  
Edmonton, Alberta, Canada T5K 2G8

Office: (780) 638-9618  
[ricardo.barbosa@gov.ab.ca](mailto:ricardo.barbosa@gov.ab.ca)

---

**From:** Donald Hodges <DHodges@westhoff.ab.ca>  
**Sent:** Friday, December 07, 2018 3:49 PM  
**To:** AEP Water-Boundaries <Water.Boundaries@gov.ab.ca>  
**Subject:** Crown Claimed Wetlands in SE-32-26-04 W5M and NE-29-26-04 W5M

Good Afternoon

Please review to determine if any Crown claimed wetlands are present within SE-32-26-04 W5M and NE-29-26-04 W5M. I've attached a series of historical aerial photographs for your review.

If you have any questions regarding the location or the review don't hesitate to contact me.

Thank you and have a good day.

**Don Hodges, B.A. Geog.**  
*Environmental Specialist*

**Westhoff Engineering Resources, Inc.**  
*Land & Water Resources Management Consultants*

Suite 601, 1040 - 7th Avenue S.W.

Calgary, AB T2P 3G9

Phone: 403 264-9366 ext. 242

Fax: 403 264-8796

Email: [dhodges@westhoff.ab.ca](mailto:dhodges@westhoff.ab.ca)

This email is confidential and may also be privileged. If you are not the intended recipient, please notify us and delete this message from your system immediately. Any personal data in this email (including all attachments) must be handled in accordance with applicable data protection laws.

This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this email in error please notify the system manager. This message contains confidential information and is intended only for the individual named. If you are not the named addressee you should not disseminate, distribute or copy this e-mail.

**Appendix F Potential Wildlife Species**

Common Name	Scientific Name	Alberta General Status	Wildlife Act	COSEWIC	SARA Schedule 1
<b>Amphibians and Reptiles</b>					
boreal chorus frog	<i>Pseudacris maculata</i>	S			
bullsnake	<i>Pituophis catenifer</i>	SEN			
Canadian toad	<i>Anaxyrus hemiophrys</i>	MBAR	DD		
plains garter snake	<i>Thamnophis radix</i>	SEN			
red-sided garter snake	<i>Thamnophis sirtalis</i>	SEN			
tiger salamander	<i>Ambystoma tigrinum</i>	S		SC	
wandering garter snake	<i>Thamnophis elegans</i>	SEN			
western toad	<i>Anaxyrus boreas</i>	SEN		SC	SC
wood frog	<i>Rana sylvatica</i>	S			
<b>Mammals</b>					
American badger	<i>Taxidea taxus [taxus]</i>	SEN			
big brown bat	<i>Eptesicus fuscus</i>	S			
black bear	<i>Ursus americanus</i>	S			
bobcat	<i>Lynx rufus</i>	SEN			
common porcupine	<i>Erethizon dorsatum</i>	S			
cougar	<i>Puma concolor</i>	S			
coyote	<i>Canis latrans</i>	S			
deer mouse	<i>Peromyscus maniculatus</i>	S			
ermine	<i>Mustela erminea</i>	S			
grizzly bear	<i>Ursus arctos</i>	AR	TH	SC	
hoary bat	<i>Lasiurus cinereus</i>	S			
house mouse	<i>Mus musculus</i>	EX			
least weasel	<i>Mustela nivalis</i>	S			
little brown bat	<i>Myotis lucifugus</i>	MBAR		EN	EN
long-tailed vole	<i>Microtus longicaudus</i>	S			
long-tailed weasel	<i>Mustela frenata</i>	MBAR			
masked shrew	<i>Sorex cinereus</i>	S			
meadow vole	<i>Microtis pennsylvanicus</i>	S			
moose	<i>Alces alces</i>	S			
mule deer	<i>Odocoileus hemionus</i>	S			
northern pocket gopher	<i>Thomomys talpoides</i>	S			
pygmy shrew	<i>Sorex hoyi</i>	S			
red bat	<i>Lasiurus borealis</i>	SEN			
red fox	<i>Vulpes vulpes</i>	S			
Richardson's ground squirrel	<i>Spermophilus richardsonii</i>	S			
silver-haired bat	<i>Lasionycteris noctivagans</i>	SEN			
snowshoe hare	<i>Lepus americanus</i>	S			
striped skunk	<i>Mephitis mephitis</i>	S			
thirteen-lined ground squirrel	<i>Spermophilus tridecemlineatus</i>	S			
western jumping mouse	<i>Zapus princeps</i>	S			
white-tailed deer	<i>Odocoileus virginianus</i>	S			

Common Name	Scientific Name	Alberta General Status	Wildlife Act	COSEWIC	SARA Schedule 1
white-tailed jack rabbit	<i>Lepus townsendii</i>	S			
<b>Birds</b>					
American coot*	<i>Fulica Americana</i>	S			
American crow*	<i>Corvus brachyrhynchos</i>	S			
American green-winged teal	<i>Anas crecca</i>	S			
American goldfinch*	<i>Carduelis tristis</i>	S			
American kestrel*	<i>Falco sparverius</i>	SEN			
American pipit	<i>Anthus rubescens</i>	S			
American robin*	<i>Turdus migratorius</i>	S			
American wigeon*	<i>Anas americana</i>	S			
Baird's sandpiper*	<i>Calidris bairdii</i>	S			
bald eagle*	<i>Haliaeetus leucocephalus</i>	SEN			
Baltimore oriole*	<i>Icterus galbula</i>	SEN			
bank swallow	<i>Riparia riparia</i>	SEN		TH	TH
barn swallow*	<i>Hirundo rustica</i>	SEN		TH	TH
belted kingfisher	<i>Megaceryle alcyon</i>	S			
black-bellied plover*	<i>Pluvialis squatarola</i>	S			
black-billed magpie*	<i>Pica hudsonia</i>	S			
black-capped chickadee*	<i>Poecile atricapilla</i>	S			
black-necked stilt*	<i>Himantopus mexicanus</i>	SEN			
black tern*	<i>Chidonias niger</i>	SEN			
blue jay	<i>Cyanocitta cristata</i>	S			
blue-winged teal*	<i>Anas discors</i>	S			
Bonaparte's gull*	<i>Chroicocephalus philadelphia</i>	S			
Brewer's blackbird*	<i>Euphagus cyanocephalus</i>	S			
brown thrasher	<i>Toxostoma rufum</i>	S			
brown-headed cowbird*	<i>Molothrus ater</i>	S			
bufflehead*	<i>Bucephala albeola</i>	S			
California gull*	<i>Larus californicus</i>	S			
Canada goose*	<i>Branta Canadensis</i>	S			
canvasback*	<i>Aythya valisineria</i>	S			
Caspian tern	<i>Hydroprogne caspia</i>	SEN			
cedar waxwing*	<i>Bombycilla cedrorum</i>	S			
chipping sparrow*	<i>Spizella passerine</i>	S			
cinnamon teal*	<i>Anas cyanoptera</i>	S			
clay-colored sparrow*	<i>Spizella pallida</i>	S			
common goldeneye*	<i>Bucephala clangula</i>	S			
common grackle	<i>Quiscalus quiscula</i>	S			
common loon*	<i>Gavial immer</i>	S			
common merganser*	<i>Mergus merganser</i>	S			
common nighthawk	<i>Chordeiles minor</i>	SEN		TH	TH
common raven*	<i>Corvus corax</i>	S			

Common Name	Scientific Name	Alberta General Status	Wildlife Act	COSEWIC	SARA Schedule 1
common redpoll	<i>Acanthis flammea</i>	S			
common tern	<i>Sterna hirundo</i>	S			
common yellowthroat*	<i>Geothlypis trichas</i>	SEN			
dark-eyed junco	<i>Junco hyemalis</i>	S			
double-crested cormorant	<i>Phalacrocorax auritus</i>	S			
downy woodpecker*	<i>Picoides pubescens</i>	S			
dunlin	<i>Calidris alpine</i>	S			
eastern kingbird*	<i>Tyrannus tyrannus</i>	SEN			
eared grebe*	<i>Podiceps nigricollis</i>	S			
eastern phoebe	<i>Sayornis phoebe</i>	SEN			
European starling*	<i>Sturnus vulgaris</i>	EX			
ferruginous hawk	<i>Buteo regalis</i>	AR	E	TH	TH
Franklin's gull*	<i>Larus pipixcan</i>	S			
gadwall*	<i>Anas strepera</i>	S			
gray catbird	<i>Dumetella carolinensis</i>	S			
gray partridge*	<i>Perdix perdix</i>	EX			
great blue heron*	<i>Ardea Herodias</i>	SEN			
great horned owl*	<i>Bubo virginianus</i>	S			
greater scaup*	<i>Aythya marila</i>	S			
greater yellowlegs	<i>Tringa melanoleuca</i>	S			
green-winged teal*	<i>Anas crecca</i>	S			
hairy woodpecker	<i>Picoides villosus</i>	S			
herring gull	<i>Larus argentatus</i>	S			
hooded merganser*	<i>Lophodytes cucullatus</i>	S			
horned grebe*	<i>Podiceps auritus</i>	SEN		SC	SC
horned lark*	<i>Eremophila alpestris</i>	S			EN
house finch*	<i>Carpodacus mexicanus</i>	S			
house sparrow	<i>Passer domesticus</i>	EX			
house wren*	<i>Troglodytes aedon</i>	S			
killdeer*	<i>Charadrius vociferus</i>	S			
lapland longspur	<i>Calcarius lapponicus</i>	S			
least flycatcher*	<i>Empidonax minimus</i>	SEN			
Le Conte's sparrow*	<i>Ammodramus leconteii</i>	S			
least sandpiper*	<i>Calidris minutilla</i>	S			
lesser scaup*	<i>Aythya affinis</i>	S			
lesser yellowlegs*	<i>Tringa flavipes</i>	S			
Lincoln's sparrow*	<i>Melospiza linolnii</i>	S			
long-billed dowitcher*	<i>Limnodromus scolopaceus</i>	S			
long-eared owl*	<i>Asio otus</i>	S			
long-tailed duck	<i>Clangula hyemalis</i>	S			
MacGillivray's warbler	<i>Oporornis tolmiei</i>	S			
mallard*	<i>Anas platyrhynchos</i>	S			

Common Name	Scientific Name	Alberta General Status	Wildlife Act	COSEWIC	SARA Schedule 1
marbled godwit*	<i>Limosa fedoa</i>	S			
merlin*	<i>Falco columbarius</i>	S			
mourning dove*	<i>Zenaida macroura</i>	S			
mountain bluebird	<i>Sialia currucoides</i>	S			
Nelson's sharp-tailed sparrow*	<i>Ammodramus nelsoni</i>	S			
northern flicker*	<i>Colaptes auratus</i>	S			
northern goshawk*	<i>Accipiter gentilis</i>	SEN			
northern harrier*	<i>Circus cyaneus</i>	S			
northern mocking bird	<i>Mimus polyglottos</i>	S			
northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	S			
northern pintail*	<i>Anas acuta</i>	S			
northern shoveler*	<i>Anas clypeata</i>	S			
northern shrike	<i>Lanius excubitor</i>	S			
olive-sided flycatcher	<i>Contopus cooperi</i>	MBR			
orange-crowned warbler*	<i>Vermivora celata</i>	S			
ovenbird	<i>Seiurus aurocapilla</i>	S			
pectoral sandpiper*	<i>Calidris melanotos</i>	S			
pie-billed grebe*	<i>Podilymbus podiceps</i>	SEN			
pileated woodpecker	<i>Dryocopus pileatus</i>	SEN			
peregrine falcon	<i>Falco peregrinus</i>	AR	TH		
Piping plover	<i>Charadrius melodus</i>	AR	EN		
prairie falcon	<i>Falco mexicanus</i>	SEN	SC		
purple finch	<i>Carpodacus purpureus</i>	S			
red-breasted nuthatch	<i>Sitta Canadensis</i>	S			
red crossbill	<i>Loxia curvirostra</i>	S			
redhead*	<i>Aythya Americana</i>	S			
red-naped sapsucker	<i>Sphyrapicus nuchalis</i>	UN			
red-necked grebe*	<i>Podiceps grisegena</i>	S			
red-necked phalarope*	<i>Phalaropus lobatus</i>	S		SC	
red-tailed hawk*	<i>Buteo jamaicensis</i>	S			
red-winged blackbird*	<i>Agelaius phoeniceus</i>	S			
ring-billed gull*	<i>Larus delawarensis</i>	S			
ring-necked duck*	<i>Aythya collaris</i>	S			
ring-necked pheasant	<i>Phasianus colchicus</i>	EX			
rock pigeon*	<i>Columba livia</i>	EX			
rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	S			
rough-legged hawk*	<i>Buteo lagopus</i>	S			
ruby-throated hummingbird	<i>Archilochus colubris</i>	S			
ruddy duck*	<i>Oxyura jamaicensis</i>	S			
savannah sparrow*	<i>Passerculus sandwichensis</i>	S			SC
Say's phoebe	<i>Sayornis saya</i>	S			
semipalmated plover*	<i>Charadrius semipalmatus</i>	S			

Common Name	Scientific Name	Alberta General Status	Wildlife Act	COSEWIC	SARA Schedule 1
semipalmated sandpiper*	<i>Calidris pusilla</i>	S			
sharp-shinned hawk	<i>Accipiter striatus</i>	S			
snow goose	<i>Chen caerulescens</i>	S			
solitary sandpiper	<i>Tringa solitaria</i>	S			
song sparrow	<i>Melospiza melodia</i>	S			
sora*	<i>Porzana carolina</i>	SEN			
spotted sandpiper*	<i>Actitis macularius</i>	S			
spotted towhee	<i>Pipilo maculatus</i>	S			
Sprague's pipit*	<i>Anthus spragueii</i>	SEN	SC	TH	TH
surf scoter*	<i>Melanitta perspicillata</i>	S			
Swainson's hawk*	<i>Buteo swainsoni</i>	S			
Tennessee warbler	<i>Vermivora peregrina</i>	S			
tree swallow*	<i>Tachycineta bicolor</i>	S			
trumpeter swan*	<i>Cygnus buccinators</i>	SEN	SC		
tundra swan*	<i>Cygnus columbianus</i>	S			
turkey vulture*	<i>Cathartes aura</i>	S			
upland sandpiper*	<i>Bartramia longicauda</i>	SEN			
vesper sparrow*	<i>Pooecetes gramineus</i>	S			EN
violet-green swallow*	<i>Tachycineta thalassina</i>	S			
western grebe*	<i>Aechmophorus occidentalis</i>	AR	TH	SC	SC
western kingbird	<i>Tyrannus verticalis</i>	S			
western meadowlark*	<i>Sturnella neglecta</i>	S			
western sandpiper	<i>Calidris mauri</i>	S			
western wood-pewee	<i>Contopus sordidulus</i>	MBAR			
white-breasted nuthatch	<i>Sitta carolinensis</i>	S			
white-crowned sparrow*	<i>Zonotrichia leucophrys</i>	S			
white-rumped sandpiper	<i>Calidris fuscicollis</i>	S			
white-winged scoter*	<i>Melanitta fusca</i>	SEN	SC		
willet*	<i>Tringa semipalmata</i>	S			
Wilson's phalarope*	<i>Phalaropus tricolor</i>	S			
Wilson's snipe*	<i>Gallinago delicata</i>	S			
wood duck*	<i>Aix sponsa</i>	S			
yellow warbler*	<i>Dendroica petechial</i>	S			
yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	S			
yellow-headed blackbird*	<i>Xanthocephalus xanthocephalus</i>	S			
yellow warbler	<i>Dendroica petechial</i>	S			
yellow-rumped warbler*	<i>Dendroica coronata</i>	S			

Note: UN = Undetermined, S = Secure, AR = At Risk, MBAR = May Be At Risk, SEN = Sensitive, EN = Endangered, TH = Threatened, SC = Species of Concern; \* These eBird species observations were recorded at Cochrane Lake. The potential for aquatic species to occur within the Project Site is low although some wetland habitat is available.

**Appendix G FWMIS Report**

# Fish and Wildlife Internet Mapping Tool (FWIMT)

(source database: Fish and Wildlife Management Information System (FWMIS))

## Species Summary Report

**Report Date:** 13-Oct-2021 08:53

### Species present within the current extent

#### Fish Inventory

FATHEAD MINNOW

#### Wildlife Inventory

BALD EAGLE  
 BALTIMORE ORIOLE  
 COUGAR  
 EASTERN KINGBIRD  
 GREAT BLUE HERON  
 GRIZZLY BEAR  
 LEAST FLYCATCHER  
 PIPING PLOVER  
 SORA  
 TRUMPETER SWAN  
 WESTERN WOOD-PEWEE

#### Stocked Inventory

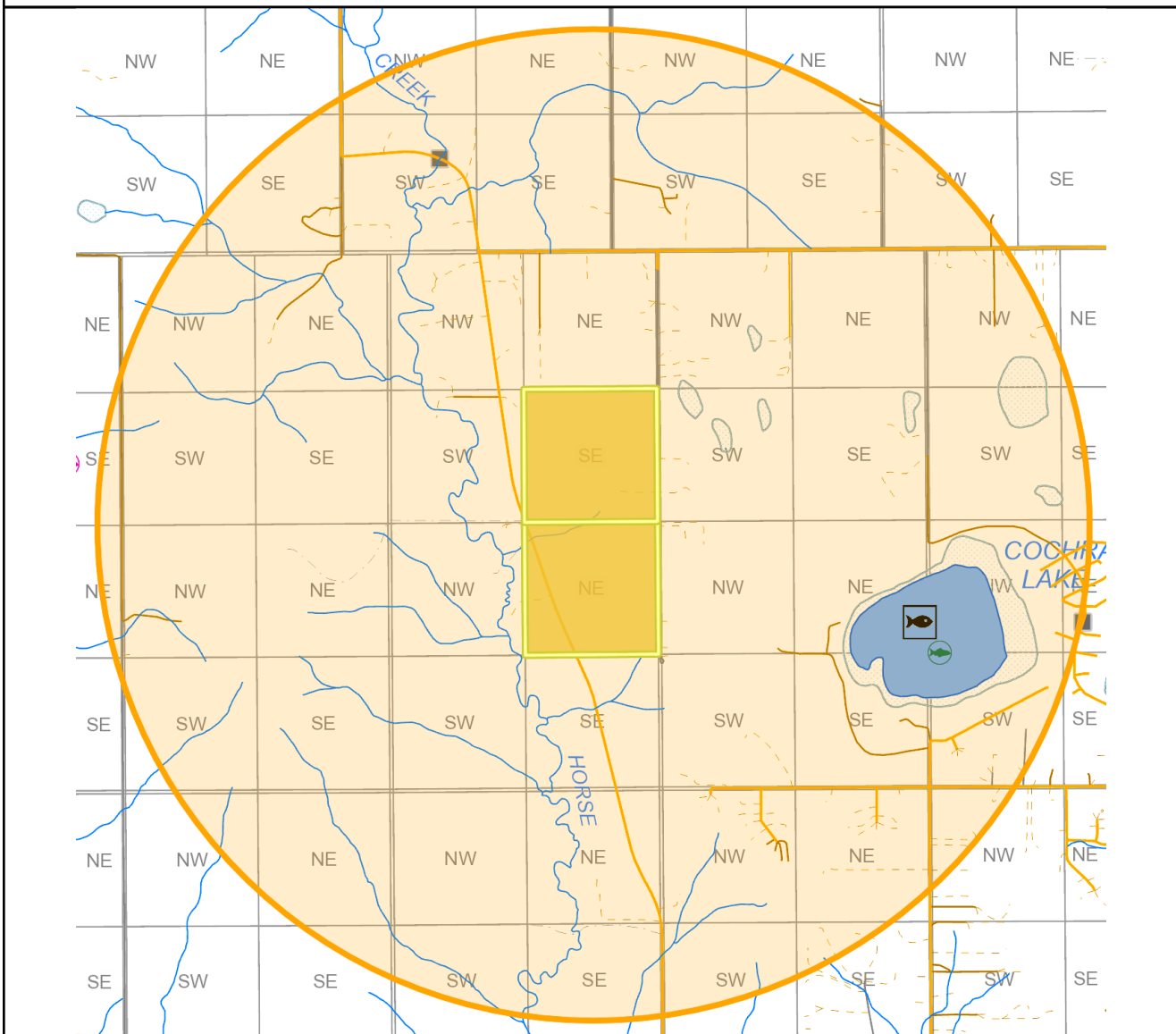
NORTHERN PIKE  
 YELLOW PERCH

### Buffer Extent

Centroid (X,Y)	Projection	Centroid (Qtr Sec Twp Rng Mer)	Radius or Dimensions
533551, 5676112	10-TM AEP Forest	NE 29 26 4 5	3 kilometers

### Contact Information

For contact information, please visit:  
<https://www.alberta.ca/fisheries-and-wildlife-management-contacts.aspx>



Display may contain: Base Map Data provided by the Government of Alberta under the Alberta Open Government Licence. Cadastral and Dispositions Data provided by Alberta Data Partnerships. © GeoEye, all rights reserved. Information as depicted is subject to change, therefore the Government of Alberta assumes no responsibility for discrepancies at time of use.

**Appendix H Aquatic Environmentally Significant Areas (AESAs)**

<b>Wetland W01</b>			
<b>Criteria<sup>1</sup></b>	<b>Rules<sup>1</sup></b>	<b>Project Site Description</b>	<b>Results</b>
<b>1a: Focal amphibian species</b>	Contains 2 or more focal amphibian species.	No amphibians were recorded during field surveys.	N
	Contains 1 focal amphibian species adjacent to a site with two or more focal amphibian species.	No records of amphibians on adjacent sites are in FWMIS. Surveys of adjacent sites would be needed.	Unknown
<b>1b: Focal bird species</b>	Contains at least one aquatic bird foraging guild.	No aquatic birds observed. Piping plover, Sora and Trumpeter swan recorded on FWMIS.	N
	Contains at least one aquatic bird breeding habitat guild.	No aquatic birds observed. Piping plover, Sora and Trumpeter swan recorded on FWMIS.	N
	Contains ten or more different aquatic birds.	No aquatic birds observed. Piping plover, Sora and Trumpeter swan recorded on FWMIS.	N
<b>1c: Focal fish species</b>	Contains sections of stream with $\geq 5$ focal fish species occurrence records.	No fish species were observed. Fathead minnow recorded on FWMIS.	N
<b>1d: Focal habitats</b>	Contains intact focal habitat in combination with at least one other criterion, <i>or</i>	The Project Site does not contain an intact focal habitat.	N
	Contains only intact focal habitat but was in the top 25th percentile for size within this criterion i.e. $\geq 725$ ha for Grassland.	The Project Site does not contain an intact focal habitat.	N
<b>2a: Listed bird, amphibian and plant species</b>	Contains three or more species of conservation concern.	No species of conservation concern were observed during the field surveys.	N
	Contains one or more species of conservation concern overlapping intact landscapes.	No intact landscapes were observed during field surveys.	N
	Contains one or more species of conservation concern in combination with or adjacent to quarter sections with contained identified important aquatic elements.	No important aquatic elements were observed during field surveys.	Unknown

<b>Wetland W02</b>			
<b>Criteria<sup>1</sup></b>	<b>Rules<sup>1</sup></b>	<b>Project Site Description</b>	<b>Results</b>
<b>1a: Focal amphibian species</b>	Contains 2 or more focal amphibian species.	No amphibians were recorded during field surveys.	N
	Contains 1 focal amphibian species adjacent to a site with two or more focal amphibian species.	No records of amphibians on adjacent sites are in FWMIS. Surveys of adjacent sites would be needed.	Unknown
<b>1b: Focal bird species</b>	Contains at least one aquatic bird foraging guild.	No aquatic birds observed. Piping plover, Sora and Trumpeter swan recorded on FWMIS.	N
	Contains at least one aquatic bird breeding habitat guild.	No aquatic birds observed. Piping plover, Sora and Trumpeter swan recorded on FWMIS.	N
	Contains ten or more different aquatic birds.	No aquatic birds observed. Piping plover, Sora and Trumpeter swan recorded on FWMIS.	N
<b>1c: Focal fish species</b>	Contains sections of stream with $\geq 5$ focal fish species occurrence records.	No fish species were observed. Fathead minnow recorded on FWMIS.	N
<b>1d: Focal habitats</b>	Contains intact focal habitat in combination with at least one other criterion, <i>or</i>	The Project Site does not contain an intact focal habitat.	N
	Contains only intact focal habitat but was in the top 25th percentile for size within this criterion i.e. $\geq 725$ ha for Grassland.	The Project Site does not contain an intact focal habitat.	N
<b>2a: Listed bird, amphibian and plant species</b>	Contains three or more species of conservation concern.	No species of conservation concern were observed during the field surveys.	N
	Contains one or more species of conservation concern overlapping intact landscapes.	No intact landscapes were observed during field surveys.	N
	Contains one or more species of conservation concern in combination with or adjacent to quarter sections with contained identified important aquatic elements.	No important aquatic elements were observed during field surveys.	Unknown