Volume 2, Section 11 Snake Lake Reservoir Expansion Project
Environmental Impact Assessment
Wildlife and Wildlife Habitat

Submitted to:

MPE a division of Englobe

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Executive Summary

The Eastern Irrigation District (EID) is proposing expansion of the current Snake Lake Reservoir (SLR), located in the County of Newell Alberta, between Bassano and Brooks, to increase existing water storage capacity from 19.25 million m^3 (15,600 ac-ft) to 87.4 million m^3 (70,900 ac-ft). This expansion will result in the flooding of 4 sections of EID land (763.6 ha), development of outer berms covering 63.5 ha, 52.3 ha of temporary workspace and 41.3 ha for a topsoil storage area for a total footprint of 920.7 ha. The proposed SLR Expansion Project (the Project) requires approval under the *Environmental Protection and Enhancement Act* (EPEA). As part of the EPEA approval process, an Environmental Impact Assessment (EIA), including an examination of current, pre-development (e.g., Baseline) conditions, is required. This section provides a comprehensive assessment of the Baseline wildlife and wildlife habitat Cases, at local and regional scales, followed by EIA, including cumulative effects assessments.

Baseline Cases were described and quantified to meet requirements provided in the Final Terms of Reference (FTOR; Volume 2, Appendix A) issued by Alberta Environment and Protected Areas (Alberta EPA) and following the *Guide to Preparing Environmental Impact Assessments in Alberta*. This includes identification and examination of wildlife diversity, communities, habitats, and species of conservation concern (SOCC) that may be affected by the Project.

The Project is in the Dry Mixedgrass Natural Subregion of the Grassland Natural Region of Alberta, and the Project area is dominated by native grassland habitat, affected by disturbance from agricultural and industrial activities (e.g., grazing and oil and gas). Despite these disturbances, this area is habitat for many sensitive species, such as nesting grassland songbirds, sensitive raptors and Pronghorn. Waterbodies, including wetlands and dugouts, are also found within the Project area, and provide potential breeding habitat for amphibians, as well as feeding and nesting habitat for numerous water and shorebird species.

Species found within the local and regional Project study areas are detailed and discussed, as detected during systematic species surveys and incidentally by qualified biologists. Current (Baseline) Cases support grassland species, many of which are SOCCs. Flooding of and construction on this grassland habitat will require species using nesting or feeding habitat within the Project area to find resources elsewhere. The loss of raptor nesting habitat in the Project area will affect a pair of Ferruginous Hawks – a species listed under the Alberta *Wildlife Act* (AWA) as Endangered. The reservoir may also act as a barrier to movement for terrestrial species, including Pronghorn (*Antilocapra americana*). Once flooded, the expanded reservoir may provide additional aquatic habitat to species such as waterfowl, amphibians, and some reptiles (e.g., garter snakes), if adequate riparian habitat is provided for these species.

Environmental impacts were assessed for the Project Construction Case and Operations Case, using several species or groups as representative models: Northern Leopard Frog (*Lithobates pipiens*), Loggerhead Shrike (*Lanius ludovicianus*), Long-billed Curlew (*Numenius americanus*), Sprague's Pipit (*Anthus spragueii*), Richardson's Ground Squirrel (*Spermophilus richardsonii*), Ferruginous Hawk, American Badger (*Taxidea taxus*), Migratory Bird Stopover, and Pronghorn Movement. Habitat Suitability Index (HSI) modelling identified a range of potential Project effects

on these species and groups. These models were selected to represent key wildlife species and the variety of habitat types and resources present in and around the Project area, so that Project effects on these habitats and the species they support could be assessed. The greatest negative effects, common across most models, was the loss of grassland habitat in the Project area. Changes to terrestrial wildlife migration are also predicted to be a negative effect of the Project, as the reservoir will act as a barrier to Pronghorn movement. Cumulative effects were calculated as high for both grassland habitat loss and terrestrial wildlife migration, but in each case with low relative Project contributions. Not taken into consideration in this assessment was the efforts the EID has made and continues to make to support and enhance grassland habitat within the EID, nor the increased water on the landscape, including, for example, enhanced wetlands, as a result of the EID's network of canals and reservoirs as well as support for wildlife habitat initiatives.

The Project has the potential to provide positive effects on some wildlife including amphibians – for instance, if adequate riparian habitat is provided, the expanded reservoir may serve as important overwintering habitat for Northern Leopard Frogs. The recommendations provided in this section and the Wildlife Management Plan (Appendix I4) will mitigate the greatest negative effects of the Project on wildlife and wildlife habitat. Additionally, the EID will continue to support habitat enhancement within the EID, for instance by working with groups such as Ducks Unlimited Canada and continuing to provide funds to landowners to enhance habitat through the EID's Partners in Habitat Development program. See Volume 1, Section 4 (Regional and Cooperative Efforts) for more details.

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Appendix I

Abbreviations

AARES	AAR Environmental Services
AGRASID	Agricultural Regions of Alberta Soil Inventory Database
Alberta EPA	Alberta Environment and Protected Areas
AMWI	Alberta Merged Wetland Inventory
ARSA	Aquatic Regional Study Area
AWA	Alberta *Wildlife Act*
AWCS	Alberta Wetland Classification System
BBS	Breeding Bird Survey
BMP	Best Management Practice
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPKC	Canada Pacific Kansas City (Railway)
DMNS	Dry Mixedgrass Natural Subregion
EIA	Environmental Impact Assessment
EID	Eastern Irrigation District
EPEA	*Environmental Protection and Enhancement Act*
FTOR	Final Terms of Reference
FWMIS	Fisheries and Wildlife Management Information System
GOA	Government of Alberta
GOC	Government of Canada
GPS	Global Positioning System
GVI	Grassland Vegetation Inventory
HSI	Habitat Suitability Index
MBCA	*Migratory Birds Convention Act*
MSSC	Master Schedule of Standards and Conditions
MULTISAR	Multiple Species at Risk
RSF	Resource Selection Function
SARA	*Species at Risk Act*
SLR	Snake Lake Reservoir
SOCC	Species of Conservation Concern
SSIG	Sensitive Species Inventory Guide
SSRP	South Saskatchewan Regional Plan
TCH	Trans-Canada Highway (Highway 1)
TLSA	Terrestrial Local Study Area
TRSA	Terrestrial Regional Study Area
TU	Traditional Use
WMP	Wildlife Management Plan

Species Codes Used in HSI Models

BADG	American Badger	NOLF	Northern Leopard Frog
FEHA	Ferruginous Hawk	RIGS	Richardson’s Ground Squirrel
LOSH	Loggerhead Shrike	SPPI	Sprague’s Pipit
LBCU	Long-billed Curlew		

11.1 INTRODUCTION

The Eastern Irrigation District (EID) is applying for approval under the *Environmental Protection and Enhancement Act* (EPEA) to construct the proposed Snake Lake Reservoir (SLR) Expansion Project (the Project) and increase existing water storage from the current capacity of 19.25 million m^3 (15,600 ac-ft) to 87.4 million m^3 (70,900 ac-ft). As part of the approval process, this section of the Environmental Impact Assessment (EIA) examines wildlife species, communities, habitats, and species of conservation concern (SOCC) that may be affected by the Project.

The proposed Project is an expansion of the existing SLR into four sections of privately-owned land in the EID: sections 29, 30, 31, and 32 in Township 19, Range 16, west of the fourth meridian. The Project is in the County of Newell, 22 km southeast of the town of Bassano and 19 km northwest of the city of Brooks, Alberta. The Project will permanently inundate portions of four sections of native prairie and will involve construction of an earthen berm that is approximately 8 km long and up to 20 m high around a partially excavated basin.

11.1.1 Purpose

Wildlife surveys and historic species records were used to identify and map the current and potential wildlife species and habitat present within the proposed Project footprint and surrounding area. The Project Baseline description outlines the environmental conditions before Project development (e.g., the Baseline Case), including species populations and diversity, distribution, and known and potential use of habitat (see Section 11.4). Potential effects of the Project on wildlife and their habitat, are assessed and discussed in the Impact Assessment section (Section 11.5). Mitigations to limit detrimental Project effects on wildlife and wildlife habitat are discussed in Section 11.7 (Mitigations and Management Actions).

The objectives of the wildlife baseline assessments were to:

- identify wildlife resources that may be affected by the Project;
- identify SOCC for the Project;
- provide information on presence, distribution, and habitat use of wildlife potentially affected by the Project, with a focus on SOCC;
- determine whether any provincially or federally listed wildlife species, and species of cultural significance, are present with the local study area; and
- identify existing wildlife habitat and habitat disturbances.

The objectives of the wildlife impact assessment were to:

- compare the Baseline Case of habitat suitability and habitat quality, including habitat fragmentation and terrestrial movement, for SOCC to the Project Cases (Project Construction, Operation, Reclamation) to estimate the effect of the Project on wildlife and wildlife habitat;
- estimate the environmental effects of the Project on other species found on or near the Project area by extrapolating the effects calculated for SOCC; and
- determine mitigation measures and offsets that reduce harmful effects to wildlife, as well as opportunities for habitat creation or enhancement that may result from the Project.

11.1.2 Project Setting

The proposed Project occurs within the Dry Mixedgrass Natural Subregion (DMNS; Appendix I1, Figure I1-1) of the Grassland Natural Region of Alberta (Government of Alberta [GOA], 2006). The DMNS, the largest subregion within the Grassland Region, is situated in the southeast portion of the province. This subregion consists of level to gently rolling semi-arid prairie landscapes intermixed with coulees (e.g., steep narrow to wide ravines associated with flat grasslands), valleys, badlands, and dune fields. Slopes vary from level to steep (as found in coulees). The climate is warm and dry, with a mean annual temperature of 4.2°C. In summer, the mean temperature is 18.5°C, and in winter the mean temperature is -10.2°C. Mean annual precipitation is 333 mm, the lowest of any subregion in Alberta (GOA, 2006). Many native plants in the region are deep-rooted and short-lived or have developed physiological traits which allow them to remain dormant during dry periods. These traits have allowed vegetation species to adapt to drying winds, low precipitation levels in the summer, high summer temperatures and intense sunshine which creates significant moisture deficits (GOA, 2006). Similarly, some native wildlife species have adapted to dry, windy conditions, lack of canopy cover, and low precipitation levels and have therefore adopted life history strategies such as nocturnality, subterranean burrows, ground nests, eruptive breeding cycles, and dependency on temporary and permanent water sources.

The dominant ecosystems in the DMNS are grasslands, ranging from fully native grasslands to fully anthropogenic. Native vegetation are predominantly drought-tolerant grasses, forbs, cacti, and in some areas, shrubs. Trees are uncommon and restricted to habitats with increased moisture (e.g., along river systems, deep coulees) as well as altered environments such as in farmsteads and along ditches, canals and reservoirs. Shrubby and treed areas, whether present naturally or associated with anthropogenic development, provide important cover and nesting habitat. For further details on the vegetation communities and plant species found in this area, please refer to Volume 2, Section 10. Waterbodies in this natural subregion are uncommon but are important for the maintenance of aquatic life and provide highly productive riparian habitat (except where removed through cultivation) and water resources for upland species. These riparian areas provide the needed habitats for native wildlife species, including cover, nesting or denning habitats, forage habitats, and movement corridors.

Native grasslands have been subject to land use changes for agricultural and other uses since settlement in the 19th and especially 20th centuries. These changes include conversion from native prairie to tame pasturelands, croplands, and irrigated croplands. Tracts of upland habitat have also been fragmented by canals, highways, gravel roads, barbed wire and woven wire fences, residential and commercial areas, utility corridors, and other infrastructure associated with the energy, agricultural, and municipal service industries. Natural water systems have been supplemented by the development of a system of reservoirs and canals that provide additional aquatic habitat for some species. Though livestock grazing can be an important ecological service to native grasslands, overgrazed lands may lose the natural character and habitat value of a healthy grassland. Additionally, the overuse of preferred forage species can lead to an abundance of less palatable species, such as Buckbrush or Silverberry, which may support a different assemblage of wildlife species.

The range of terrestrial and aquatic habitats within the DMNS support a diversity of wildlife. Larger mammal species typical for this subregion include Mule Deer (*Odocoileus hemionus*), Pronghorn

(*Antilocapra americana*), Coyote (*Canis latrans*), and Red Fox (*Vulpes vulpes*). Medium-sized terrestrial mammals include Prairie Long-tailed Weasel (*Mustela frenata longicauda*), American Badger (*Taxidea taxus*), Beaver (*Castor canadensis*), and Porcupine (*Erethizon dorsatum*). Common small mammals include rodents and shrews, as well as migratory and non-migratory bats. A diverse assemblage of birds can also be found in this region, including waterfowl (e.g., Green-winged Teal [*Anas crecca*], American Coot [*Fulica americana*]), waterbirds (e.g., Great Blue Heron [*Ardea herodias*], Long-billed Curlew [*Numenius americanus*], Sora [*Porzana carolina*]), raptors (e.g., Ferruginous Hawk [*Buteo regalis*], Swainson's Hawk [*Buteo swainsoni*], Red-tailed Hawk [*B. jamaicensis*], Golden Eagle [*Aquila chrysaetos*]), upland gamebirds (e.g., Sharp-tailed Grouse [*Tympanuchus phasianellus*]), and a wide diversity of songbirds (e.g., Western Meadowlark [*Sturnella neglecta*], Vesper Sparrow [*Pooecetes gramineus*], Loggerhead Shrike [*Lanius ludovicianus*]). Additionally, several herptiles are also found in the DMNS, including snakes (e.g., Plains Garter Snake [*Thamnophis radix*], Prairie Rattlesnake [*Crotalus viridis*]), frogs (e.g., Boreal Chorus Frog [*Pseudacris maculata*], Northern Leopard Frog [*Lithobates pipiens*]), and toads (e.g., Plains Spadefoot [*Spea bombifrons*], Great Plains Toad [*Anaxyrus cognatus*]).

Species distribution and wildlife habitat use is largely based on vegetation type and topography. Moderately to heavily grazed grasslands support Horned Lark (*Eremophila alpestris*), Western Meadowlark, Thick-billed (*Rynchophanes mccownii*) and Chestnut-collared Longspur (*Calcarius ornatus*), and Richardson's Ground Squirrel (*Spermophilus richardsonii*), while less intensively grazed sites support Baird's Sparrow (*Centronyx bairdii*), Sprague's Pipit (*Anthus spragueii*), Sharp-tailed Grouse, and Upland Sandpiper (*Bartramia longicauda*). Richardson's Ground Squirrel are an important species as they are primary excavators; their burrows help support many additional species, including secondary burrow users like Burrowing Owls (*Athene cunicularia*), snakes, and amphibians. Additionally, these rodents are a primary food source for predators (e.g., American Badger and Ferruginous Hawk).

Sagebrush habitats have historically supported Greater Sage Grouse (*Centrocercus urophasianus*), Lark Bunting (*Calamospiza melanocorys*), Lark and Brewer's Sparrows (*Chondestes grammacus, Spizella breweri*), and Pronghorn, and provide overwintering habitat for Sharp-tailed Grouse (Eder & Kennedy, 2011; Fisher & Acorn, 1998; GOA, 2006). Specialized habitats in the DMNS, such as sand plains and dune fields, support Ord's Kangaroo Rat (*Dipodomys ordii*) and Western Hog-nosed Snake (*Heterodon nasicus*), whereas coulees and rocky outcrops provide habitats for cliff-nesting songbirds (e.g., Rock Wren [*Salpinctes obsoletus*]) and raptors (e.g., Golden Eagle, Prairie Falcon [*Falco mexicanus*]). Coulees and rocky outcrops also provide protection and denning habitat for small and medium-sized mammals (Bushy-tailed Woodrat [*Neotoma cinerea*], Porcupine), as well as valuable overwintering hibernacula habitat for snakes (e.g., Prairie Rattlesnake, Bullsnake [*Pituophis catenifer sayi*]) and bats (e.g., Little Brown Myotis [*Myotis lucifugus*], Long-eared Myotis [*Myotis evotis*], Western Small-footed Myotis [*Myotis ciliolabrum*]).

Large, permanent, open waterbodies are relatively uncommon in grassland ecosystems, but when present, support diverse communities of wildlife. Marshes and open water support species such as Muskrat (*Ondatra zibethicus*), dabbling and diving ducks, American Coot, Red-winged and Yellow-headed Blackbirds (*Agelaius phoeniceus, Xanthocephalus xanthocephalus*), Boreal Chorus Frogs, and sensitive amphibians such as Northern Leopard Frogs and Plains Spadefoot. Some areas may also support local populations of Marsh Wren (*Cistothorus palustris*), American

Bittern (*Botaurus lentiginosus*), Black-crowned Night-Herons (*Nycticorax nycticorax*) and Franklin's Gulls (*Leucophaeus pipixcan*). Large lakes and rivers support Canada Geese (*Branta canadensis*), Ring-billed and California Gulls (*Larus delawarensis, L. californicus*), American White Pelican (*Pelecanus erythrorhynchos*), and Double-crested Cormorant (*Phalacrocorax auratus*). Species that often occur near open water edges include shorebirds (e.g., Killdeer, Marbled Godwit [*Limosa fedoa*], Willet [*Tringa semipalmata*], American Avocet [*Recurvirostra americana*]), Beaver, and bank-nesting birds (e.g., Bank Swallows [*Riparia riparia*]).

11.1.3 Regulatory Context

Regulations protecting wildlife species, features, and habitats include the EPEA (GOA, 2000a), the federal *Migratory Birds Convention Act* (MBCA; Government of Canada [GOC], 1994) and *Species at Risk Act* (SARA; GOC, 2002), and Alberta's *Wildlife Act* (AWA; GOA, 2000a). Guidelines and best practices to protect and inventory wildlife include the Sensitive Species Inventory Guidelines (SSIG; GOA, 2013), the Recommended Land Use Guidelines for Protection of Selected Wildlife Species and Habitat within Grassland and Parkland Natural Regions of Alberta (GOA, 2011), and The South Saskatchewan Regional Plan (SSRP) under the Provincial Land Use Framework (GOA, 2018). The SSRP also provides best management practices (BMPs) for natural habitats and species in this area. The Master Schedule of Standards and Conditions (MSSC) does not apply on private lands but is used as BMPs for land use and wildlife protections (GOA, 2024a). Table 11-1 summarizes the regulations and guidelines for assessing and protecting sensitive wildlife species and features in Alberta.

The SSRP discusses the importance of connectivity of wildlife habitat across landscapes to prevent habitat fragmentation and isolation of populations, to allow for wildlife movement necessary for their life stage or to reach seasonal resources, and to reduce the potential for human-wildlife conflict (GOA, 2018). The southeastern area of the province, including the Project location, provides important corridors for wildlife movement between Alberta, Montana, and Saskatchewan. Native grassland, present within the Project area, has high ecological value for biodiversity and watershed protection. Native grassland is critical habitat for many of Alberta's SOCC; therefore, maintaining intact native grassland habitat is important for the conservation of many species. According to the SSRP, the overarching management intent of regulators is to create an interconnected network of conservation efforts on private land to sustain and improve overall habitat connectivity for grassland species (GOA, 2018).

Table 11-1: Regulations and guidelines for assessment and protection of wildlife, wildlife features, and wildlife habitat in Alberta

Regulation or Guideline	Context
Species at Risk Act (SARA)	A federal Act that governs activities that have the potential to impact any federally listed species (GOC, 2002). Species protected by this legislation are listed in Schedule 1 of the Act. This legislation mostly applies to projects on federal lands but also applies to Schedule 1 Species designated by the *Migratory Birds Convention Act* and all Schedule 1 aquatic species on all lands regardless of ownership or jurisdiction. Protection applies to basic prohibition against killing or harming species and their residences and protection of critical habitat. If a listed species faces imminent threats to its survival or recovery, an Emergency Order may be issued. These Orders apply to both federal and non-federal lands.
Migratory Birds Convention Act (MBCA) and *Migratory Bird Regulations*	A federal Act that provides protection for most Canadian birds, their nests, their eggs, and nest boxes/shelters (GOC, 1994).
Alberta *Wildlife Act* (AWA) and *Wildlife Regulations*	The provincial *Wildlife Act* (GOA, 2000b) and Regulation (GOA, 1997) requires protection of species listed as endangered or threatened under the Act (see also GOA 2024b for species listing). Most native birds not protected under the MBCA, and their nests, are protected under AWA. The Act includes protection for non-bird wildlife features (e.g., dens, houses), and regulates the hunting and trapping of wildlife.
Environmental Protection and Enhancement Act (EPEA)	A provincial Act (GOA, 2000a) that specifies regulatory requirements for how air, water, land, and biodiversity are managed.
South Saskatchewan Regional Plan (SSRP)	Aligns provincial policies for the preservation of native grasslands and establishes a long-term vision for the region that balances the economic, environmental, and social goals of the province (GOA, 2018). It discusses the importance of connectivity of wildlife habitat across landscapes to prevent habitat fragmentation and allow for animal movement, genetic diversity, and reduce the potential for human-wildlife conflict.
Sensitive Species Inventory Guidelines (SSIG)	Provincial guidelines for conducting inventory surveys for sensitive species in Alberta (GOA, 2013).
Master Schedule of Standards and Conditions (MSSC)	Provincial standards and conditions that apply to formal disposition applications approved under the *Public Lands Act* and ensure consistent application of standards across the province (GOA, 2024a).

Regulation or Guideline	Context
Environment and Climate Change Canada Nesting Zones and Nesting Calendars	Summary of known migratory bird nesting dates across Canada, broken up into Nesting Zones with similar species diversity, habitat and climatic conditions (GOC, 2018). These Nesting Zones and Calendar provide the dates when migratory birds are likely to be nesting in any given part of the country, providing guidance for project planning, thus helping proponents reduce project effects on birds and their reproductive success.
Alberta Environment and Protected Areas (Alberta EPA) Wildlife Sensitivity Layers	Provincial mapping that provides information on the known extent or partial extent of a species' range in Alberta. The ranges can assist with surveys for identification of sensitive wildlife features and correspond with specific mitigations in the MSSC (GOA, 2021a). Sensitive layers that relate to the Project area include: • Sensitive Amphibian Range • Sensitive Raptor Range • Sharp-tailed Grouse Range • Burrowing Owl Range

11.2 ISSUE SCOPING

Scoping for this EIA is a process that includes:

- developing a list of resources or indicators specific to wildlife and their habitats;
- identifying Project activities that may alter or remove resources or indicators;
- identifying the risks, issues, or concerns regarding these effects;
- determining what assessments to include (ones where high effects are likely), and which to exclude (e.g., effects that are likely to be negligible or trivial); and
- identifying the quantity and quality of available information and data to assess whether the issue can be addressed locally and/or regionally.

Table 11-2 is a summary of issue scoping for wildlife and wildlife habitat resources that may be affected by the Project.

Table 11-2: Issue scoping for wildlife and wildlife habitat resources

Project Activities and Risks	Resources	Indicators or Measures	Potential Issues	Screening[1]
• Clearing of vegetation and habitat areas in the new reservoir area • Reclamation and planting / establishment of new vegetation communities in outer berm areas • Removal of wetlands and drainages • Altered water quality during inundation due to silt and saline interactions • Flooding of habitat during new reservoir filling • Development of new deepwater and shallow waterbody fringe habitats in the expanded reservoir	Wildlife Habitat	• Habitat area available for indicator species	• Loss of natural habitat	• Likely – large grassland areas and small treed areas in the Project area will be permanently cleared and flooded • Likely – most of the reservoir will be deep water; steep waterbody edges reduce feeding habitat for shorebirds, wading birds, and dabbling ducks and constitutes poor amphibian breeding and summer habitat • Unlikely – water quality is not expected to be affected by the Project (see Volume 2, Section 7).
			• Gain of aquatic habitat	• Likely – due to existing topography, a shallow wetland is expected to develop on the western edge of the proposed reservoir, which will increase feeding habitat for shorebirds, waterfowl, and summer breeding and overwintering habitat for amphibians • Likely – deep open water provides stopover habitat for migrating waterfowl and summer habitat for diving ducks
			• Loss of habitat for wildlife SOCC	• Likely – loss of native grassland and trees in the Project area reduces nesting habitat for ground- and tree-nesting birds (e.g., Ferruginous Hawk), reduces habitat for burrowing animals (e.g., American Badger), and reduces foraging habitat for herbivores (e.g., Pronghorn).
			• Increase of disturbed / non-native habitat areas	• Likely – creation of berm and related infrastructure creates an anthropogenic waterbody with steep banks. • Likely – construction activities often introduce non-native vegetation and weed species, as well as associated invertebrate communities.

Project Activities and Risks	Resources	Indicators or Measures	Potential Issues	Screening[1]
			• Habitat Fragmentation	• Likely – reservoir will create aquatic habitat that is a barrier to movement for some terrestrial mammals (e.g., Pronghorn, Long-tailed Weasel, American Badger).
	Wildlife Species Assemblages	• Wildlife SOCC observations • Wildlife species richness by habitat	• Local loss of SOCC	• Likely – habitat loss for nesting raptors, sensitive mammals, grassland songbirds of conservation concern will lead to those species seeking habitat elsewhere.
			• Decrease or change in species richness	• Likely – decreased habitat availability for terrestrial species, increased habitat for (some) aquatic species.
• Air emissions and dust from vehicles and equipment during construction • Equipment noise during construction • Artificial light used at night during construction	Wildlife Species Assemblages	• Wildlife SOCC observations • Wildlife species richness by habitat	• Avoidance of habitat near the Project	• Likely – Noise, vibration, and light from Project construction will likely deter some animals from the Project area and surrounding land. The largest effects will be within or close to the Project area (see Volume 2, Section 5) • Unlikely – Dust and emissions will only be a concern during construction. Dust will be mitigated through watering. Emissions exceedances are unlikely and short-term based on modelling, and wildlife in the area has already adapted to similar or greater emissions from the nearby Trans-Canada Highway and Canada Pacific Kansas City Railway (see Volume 2, Section 4)
• Increased size of final reservoir • Increased public access to Project area (currently private land)	Harvested or Viewed Wildlife	• Abundance of harvested species • Number of harvested species	• Increase in harvest due to increased access • Reduced abundance of harvested species	• Unlikely – The completed Project may attract more anglers and wildlife viewers, but this is not expected to increase hunting pressure, as hunting is not permitted at the current SLR and won't be permitted in the Project area; hunting is also limited by provincial regulations to ensure sustainable harvest of wildlife.

Project Activities and Risks	Resources	Indicators or Measures	Potential Issues	Screening[1]
	Traditionally-Used Wildlife Species (e.g., Indigenous use)	• Occurrence, distribution and/or abundance of traditionally used species	• Loss of traditionally used wildlife species	• Unlikely – Project is on private land with limited public access; there is no known current Traditional Use of wildlife species in the Project area.
	Non-native Wildlife Species and Assemblages	• Occurrence, distribution, and/or abundance of non-native wildlife species	• Increase in the abundance of non-native species	• Unlikely – non-native wildlife species tend to assemble in urban environments or where development creates breeding habitat or feeding opportunities, (e.g., House Sparrows and European Starlings nesting in buildings and substations).
• Conversion of open grassland habitat to a reservoir with relatively steep banks	Wildlife Movement Corridors / Connectivity	• Movement, migration, and/or distribution of wildlife	• Isolation of wildlife populations	• Unlikely – movement corridors exist around the reservoir.
			• Changes to wildlife movement / migration paths	• Likely – large, open water is a barrier to movement for terrestrial species either year-round (e.g., Pronghorn) or during non-frozen conditions (e.g., Coyote).
• Garbage or food waste left on site by workers during construction	Wildlife Movement and Behaviour	• Signs of wildlife accessing garbage or food	• Attraction of wildlife to garbage or food • Potential for human-wildlife conflict	• Likely – opportunistic species (e.g., Coyotes, Red Fox, Striped Skunk, Common Raccoon, corvids, gulls) can be attracted to garbage or food that is discarded or left unattended. This can change wildlife behaviour and potentially lead to conflict with humans.
• Exposure of wildlife to harmful substances during Construction or Operation	Wildlife Health	• Observation of wildlife mortalities or sick wildlife • Observations of wildlife ingesting or otherwise interacting with harmful substances	• Negative effects on wildlife health (illness or injury) • Wildlife mortalities	• Unlikely – harmful substances will be properly contained throughout construction, which should prevent any ingestion by wildlife. The Operations phase is not expected to involve any substances that are harmful to wildlife.

[1]Determine if the issue is unlikely to occur, or if relevant data is sufficient for assessment and therefore whether the assessment should occur.

Based on Table 11-2, the following wildlife and wildlife habitat resources were selected for assessment:

- wildlife presence (including relative abundance and distribution) and habitat associations of wildlife species;
- SOCC present within and surrounding the Project area;
- habitat connectivity and movement corridors;
- noise, vibration and light effects on wildlife from construction; and
- attraction of wildlife to the Project area and potential for human-wildlife conflict.

Additionally, the following wildlife indicators are discussed further, despite being screened out, as baseline knowledge is required by the Project FTOR:

- harvested and viewed wildlife;
- Traditional Use (TU) and culturally-significant species; and
- introduced wildlife species.

Air emissions are not expected to affect wildlife, as Project emissions are expected to be limited and temporary in nature (see Volume 2, Section 4 for details and mitigations). Emissions from the Project will be limited to the Construction phase and are generally comparable to or less than the emissions currently generated from vehicles driving along the nearby Trans-Canada Highway (TCH) and trains travelling along the nearby Canada Pacific Kansas City (CPKC) rail line. Air emissions have been screened out (Table 11-2) and are therefore not further discussed in this section nor elsewhere in this EIA in the context of effects on wildlife.

This assessment will consider the loss or conversion/modification of habitats within the Project area as a result of the reservoir expansion and inundation of grassland and other habitats. This Project does not include conversion of land outside of the Project area – native prairie or otherwise – to irrigated or irrigable cultivation, and therefore this is not assessed. The EID is not increasing the area of irrigated cultivation as a result of this Project.

11.2.1 Wildlife Presence and Habitat Associations

Grasslands are home to diverse wildlife species, which will be unequally affected by the Project. It is important to determine the species present within the Project area and their habitat associations to:

- identify the species that may be adversely affected by the Project;
- develop strategies to mitigate harm to species that will be affected by the Project; and
- ensure compliance with legal and regulatory protections for SOCC and sensitive features (e.g., bird nests).

Wildlife species can be affected by projects directly or indirectly, such as through direct habitat loss or indirect changes of reduced habitat quality.

11.2.1.1 Species of Conservation Concern

SOCC are species that require management actions or protections to ensure the survival of populations at risk due to habitat loss, restricted range, or other threats.

In Alberta, SOCC are defined to include species:

- listed as federally "Endangered", "Threatened", or "Special Concern" under Schedule 1 of SARA (GOC, 2002);
- assessed as federally "Endangered", "Threatened", or "Special Concern" by Committee on the Status of Endangered Wildlife in Canada (Committee on the Status of Endangered Wildlife in Canada [COSEWIC], 2021);
- listed as provincially "Threatened" or "Endangered" under the AWA, in the Alberta Wildlife Regulation, Schedule 6 (GOA, 2024b); and
- considered provincially "At Risk" (e.g., indicating that the species is listed as Endangered or Threatened), "May Be at Risk", or "Sensitive" in the General Status of Alberta Wild Species 2020 (GOA, 2020a).

The Project area overlaps the mapped distribution ranges for several SOCC, including Sensitive Amphibians, Burrowing Owl, Sharp-tailed Grouse, and sensitive prairie raptors (GOA, 2021a).

11.2.1.2 Grassland Songbirds

Grassland songbirds are often used as indicators of the health of prairie composition and structure because of their dependency on intact native prairie, sensitivity to native prairie fragmentation, and their decrease in abundance in recent decades (e.g., loss of approximately 50% since the 1960s; Sauer, et al., 2015). Studies have shown that the amount of intact native prairie does not predict the abundance of these species, but vegetation type, percent grass cover, and distance to landscape disturbance are better predictors of grassland songbird community composition (Lockhart & Koper, 2018; Landry-DeBoer et al., 2023).

11.2.2 Wildlife Movement and Habitat Connectivity

Assessing habitat connectivity is crucial for maintaining biodiversity, supporting ecosystem functions, and ensuring the long-term survival of wildlife populations. Habitat connectivity refers to the degree to which landscapes facilitate the availability to support individuals' home ranges, movement of species for seasonal or daily migration, genetic diversity within and between populations, and ability for species to coexist with humans, often through spatial and/or temporal avoidance. This assessment focuses on the habitat connectivity for waterfowl seasonal movement and Pronghorn migration.

11.2.2.1 Migratory Bird Stopover

During migration, migratory waterfowl and other birds take periodic breaks in long-distant flight where they land, sleep, eat, and interact socially (Linscott & Senner, 2021). These breaks are called "Stopovers". Stopover is expensive, as birds must be vigilant for predators, forage, and thermoregulate. Stopovers during migration can account for 70% of the total energy used during migration (Wikelski, et al., 2003). It is therefore crucial for migratory birds to have quality stopover habitat that provides suitable conditions conducive to replenishing energy in an efficient and survivable manner. High quality stopover habitat for migrating waterfowl includes areas within the migratory flyway that contain a waterbody, food, low human disturbance, and conditions suitable for predator vigilance (e.g., low vegetation or a large enough waterbody that supports line-of-sight).

11.2.2.2 Pronghorn Movement

In southern Alberta, habitat connectivity and movement corridors for terrestrial species are best studied for Pronghorn. Once widespread across Canada's prairie habitats, their abundance and distribution have been reduced by landscape modification, habitat fragmentation, and barriers to movement (Gates, et al., 2012). Hunting regulations have allowed populations to recover from lows in the early 20th century, but landscape fragmentation, particularly barriers to movement, are a concern for the viability of populations moving forward. Although not a true obligate prairie species (Jones, et al., 2015), large areas of intact native vegetation have been correlated with increased Pronghorn density, migration distance, survivability, and time spent foraging (Sheriff, 2006; Gavin & Komers, 2006). Movement and migration corridors are especially important in winter when survival depends on the ability to move away from areas with deep snow and towards suitable forage (Barrett, 1982; Christie et al., 2015). Urban development, rivers and other large bodies of water, and large fenced facilities represent the strongest movement barriers. Even frozen waterbodies can be treacherous; attempts to cross frozen waterbodies have led to Pronghorn becoming stranded, injured, or preyed upon by Coyotes (Gates, et al., 2012; Selsky, 2017). Barbed wire fences, gravel roads, and other semi-permeable barriers also negatively affect migration, population metrics, and habitat use on the landscape (Robb et al., 2022). Though not strong barriers to movement for most terrestrial mammals, depending how they are built, barbed wire fences represent partial or complete barriers to daily movement for Pronghorn and have repeatedly been shown to reduce access to foraging habitats and water resources, interrupt seasonal migration, and redirect individuals towards high-risk travel corridors, such as highways and railways (Gates, et al., 2012). Pronghorn are poor jumpers, and so typically crawl under or through barbed wire fences, which can lead to injuries or entanglement. Like fencing, road traffic represents both a physical barrier to movement through direct mortality from vehicle collisions, and a behavioural impediment, requiring increased vigilance, resulting in reduced foraging within 300 m of roads (Gavin & Komers, 2006).

At the provincial scale, the most critical Pronghorn migration corridor in Alberta is located from the southeastern US border, north past the City of Medicine Hat, and across to the town of Hanna (Alberta Conservation Association, 2023). The Project study areas (see Section 11.3) are located west of this migration route and outside of the core distribution range for Pronghorn in the province (Alberta Biodiversity Monitoring Institute, 2020). However, an estimated 6% of the provincial Pronghorn population occupy land within the regional study area (GOA, 2019a), therefore attention should be given to habitat connectivity, barriers to movement, and migration routes around the Project site.

11.2.3 Additional Project Effects on Wildlife

11.2.3.1 Noise, Vibration, and Artificial Light Effects

Anthropogenic noise, vibration, and artificial lighting at night can have numerous effects on a wide variety of taxa, from movement and behaviour (e.g., courtship, herbivory and predation patterns, increased vigilance and stress responses) to physiological effects (e.g., increased cortisol and other hormonal changes) to direct mortality (e.g., collisions with communication towers or buildings). The only Project phase expected to have the potential to increase these factors locally

or regionally is Construction. These factors were not modelled for wildlife specifically, but the Baseline Case (Section 11.4) and Construction (Section 11.5) effects are discussed qualitatively based on noise and vibration modelling (Volume 2, Section 5).

11.2.3.2 Wildlife Attraction, Human-Wildlife Conflict, and Other Harms to Wildlife

While the likelihood is low, the Project does have some potential to unintentionally attract wildlife, which could lead to human-wildlife encounters and/or conflict. Typical attractants with the potential to lead to conflict with humans are anthropogenic food and food waste. Generally, wildlife will be attracted to these food sources and, overtime, become food-conditioned to human presence or activities associated with the site (McCarthy & Seavoy, 1994). Food-conditioning reduces an individual's wariness of humans, as the benefit of often high-caloric foods outweighs the risks of human presence (Dubois & Fraser, 2013). Food-conditioned wildlife are therefore more likely to have encounters with humans, and these encounters are more likely to lead to human-wildlife conflict, as wildlife may become aggressive in seeking out food resources (GOA, 2011). Improper management and disposal of food and food waste is possible during both Project Construction and Operation.

Wildlife can also be harmed by coming into contact with or ingesting harmful substances. While this is considered an unlikely effect of the Project and therefore screened out, it will be discussed, including appropriate mitigation measures, as required by the FTOR (Volume 2, Appendix A).

11.2.4 Other Wildlife Indicators

11.2.4.1 Human-use Wildlife Species

Humans value wildlife extrinsically for non-consumptive recreational use (e.g., bird watching) and various consumptive uses, including subsistence and recreational hunting. The SLR currently provides access to recreational bird watching, particularly waterfowl. Expansion of the reservoir should retain or enhance this access.

The Project is located within Wildlife Management Unit 138, which has set hunting seasons for big game, upland game birds, and migratory game birds, which includes waterfowl (GOA, 2023). However, hunting is not permitted at the current reservoir, nor within the proposed Project area. Further information on this and related activities (e.g., fishing) are discussed in Volume 2, Section 13 (Land Use and Management).

11.2.4.2 Traditional Use Wildlife Species and Species of Cultural Significance

After inquiry to the Aboriginal Consultation Office regarding Indigenous Consultation Requirements for the Project, the EID was informed that a formal Indigenous Consultation for the Project was not required. Based on this decision and given that the Project area has not been accessible for Traditional Uses (TU) since settlement and the signing of Treaty 7, except for access along a public road allowance, no formal Traditional Land Use and/or Traditional Ecological Knowledge study took place for this Project (see Volume 2, Section 15: Traditional Ecological Knowledge and Traditional Land Use). Using publicly-available data, a review of likely

wildlife species of Traditional or Cultural significance was completed to meet the FTOR requirements.

11.2.4.3 Introduced Wildlife Species

Introduced wildlife species exist in areas beyond their native range because of human activities, and include both intentional and unintentional introduction of wildlife species to an area (Jeschke, 2014). These include exotic species introduced intentionally by deliberate release (e.g., House Sparrow [*Passer domesticus*]), species raised and released for hunting (e.g., Ring-necked Pheasant [*Phasianus colchicus*]), escaped or released livestock (e.g., Wild Pigs [*Sus scrofa*]), and animals unintentionally transported during human travel (e.g., rats [*Rattus* sp.]). Several of these species have been so successful in establishing populations in Canada that they have become invasive and are designated in the Alberta *Agricultural Pests Act* (GOA, 2000c) as agricultural pests (e.g., wild pigs) or nuisances (e.g., Rock Pigeon [*Columba livia*]). Introduced wildlife can also include native species that have expanded their ranges into novel habitats in response to climate change, agricultural practices, large-scale land use changes, or predator suppression. However, there is a lack of consensus about historical ranges for most species (Guiasu, 2016), therefore, those native to Canada are not classified here as introduced wildlife species. Domestic species (e.g., cattle) are also non-native, but are not considered “wildlife” in this analysis.

Here, introduced wildlife species are defined as those that have spread to continents beyond their original distribution (Huston, 1994). In the study areas, these likely include mammal (e.g., House Mouse [*Mus musculus*]) and bird species (e.g., European Starling [*Sturnus vulgaris*], Gray Partridge [*Perdix perdix*], Ring-necked Pheasant, Rock Pigeon). Rats are a prolific introduced species with a global cosmopolitan distribution but have been excluded from establishing resident populations in Alberta due to intensive rat suppression policies in place since 1950 (GOA, 2017a).

11.3 STUDY AREAS

Baseline Cases and potential Project effects were investigated at both a local (Project-specific) scale and a regional (cumulative effects) scale. The study areas for terrestrial disciplines were defined as:

- Terrestrial Local Study Area (TLSA) – Project boundary + 500 m buffer (Appendix I1, Figure I1-2)
- Terrestrial Regional Study Area (TRSA) – Project boundary + 15 km buffer (Appendix I1, Figure I1-3)

Databases and literature relevant to the study areas were consulted and key resources and sensitive indicator species in the TLSA and TRSA were identified.

11.3.1 Terrestrial Local Study Area

The TLSA was used in the assessment of direct and indirect Project effects on wildlife and biodiversity at the local scale for the EIA. The 500 m buffer represents a zone where direct and indirect effects of the Project may occur. The TLSA covers 1,657.5 ha and is located in the DMNS, within the Grassland Natural Region (see Section 11.1.2: Project Setting). The majority of the

TLSA is within the Onetree Creek sub-basin of the Red Deer River basin, with the northeast corner located within the Matzhiwin Creek sub-basin of the Red Deer River basin (GOA, 2024c). Some important local features found within the TLSA include a portion of the existing reservoir, the East Dam and other related infrastructure, Snake Lake Canal, portions of the East Branch Canal, county roads including RR 163A, RR 164, and Twp Rd 200, private native grassland pasture lands to the north, east, and south, with some wetlands and treed areas interspersed, and cultivated cropland to the west (Appendix I1, Figure I1-2).

11.3.2 Terrestrial Regional Study Area

The TRSA was developed as a land base for the cumulative effects assessment to address how Project effects may interact with past, present, and future activities on regional resources or indicators. The TRSA is the same study area used by in Soils and Terrain (Volume 2, Section 9), Vegetation and Wetlands (Volume 2, Section 10), and Land Use (Volume 2, Section 13) disciplines and represents a mix of natural landscapes and lands modified for agriculture, transportation, oil and gas, utilities, and other industrial and municipal land uses. The TRSA was defined as a 15 km radius surrounding the Project area. This buffer was chosen to match what was used in a recent EIA for assessment of terrestrial resources (Stantec Environmental Consulting Ltd., 2018).

The TRSA covers an area of 88,404.9 ha and was defined using the following ecological parameters:

- Natural Regions and Subregions;
- watersheds and major watercourses;
- human development like that of the TLSA (e.g., reservoirs, municipal areas with populations of <1,000); and
- defined sensitive wildlife ranges (e.g., Sharp-tailed Grouse, Burrowing Owl, sensitive raptors).

The TRSA is situated entirely within the South Saskatchewan River Basin and the Grassland Natural Region. It is primarily within the DMNS and includes a small area along the southwestern boundary within the Mixedgrass Natural Subregion (Appendix I1, Figure I1-1). The north and central sections of the TRSA are within the Matzhiwin Creek and Onetree Creek sub-basins of the Red Deer River basin; the southwest portion of the TRSA is within the Lower Bow River sub-basin of the South Saskatchewan basin and includes a portion of the Bow River. This area represents a mix of natural landscapes and modified lands for agriculture, transportation, oil and gas, utilities, and other industrial and municipal land uses (e.g., contains the communities of Lathom and Rosemary).

11.4 BASELINE

11.4.1 Baseline Methods

Baseline information pertaining to wildlife and their habitats was compiled from various sources, including existing databases and fieldwork. Data was collected in and around the TLSA from 2021 to 2023 and includes ground-based inventories conducted for this Project. Data regarding SOCC

in the areas surrounding the Project was obtained from various sources including the provincial Fisheries and Wildlife Management Information System (FWMIS), Alberta Biodiversity Monitoring Institute, citizen science sources (eBird and iNaturalist), and game harvest surveys for Pronghorn (GOA, 2019a; eBird, 2021; iNaturalist community, 2024; Alberta Biodiversity Monitoring Institute, 2020). Related scientific literature and government reports were reviewed to provide additional context.

11.4.1.1 Wildlife Inventories

The richness and distribution of wildlife species in the study areas were compiled from government (e.g., FWMIS), citizen science (e.g., eBird, iNaturalist), and ground-based site surveys, sweeps, and site visits (described below; see 11.4.1.2 Field Programs). The Government of Alberta maintains the FWMIS database as the official repository of wildlife species observations within the province. FWMIS data are collected by educational institutions, government, individuals, industry, and private consulting companies. FWMIS data are generally considered moderate- to high-quality because they are typically collected by qualified personnel using appropriate survey protocols as well as incidental observations; however, data can be patchily distributed and biased towards easily accessed lands (e.g., along roads), areas of conservation concern (e.g., native grassland), or in areas of interest to industry or development, where inventory surveys are required as part of project applications and/or monitoring. Citizen science data were included in the analysis and sourced from eBird and iNaturalist. The former is a project of the Cornell Lab of Ornithology (eBird, 2021), and the latter is an independent non-profit organization (iNaturalist community, 2024). Data are submitted to these sources by private citizens and verified by qualified professionals, when possible (data that is not verified, is classified as such). Citizen science data is considered low- to moderate-quality because they are generally collected as incidental observations by the public with no standard protocol. As with FWMIS, records can be patchily distributed with a bias towards areas frequented by humans, including settlements and urban areas, roads, hiking trails, and public-access wetlands and protected areas.

To maximize the quantity of data available for analysis while ensuring low-quality records were removed, wildlife observations were excluded from analysis if:

- the record was prior to 2012; per professional judgment, data older than this was not considered applicable to the current land use and habitat of the study areas;
- the record did not identify the animal to species;
- the observation was for a dead individual(s);
- the record did not clearly indicate if a species was actually observed or not:
- there were duplicate records recorded by the same person with the same location, date, species, count, and age group; if so, a single record was kept, and duplicates removed.

Species of Conservation Concern

SOCC records in the TRSA were also sourced from online databases (e.g., FWMIS, eBird, iNaturalist). Location records were mapped for each study area and the observations per species was recorded; however, this approach only provides information on species presence and cannot confirm if a species is absent. Additionally, though published protocols were followed regarding

survey season, time-of-day, and surveyor expertise, there is an inherent bias towards detection of conspicuous, common, and/or diurnal species and expectedly lower detection of rare, subterranean, nocturnal, elusive, or cryptic species. Next, data on habitat features (vegetation, soil, and wetland classes) and anthropogenic disturbances (permanent infrastructure, altered or reclaimed vegetation), were compiled from a variety of sources to determine habitat classes (see Section 11.4.1.3 Wildlife Habitat Assessment). Species locations were associated with habitat data to determine the SOCC expected to occur in each habitat class within the study areas. Table 11-3 includes all SOCC that may be found in the TLSA, based on species distribution and range data (Fisher & Acorn, 1998; Eder & Kennedy, 2011; Dunn & Alderfer, 2006).

Provincial data from Breeding Bird Surveys (BBS) and point count surveys from 2012 to 2022 throughout the TLSA and TRSA were analysed for presence and abundance of species (GOA, 2022). However, wildlife records from incidental observations, citizen science, and area searches were excluded from analysis because these records were not supported by use of systematic survey protocols; thus, exact locations and individuals counted were considered unreliable.

Table 11-3: Wildlife species of conservation concern with distribution ranges[1] that overlap the Project site

Common Name	Scientific Name	Provincial Status[2]	AWA Status[3]	COSEWIC Status[4]	SARA Status[5]
Amphibians					
Great Plains Toad	*Anaxyrus cognatus*	Sensitive	Special Concern	Special Concern	Special Concern
Northern Leopard Frog	*Lithobates pipiens*	At Risk	Threatened	Special Concern	Special Concern
Plains Spadefoot	*Spea bombifrons*	May Be at Risk	-	Not at Risk	-
Birds: Other Birds (Non-Raptors)					
American Bittern	*Botaurus lentiginosus*	Sensitive	-	-	-
American White Pelican	*Pelecanus erythrorhynchos*	Sensitive	-	Not at Risk	-
Baird's Sparrow	*Centronyx bairdii*	Sensitive	-	Special Concern	Special Concern
Bank Swallow	*Riparia riparia*	Sensitive	-	Threatened	Threatened
Barn Swallow	*Hirundo rustica*	May Be at Risk	-	Special Concern	Threatened
Black Tern	*Chlidonias niger*	Sensitive	-	Not at Risk	-
Black-crowned Night-heron	*Nycticorax nycticorax*	Sensitive	-	-	-
Black-necked Stilt	*Himantopus mexicanus*	Sensitive	-	-	-
Bobolink	*Dolichonyx oryzivorus*	Sensitive	-	Special Concern	Threatened
Brewer's Sparrow	*Spizella breweri*	Sensitive	-	-	-
Chestnut-collared Longspur	*Calcarius ornatus*	May Be at Risk	-[6]	Endangered	Endangered
Clark's Grebe	*Aechmophorus clarkii*	May Be at Risk	-	-	-
Common Nighthawk	*Chordeiles minor*	Sensitive	-	Special Concern	Special Concern
Common Yellowthroat	*Geothlypis trichas*	Sensitive	-	-	-
Eared Grebe	*Podiceps nigricollis*	Sensitive	-	-	-
Eastern Kingbird	*Tyrannus tyrannus*	Sensitive	-	-	-
Forster's Tern	*Sterna forsteri*	Sensitive	-	Data Deficient	-
Grasshopper Sparrow	*Ammodramus savannarum*	Sensitive	-	-	-
Great Blue Heron	*Ardea herodias*	Sensitive	-	-	-
Horned Grebe	*Podiceps auritus*	Sensitive	-	Special Concern	Special Concern
Lark Bunting	*Calamospiza melanocorys*	Sensitive	-	Threatened	Threatened
Loggerhead Shrike	*Lanius ludovicianus*	Sensitive	Special Concern	Threatened	Threatened
Long-billed Curlew	*Numenius americanus*	May Be at Risk	Special Concern	Threatened	Special Concern

Common Name	Scientific Name	Provincial Status[2]	AWA Status[3]	COSEWIC Status[4]	SARA Status[5]
Pied-billed Grebe	*Podilymbus podiceps*	Sensitive	-	-	-
Piping Plover	*Charadrius melodus*	At Risk	Endangered	Endangered	Endangered
Sandhill Crane	*Grus canadensis*	Sensitive	-	-	-
Sharp-tailed Grouse	*Tympanuchus phasianellus*	Sensitive	-	-	-
Sora	*Porzana carolina*	Sensitive	-	-	-
Sprague's Pipit	*Anthus spragueii*	Sensitive	Special Concern	Threatened	Threatened
Thick-billed Longspur	*Rhynchophanes mccownii*	May Be at Risk	-[6]	Threatened	Threatened
Trumpeter Swan	*Cygnus buccinator*	Sensitive	Special Concern	Not at Risk	-
Upland Sandpiper	*Bartramia longicauda*	Sensitive	-	-	-
Western Grebe	*Aechmophorus occidentalis*	At Risk	Threatened	Special Concern	Special Concern
White-faced Ibis	*Plegadis chihi*	Sensitive	-	-	-
Birds: Raptors					
American Kestrel	*Falco sparverius*	Sensitive	-	-	-
Bald Eagle	*Haliaeetus leucocephalus*	Sensitive	-	Not at Risk	-
Burrowing Owl	*Athene cunicularia*	At Risk	Endangered	Endangered	Endangered
Ferruginous Hawk	*Buteo regalis*	At Risk	Endangered	Special Concern	Threatened
Golden Eagle	*Aquila chrysaetos*	Sensitive	-	Not at Risk	-
Prairie Falcon	*Falco mexicanus*	Sensitive	Special Concern	Not at Risk	-
Short-eared Owl	*Asio flammeus*	May Be at Risk	-	Threatened	Special Concern
Mammals: Bats					
Hoary Bat	*Lasiurus cinereus*	Sensitive	-[6]	Endangered	Endangered
Little Brown Myotis	*Myotis lucifugus*	May Be at Risk	Endangered	Endangered	Endangered
Long-eared Myotis	*Myotis evotis*	Sensitive	-	-	-
Silver-haired Bat	*Lasionycteris noctivagans*	Sensitive	Endangered	Endangered	Endangered
Western Small-footed Myotis	*Myotis ciliolabrum*	Sensitive	Special Concern	-	-
Mammals: Terrestrial					
American Badger	*Taxidea taxus*	Sensitive	Data Deficient	Special Concern	Special Concern
Prairie Long-tailed Weasel	*Mustela frenata longicauda*	May Be at Risk	-	Not at Risk	-
Pronghorn	*Antilocapra americana*	Sensitive	-	-	-

Common Name	Scientific Name	Provincial Status[2]	AWA Status[3]	COSEWIC Status[4]	SARA Status[5]
Reptiles					
Plains Garter Snake	*Thamnophis radix*	Sensitive	-	-	-
Wandering Garter Snake	*Thamnophis elegans*	Sensitive	-	-	-

[1](Fisher & Acorn, 1998; Dunn & Alderfer, 2006; Eder & Kennedy, 2011; GOA, 2022)
[2](GOA, 2020a)
[3](GOA, 2024b) and (GOA, 1997)
[4,5](GOC, 2024)
[6]Recommended for Endangered status by the scientific sub-committee of the Endangered Species Conservation Committee (GOA, 2024b)

11.4.1.2 Field Programs

Baseline wildlife inventories and nest sweeps occurred from 2021 to 2023 in and around the TLSA to collect site-specific information on the presence of wildlife (Table 11-4). These surveys covered a broad range of wildlife groups and species and focused on SOCC in accordance with the SSIG (GOA, 2013).

Table 11-4: Field wildlife inventories conducted in the Terrestrial Local Study Area

Survey Type	Survey Dates	# of Survey Sites / Transects (total length)	Associated Figure
Amphibian Auditory	May 3-5, 2021 May 25-26, 29-30, 2021 June 7-9, 2021	29 sites	Appendix I1, Figure I1-4
Amphibian Visual	July 22-23, 26, 2021	13 wetlands	
Breeding Bird	May 17-19, 21, 2021 June 3-4, 2021	50 sites	Appendix I1, Figure I1-5
Burrowing Owl	May 17-18, 21, 2021	26 sites 36 transects (80.16 km)	Appendix I1, Figure I1-6
Common Nighthawk	May 4, 25, 29-30, 2021	26 sites	Appendix I1, Figure I1-7
Sensitive Raptor Surveys	Apr 20, 21, 23, 2021	N/A (64.9 km)	N/A
Sharp-tailed Grouse	April 20-21, 23, 2021 May 3-6, 2021	22 sites 11 transects (28.79 km)	Appendix I1, Figure I1-8
Short-eared Owl	May 3-4, 2021 May 25, 29-30, 2021 June 7-8, 2021	27 sites	Appendix I1, Figure I1-9
Yellow Rail	May 25-26, 29-30, 2021 June 7-9, 2021	22 sites	Appendix I1, Figure I1-10
Winter Mammal Tracking	March 17, 2023	6 transects (11.18 km)	Appendix I1, Figure I1-11
2022 Nest Sweeps	March 25, 2022 May 16, 31, 2022 June 17, 27, 2022 July 13, 2022	N/A (236 km)	Appendix I1, Figure I1-12
2023 Nest Sweeps	April 10, 2023 May 5/9-10, 2023 June 7-8/17, 2023	N/A (265 km)	Appendix I1, Figure I1-13

Sensitive Amphibian Inventories

Auditory and visual amphibian inventories were completed to assess species presence, distribution, and habitat associations in the TLSA in accordance with SSIG Section 1.3 (Amphibians: Auditory Survey Guidelines - Survey Protocol) and Section 2.3 (Amphibians: Non-acoustic Survey Guideline – Standard Survey Method; GOA, 2013). Waterbodies holding water at the time of the survey in the TLSA were surveyed (minimum 100 m apart), including open water wetlands, marshes, and anthropogenic dugouts and canals. Some dry temporary waterbodies were also investigated to improve study area coverage.

Auditory surveys were conducted from 29 unique survey points over 10 nights in May and June 2021 (Table 11-4; Appendix I1, Figure I1-4). Auditory surveys began no sooner than 30-minutes after sunset and were completed no later than 1:00 am. Biologists recorded all amphibian species calling in 3-to-9-minute intervals, estimating the number of individuals from each species heard. Individual species were identified by their distinctive calls and an approximation of breeding chorus size at each site was determined using the following calling index scale:

- Rank 0 = none;
- Rank 1 = individuals can be counted, no overlapping calls (1-5 individuals);
- Rank 2 = calls are overlapping, but individuals are distinguishable (6-10 individuals);
- Rank 3 = full chorus is constant and overlapping, individuals cannot be distinguished (>10 individuals)

Visual (non-auditory) amphibian surveys were conducted from 13 wetlands over three days in July 2021. Biologists completed visual amphibian surveys during daylight hours by walking the perimeter of waterbodies and recording all evidence of amphibians (e.g., eggs, larvae, and adults). Extra care was taken to survey for Northern Leopard Frog evidence because eggs and larvae can be patchily distributed (GOA, 2013); additionally, biologists surveyed for irruptive breeders (e.g., Great Plains Toad and Plains Spadefoot), in case they were present but not detected during acoustic surveys.

Information recorded at each survey location included date, arrival time, Global Positioning System (GPS) location, habitat, wetland / waterbody type, and environmental conditions (e.g., air and water temperature, wind speed, water pH, cloud cover, and precipitation). Surveys were discontinued if wind speed was greater than 20 km/hr, if more than light precipitation occurred, or if air temperature was below 10°C at the time of monitoring (GOA, 2013). Unsuitable weather conditions may reduce the efficacy of both auditory and visual surveys: poor weather conditions may reduce the likelihood of amphibians to vocalize, as well as the ability for biologists to detect calls (e.g., from the noise of rain or heavy winds), and it can cause amphibians to take shelter in vegetation or underwater, reducing the efficacy of visual detection.

Breeding Bird Surveys

Bird species, abundance, and community indices were estimated within the TLSA from BBS data, which followed standard point count procedures as described in Ralph (1993), and in accordance with the SSIG (GOA, 2013) and the North American Breeding Bird Survey instructions (GOC, 2023). BBS surveys were completed across 50 survey points over 6 days in May and June 2021 (Table 11-4; Appendix I1, Figure I1-5).

Point counts were conducted at least 400 m apart across the TLSA (Appendix I1, Figure I1-5) and completed in the morning (Sunrise to 10:00 am). Each survey included a 2-minute silent acclimatization period followed by a 5-minute point count. Biologists recorded all species visually and auditorily observed up to 800 m away, along with the number of individuals, behaviour (e.g., flying, perching, singing), and approximate position of each individual from the observer (e.g., distance and direction, including overhead/above). Distance was recorded as a distance class that included "<100 m", "100 - 400 m", and ">400 m" from the observer. Movement of individuals was monitored carefully to minimize the probability of recounting birds within the same or adjacent plots.

Date, time, observer, plot number, GPS waypoint, weather conditions, species identification, and information about active nests were recorded at each survey point. Incidental wildlife observations were also recorded. To reduce bias in bird detection, surveys were not conducted during periods of reduced visibility (e.g., heavy rains, thick fog), or high winds (>20 km/hr), as these conditions can reduce visual and auditory detection of species.

Burrowing Owl Surveys

The study areas are entirely within the mapped sensitivity range for Burrowing Owl (GOA, 2021a), which are listed as Endangered both federally under SARA, and provincially under the AWA (GOC, 2024; GOA, 2024b). Burrowing Owls prefer short vegetation on flat or rolling topography in native prairie or tame pasture. They primarily nest in abandoned American Badger and ground squirrel burrows with an inside diameter of 10 cm or larger (GOA, 2013). Call-playback surveys were completed following the SSIG Section 5.3.2 (Industrial Development Survey Methods) (GOA, 2013).

Biologists conducted call-playback surveys that were 7 minutes long (3-minute passive scanning, 3-minute call playback, 1-minute passive scanning), from vantage points spaced 800 m apart (Appendix I1, Figure I1-6). Call playback surveys were completed from 26 unique survey points over three days in May 2021 (Table 11-4). Biologists also conducted daytime burrow searches across the TLSA by searching 36 linear transects (80.16 km total length; Appendix I1, Figure I1-6), wherein they listened and scanned the landscape for signs of Burrowing Owl activity along each transect. All burrows with an inside diameter greater than 10 cm were searched closely for signs of nesting Burrowing Owls, including the presence of feathers, pellets, fecal material, nest material, or loose soil around burrows (GOA, 2013).

Common Nighthawk Surveys

Common Nighthawk (*Chordeiles minor*) are listed as Special Concern under SARA (GOC, 2024) and classified as Sensitive provincially (GOA, 2020a). During the breeding season, male Common Nighthawks have a territorial diving display that includes a 'boom' sound caused by flexing their wings while diving. They occupy all subregions of Alberta and typically nest in short, sparse, vegetation on flat to rolling topography.

Biologists sought to describe the presence and habitat associations of Common Nighthawk in the TLSA. Common Nighthawk point count with call playback surveys were completed in accordance with Section 15.3.1.1 (Point Count with Call Playback) of the SSIG (GOA, 2013). Common Nighthawk surveys were completed over four evenings (e.g., 1-hour before sunset to 1-hour after

sunset) in May 2021, across the TLSA at 26 unique survey points (Table 11-4; Appendix I1, Figure I1-7). Surveys consisted of 3-minute point counts from stations spaced 400 – 800 m apart. During these surveys, biologists listened and scanned for any sign of Common Nighthawk within 400 m of each survey location. In addition to any observations of Common Nighthawks, the following information was also recorded at each survey location: observer(s), date, arrival time, GPS location, habitat type, weather conditions (e.g., air temperature, wind speed, cloud cover, and precipitation), and any incidental wildlife species present. Surveys were not conducted if wind speeds exceeded 20 km/h or precipitation occurred.

Sensitive Raptor Surveys

The study areas are within the mapped ranges for three sensitive raptor species (GOA, 2021a): Golden Eagle and Prairie Falcon are classified as Sensitive in Alberta (2020a), while Ferruginous Hawk are listed as Threatened under SARA and Endangered under the AWA (Table 11-4; GOC, 2024; GOA, 2024b). Ferruginous Hawk are of conservation concern primarily as a result of the loss of breeding habitat throughout the North American plains, increased landscape modification for agriculture and settlement, declines in prey abundance, and behavioural sensitivity to disturbance while nesting (Bechard & Schmutz, 1995).

Sensitive raptor surveys were completed in accordance with Section 7.3.2.2 (Non-linear Development Surveys) of the SSIG (GOA, 2013). The entire Project area was surveyed up to 1,000 m from the edge of the footprint. The survey consisted of daytime raptor searches across the survey area wherein the biologist scanned a 1,000 m area around the development in search of signs of nesting raptors such as stick nests or behavioural cues (e.g., flushing, aggression). If obstacles, such as hills or obscured line of sight, the biologist surveyed the opposite side of the obstacle up to 1,000 m from the Project. If stick nests were found, biologists described them and recorded their location, as well as observed the area for any signs of raptors to determine the status of the nests and, if occupied, the species using it. Stick nests in good condition that didn't appear occupied would be monitored for signs of activity during subsequent surveys or site visits.

Sharp-tailed Grouse Surveys

Sharp-tailed Grouse are classified as Sensitive in Alberta (GOA, 2020a), but are not federally listed. Breeding individuals congregate on leks (dancing grounds) that are typically situated on slight rises in open areas and used year after year. Lekking is a critical component of Sharp-tailed Grouse reproductive behaviour, and the loss of leks, often as a result of habitat loss, can result in reduced reproductive success if alternate leks are not established nearby. Sharp-tailed Grouse surveys were completed following the SSIG and Alberta Environment and Protected Areas (Alberta EPA) recommended setbacks for wildlife Species at Risk, in accordance with Section 11.3.2.2 (Non-linear Disturbances) of the SSIG (GOA, 2013).

Biologists surveyed the Project area and 500 m buffer on foot in late April and early May 2021 (Table 11-4). Lek searches were completed from 22 survey locations on vantage points spaced 400 - 800 m apart within the TLSA, and by walking 11 linear transects (28.79 km total length; Appendix I1, Figure I1-8). At each survey location, biologists listened and scanned for Sharp-tailed Grouse for 5 minutes, with a focus on lekking (e.g., drumming and dancing) using binoculars and a spotting scope. Any observations indicating a potential lek during these surveys would be immediately followed with observations and a count of all grouse on the lek, using a spotting

scope. Additionally, any suitable lekking habitat (e.g., slight rises or ridges in grassland habitat, with short vegetation) observed during the point counts or while travelling transects, but without Sharp-tailed Grouse present at the time, was inspected closely for evidence of lekking (e.g., grouse feathers, pellets, trampled vegetation). Any leks discovered were mapped and geo-referenced using a hand-held GPS.

Short-eared Owl Surveys

Short-eared Owls (*Asio flammeus*) are federally listed as Special Concern under SARA and provincially classified as May Be at Risk in Alberta (GOC, 2024; GOA, 2020a). Short-eared Owls are more conspicuous when in flight and are most active at dusk. They occupy unforested habitats across Alberta and prefer medium to tall grassland vegetation on flat or rolling topography. Short-eared Owl surveys were completed in accordance with Section 6.3.1.1 (Roadside/Point Count Surveys) of the SSIG (GOA, 2013).

The Short-eared Owl surveys were conducted in May and early June 2021, across 27 survey points (Table 11-4; Appendix I1, Figure I1-9). Surveys were completed in the evening (e.g., 1-hour before sunset to 1-hour after sunset). Biologists conducted 3-minute point counts from locations spaced 400 - 800 m apart. Biologists listened and scanned for any sign of Short-eared Owls within 400 m of the survey location. In addition to recording observations of Short-eared Owls, information recorded included the observer(s), date, arrival time, GPS location, habitat type, weather conditions (e.g., air temperature, wind speed, cloud cover, and precipitation), and any incidental wildlife species present. Surveys were not conducted if wind speeds exceeded 20 km/h or precipitation occurred.

Yellow Rail Surveys

Yellow Rail (*Coturnicops noveboracensis*) are federally listed as Special Concern under SARA, but provincially classified as Undetermined, due to insufficient data for an assessment (GOC, 2024; GOA, 2020a). During the breeding season, male Yellow Rails vocalize using distinctive “clicking” calls. They vocalize primarily at night, from a single location, and respond to playback calls. Given a lack of information on distribution and peak breeding season, Bazin and Baldwin (2007) recommend surveys between late May and early July. Yellow Rail surveys were completed in accordance with Section 14.3.1 (Call Playback Surveys) of the SSIG (GOA, 2013).

Yellow Rail surveys were conducted in late May and early June 2021 in conjunction with the auditory amphibian surveys, to describe presence and habitat associations within the various waterbodies across the TLSA. Over 7 days, call playback surveys were completed at night (e.g., 1-hour after sunset to 1-hour before sunrise), from 22 unique survey points across the TLSA (Table 11-4; Appendix I1, Figure I1-10). The surveys consisted of 5-minutes of passive/silent acclimatization, a 3-minute call-playback sequence and subsequent 2-minute period to listen for response from survey points spaced 250 m to 1,000 m apart. The targeted waterbodies were marshes, temporary waterbodies, and dugouts that contained water at the time of the survey.

In addition to recording Yellow Rail responses to playback calls, information obtained at each sample plot included date, arrival time, GPS location, wetland type, weather conditions (e.g., air and water temperature, wind speed, cloud cover, and precipitation), and any incidental wildlife

species present. Surveys were not conducted if wind speeds exceeded 20 km/h or precipitation occurred.

Winter Mammal Tracking Survey

Mammal species may be elusive, nocturnally active, occur in low densities on the landscape, and have large home ranges; therefore, they can be challenging to detect during site visits. Examination of tracks, trails, and other signs (e.g., scat, dens, kill sites) are often used to detect the presence of mammals. For species active during winter (e.g., mustelids, canids, ungulates), winter mammal tracking is an established method of detection. To assess the presence and habitat use of ungulates (e.g., Pronghorn), carnivores (e.g., Long-tailed Weasel, American Badger), and prey species (e.g., White-tailed Jackrabbit) within the TLSA, a winter track survey was completed following a modified protocol of Section 19.3.1 (Non-invasive Mammal Surveys – Winter Tracking: General Survey Method) of the SSIG (GOA, 2013).

Biologists completed a winter mammal tracking survey in March 2023 (Table 11-4) during daylight hours (9:00 am to 5:00 pm). To maximize detectability, the survey was scheduled 5 days following snowfall (5 - 10 cm) and 3 days following a high-wind event (30 - 60 km/h). Approximately 10 cm of snow covered the entire TLSA with sporadic snow drifts up to 20 cm deep. Biologists surveyed six linear transects (11.18 km total length) on foot (Appendix I1, Figure I1-11). The number of transects was modified from the SSIG protocol that specifies a single 10 km transect be surveyed (GOA, 2013). Multiple transects were conducted to ensure all habitat types affected by the planned disturbance were surveyed.

All mammal tracks that intersected the transects were analyzed; identified species, number of individuals, and direction of travel were recorded. When necessary to confirm species identity, the biologists followed mammal trails off the transect until clear tracks were found. In addition to recording observations of mammal tracks and trails, information recorded included the observer(s), date, arrival time, GPS location, habitat type, weather conditions (e.g., air temperature, wind speed, cloud cover, and precipitation), and any incidental wildlife species present. Areas where focal species were most likely to occur (e.g., treed areas, ground squirrel colonies) were searched more closely for evidence of SOCC (e.g., American Badger).

11.4.1.3 Wildlife and Bird Nest Sweeps

Pre-disturbance General Wildlife Sweeps, and bird nest sweeps were conducted no more than 7 days prior to the start of any disturbance activities in the TLSA (e.g., geotechnical drilling). Wildlife Sweeps were conducted in accordance with the Alberta Wildlife Sweep Protocol and included a ground-based search of the disturbance footprint and 100 m buffer (GOA, 2020b). Wildlife Sweeps focused on identification of sensitive wildlife features that may be at risk of disturbance or destruction, including active mammal dens, snake hibernacula, amphibian breeding ponds, mineral licks, active bird nests, and inactive bird nests with year-round protections (e.g., sensitive raptor stick nests).

Bird nest sweeps were also conducted within the Project area and 100 m buffer and occurred concurrently with the above-described General Wildlife Sweeps. The TLSA is within the B3 nesting zone for migratory birds, which corresponds to a nesting period of April 13 to August 24; this indicates that birds in this region are most likely to nest within that period. Under the MBCA,

SARA, and the AWA, most bird nests are protected from damage, disturbance, and destruction while they are active. For most species, particularly songbirds and waterfowl, nests are only active when occupied. However, sensitive raptor nests and the nests of species listed on Schedule 1 of the MBCA (e.g., Pileated Woodpecker [*Dryocopus pileatus*] nesting cavities) have multi-year protections and these nests retain an active status even while unoccupied for a set period (e.g., 36 months).

If an occupied wildlife feature (e.g., nest, den, breeding pond) was found within the Project boundaries, a species-specific setback was applied until the young dispersed or the feature was no longer otherwise active and determined by a qualified biologist to be no longer at risk from disturbance. Species-specific setbacks are listed in the Wildlife Management Plan (WMP) developed for the Project (Appendix I4). If bird behavioural observations indicative of nesting were seen, but a nest could not be observed, it was assumed that a bird nest was present. A nest was only confirmed present in this way if at least two of the following criteria were met:

- species are identified by sight and/or sound within the expected nesting season and appropriate nesting habitat;
- observation of alarm calling by adult bird(s), which remain within the vicinity after the initial disturbance. Birds may reposition near the nest but will not immediately abandon the area;
- observation of a nest containing eggs or unfledged young;
- observation of an adult bird carrying food to the nest and/or fecal sac away from suitable nesting area; or
- hearing begging calls of unfledged chicks.

If the occupied nest was not directly observed, secondary observations assisted biologists to estimate nesting stage. Food delivery, fecal sac transport, and nestling vocalizations are examples of cues that provided evidence of nestlings present.

Incidental Wildlife Observations

Incidental wildlife sightings are non-target species observations (including direct visual or auditory observations, and indirect signs, such as scat and tracks) during surveys, as well any species observed between surveys. Incidental observations provide an opportunity to record presence of species within the TLSA, for which no formal surveys were conducted. For example, all species of garter snakes are listed as “Sensitive” in Alberta (GOA, 2020a). Several different wildlife surveys (e.g., for amphibians and birds) were conducted in habitats and conditions suitable for garter snake activity, but no specific survey for garter snakes took place. Therefore, if garter snakes were observed during site visits or any other surveys, they were recorded as incidentals. Although incidental observations can demonstrate the presence of a species in the TLSA, the lack of sightings does not prove its absence. Incidental species observations are reported in the results where appropriate, but typically not associated with habitat types, since a standardized survey method is not used for their detection.

11.4.1.4 Wildlife Habitat Assessment

Wildlife habitat was assessed using publicly available datasets and habitat classes were defined based on biological relevance to wildlife indicator species and groups. Habitat classes were mapped based on Grassland Vegetation Inventory (GVI), combined with wetlands (and other

waterbodies), and mapped disturbances. GVI is a spatial dataset that maps vegetation and soil attributes within prairie areas in the White Area of the province (GOA, 2019b). These data are available publicly from the Government of Alberta. GVI polygons were mapped with stereoscopic inventory methods into polygons with a common set of characteristics (vegetation cover, colour, slope, surface texture, etc.) and attributed based on a combination of field collected data (for the TLSA) and confirmed by comparing to aerial photography.

Alberta EPA defines wetlands as land saturated with water long enough to promote formation of water altered soils, growth of water tolerant vegetation, and various kinds of biological activity that are adapted to the wet environment (GOA, 2015a). Common identifying features of wetlands are hydric soils and hydrophytic vegetation, although the vegetation may not always be present if biotic or anthropogenic factors have removed them or prevented their development (National Research Council, 1995).

Surface hydrological features on the Project site have been identified, classified, and delineated, including wetlands and temporary (ephemeral) waterbodies, drainages, watercourses, and anthropogenic waterbodies (Volume 2, Section 10). Wetlands and temporary waterbodies were classified based on definitions in the Alberta Wetland Classification System (AWCS; GOA, 2015a). Watercourses, temporary drainages, and draws were classified based on the Alberta Public Lands Glossary of Terms (GOA, 2017b) and the Alberta Timber Harvest Planning Operating Ground Rules Framework (GOA, 2024d). Anthropogenic waterbodies, including features such as dugouts, reservoirs, ditches, and industrial/stormwater ponds, were classified based on aerial imagery observations such as linear edges and observed changes over the historical record and then field confirmed.

In the TLSA, wetlands and waterbodies were identified, classified, and boundaries delineated in accordance with the Alberta Wetland Identification and Delineation Directive (GOA, 2015b). The Alberta Merged Wetland Inventory (AMWI; GOA, 2017c) and hydrological mapping (e.g., FWMIS, Base Features Mapping) were reviewed to identify possible onsite wetlands and waterbodies. Wetland boundaries were then delineated using a Geographic Information System prior to fieldwork using imagery obtained from the Alberta EPA Informatics Branch, Air Photo Distribution and from Esri®. Mapping was then updated in the field using a hand-held GPS. In the TRSA, the same initial sources (e.g., AMWI, Base Features, and hydrological mapping) were compiled to map and classify wetlands and other waterbodies. For further information on the waterbodies within the Project area, refer to Volume 2, Section 10 (Vegetation and Wetlands).

For the habitat modelling, wetlands were selected first with the AMWI, and “Open water”, “Marsh”, and “Swamp” classes included as primary wetland types. An additional waterbody type “River” was sourced from the GVI to account for the Bow River and canals that passes through the TRSA.

Habitat Classification

To describe the habitat types that may be ecologically important for wildlife, GVI landscape polygons and delineated wetlands were categorized into mutually exclusive habitat classes that followed a descending hierarchy based on quality and scale of the data source. This method ensured that habitat types that are generally small and localized, but may maintain biological relevance (e.g., rural settlements), were included at both study scales.

Waterbodies were classified into four types for wildlife habitat classification, which differ from AWCS: “open water”, “semi-permanent / permanent”, “temporary”, and “watercourses”. Open water is defined as large, permanent natural or anthropogenic lakes, including existing reservoirs (Appendix I3, Plate I3-1). Semi-permanent / permanent waterbodies are defined as small waterbodies containing water for most or all of the growing season, including natural ponds and marshes and anthropogenic dugouts (Appendix I3, Plate I3-2). Temporary waterbodies are defined as all natural and anthropogenic seasonal or intermittent shallow open water wetlands. As defined here, temporary waterbodies also include ephemeral draws and ditches (Appendix I3, Plate I3-3). Watercourses are defined as intermittently to permanently flowing waterbodies of natural and anthropogenic origin and include rivers, streams, and canals (Appendix I3, Plate I3-4). Natural and anthropogenic waterbody sources were combined for broad analysis because species community composition (e.g., richness and density) has been found to be similar for natural and anthropogenic sources, though individual survival outcomes may be poorer at anthropogenic wetlands (Sievers et al., 2017).

Classification of modified upland habitats include cropland, pasture, vegetated disturbance, non-vegetated disturbance, and settlements. Cropland includes landscape polygons consisting of irrigated and non-irrigated cropland as defined by GVI. Similarly, pasture includes polygons classified as irrigated and non-irrigated tame or modified-native pasture (Appendix I3, Plate I3-5). Types of anthropogenic disturbance include vegetated disturbances (e.g., reclaimed transmission line, pipeline rights-of-way, reclaimed gravel pits and trails; Appendix I3, Plate I3-6), non-vegetated disturbances (e.g., highways, paved roads, railways, industrial sites), and settlements (e.g., human rural and urban settlements; Appendix I3, Plate I3-7).

Natural upland habitats include “native prairie” (Appendix I3, Plate I3-8) and “treed” habitat classes (Appendix I3, Plate I3-9). “Native prairie” was assigned to landscape polygons with >60% undisturbed native vegetation and >30% native grass coverage. Treed areas were defined to include GVI landscape polygons that have >30% coverage of trees. This classification method generated approximately 10 undefined polygons that were classified as undisturbed native grassland but were primarily bare ground with <30% vegetation coverage (e.g., mudflats, salt flats). These polygons were classified with native prairie due to their importance to some obligate grassland songbirds (Landry-DeBoer et al., 2023).

Wildlife point count data collected in the field (see Section 11.4.2 TLSA Baseline Results – Field Programs) were overlayed with the above defined habitat classes to analyze the habitat associations of each species record. Surveys covered a circular area with a 400 - 800 m radius; the habitat associated with each species record is based on the location of the observer (e.g., centre point of the survey).

11.4.2 TLSA Baseline Results

11.4.2.1 Field Programs

Sensitive Amphibian Inventories

Auditory amphibian surveys identified only Boreal Chorus Frogs, whereas visual surveys identified both Boreal Chorus Frogs and Northern Leopard Frogs. Adult Northern Leopard Frogs were identified at a single wetland within the Project area in 2021, as well as another wetland

>500 m outside of the Project area, and thus not affected by Project activities. No evidence of breeding was observed, nor were any Northern Leopard Frog calls heard during auditory surveys; therefore, it is unknown whether these wetlands were breeding ponds. However, from a precautionary approach and as recommended by Alberta EPA, a 100 m year-round setback was established from the edge of the onsite breeding pond (GOA, 2021b) in 2022 and applied to subsequent Project activities.

No Northern Leopard Frogs or other sensitive amphibian species were detected in the Project area during any wildlife sweeps, surveys, or site visits from 2022 through 2024, including follow-up visual amphibian searches in 2022 (June 17, July 13) and June 8, 2023. Therefore, it was concluded that Northern Leopard Frogs dispersed through the TLSA in 2021, but no breeding population was established on site.

There were no observations of Great Plains Toad or Plains Spadefoot during auditory or visual amphibian surveys, and none were detected in 2022 during wildlife sweeps, despite suitable rainfall conditions in June 2022, which had >100 mm of rainfall from June 4 - 15, and >50 mm from June 13 - 15. Great Plains Toads and Plains Spadefoot have not been observed in the Project area during any sweeps, surveys, or site visits from 2021 through 2024.

Breeding Bird Surveys

Biologists recorded 38 species (883 individual birds) during BBSs, including 10 SOCC (Appendix I2, Tables I2-1 and I2-4). Records of an incorrectly coded species (species code: REWA; n = 52) were removed from the results due to an inability to confirm species identification with the surveying biologist.

Burrowing Owl Surveys

No Burrowing Owls were detected during the surveys, nor were any Burrowing Owls incidentally observed during any of the surveys, sweeps, or site visits from 2021 through to 2024. Ground searches and burrow checks revealed no evidence of active Burrowing Owl nest burrows, roost sites, or even Burrowing Owl presence.

Common Nighthawk Surveys

No Common Nighthawks were detected during surveys, and none were incidentally observed during any of the 2021, 2022, or 2024 surveys, sweeps, or site visits. One Common Nighthawk was observed during nest sweeps on July 27, 2023, but no Common Nighthawk nests were observed, nor any clear behaviour indicating nesting (see Section 11.4.1.2 Field Programs: Wildlife and Bird Nest Sweeps and Incidental Observations).

Sensitive Raptor Surveys

Sensitive Raptor surveys completed in 2021 identified one active Ferruginous Hawk (FEHA) nest within the Project area (e.g., FEHAN01; see Appendix I3, Plate I3-10). Nesting activity was observed at this nest in every subsequent season (e.g., 2022-2024), though the nest was not successful in 2022 (e.g., no evidence of successful reproduction, nest last observed active that season on May 31). A second Ferruginous Hawk nest (e.g., FEHAN02) was identified in 2022 but was abandoned later that same season. No Ferruginous Hawk activity or signs of nesting were observed at this site during follow-up nest checks nor during any other surveys, sweeps, or site visits.

Because raptors often reuse nests, sensitive raptor nests retain an active designation during the winter following nesting activity, through a full second year, if unoccupied, and until May 31 of the third year. If the nest is documented to be unoccupied in both the second and third year, only as of June 1 of that third year is the nest then considered inactive and no longer retains protection (GOA, 2013). However, if the nest is reused by a sensitive raptor, the timeline for the expiry of active designation resets (GOA, 2013). By this timeline, FEHAN01 remains active, while FEHAN02 became inactive on June 1, 2024. If a Ferruginous Hawk nests in the FEHAN02 in 2025, the nest will regain “active” status.

Active Ferruginous Hawk nests are protected under the AWA (GOA, 2000b) from destruction and disturbance on both private and public lands. While occupied, 1,000 m setbacks were established around the nests. When unoccupied, active Ferruginous Hawk nests maintain 100 m setbacks from Project activities, to protect the nest(s) and surrounding habitat features. Note that the exact location of each nest is not described here as sensitive raptor nest locations are confidential information, reported directly to the government only. For more information, see Appendix I4 (WMP).

Sharp-tailed Grouse Surveys

Sharp-tailed Grouse surveys identified no primary (e.g., leks, individuals), secondary (e.g., feathers, matted grasses), or auditory signs of Sharp-tailed Grouse or their leks within 500 m of the Project. No Sharp-tailed Grouse were detected in other surveys, sweeps, or site visits from 2021 through 2024, nor any evidence of Sharp-tailed Grouse presence.

Short-eared Owl Surveys

No Short-eared Owls were detected during the dedicated surveys in 2021. No Short-eared Owls were incidentally detected during any other surveys, sweeps, or site visits conducted from 2021 through 2024.

Yellow Rail Surveys

No Yellow Rails were detected during the dedicated surveys, and none were incidentally observed during any of the 2021 to 2024 sweeps, surveys, or site visits.

Winter Wildlife Tracking Survey

A winter tracking survey took place during daylight hours on March 17, 2023. During this survey, biologists observed one set of Long-tailed Weasel tracks, three ground squirrel colonies, and one Coyote den. Prairie Long-tailed Weasels are classified as May be at Risk in Alberta, with an unclear population trend, but are not protected under SARA. Coyote dens are protected when active. While Coyotes often reuse dens, they typically have more than one den site selected, so that they can move dens if there is a disturbance. As a result, rather than protecting dens from one year to the next, it is preferable to confirm den status (e.g., active use) prior to determining appropriate setbacks and mitigations.

The Winter Wildlife Tracking Survey therefore further supports the importance of wildlife sweeps to identify active sensitive features prior to any on-site Project activity that could cause den disturbance or destruction.

Wildlife and Bird Nest Sweeps and Incidental Observations

Bird Nest Sweeps and General Wildlife Sweeps in from 2022 to 2024 identified 78 species, including 19 SOCC (14 birds, three mammals, two reptiles; see Appendix I2, Tables I2-3, I2-4). Species-specific setbacks were established to ensure all nests were protected during Geotechnical surveys completed for this Project EIA. During these sweeps, additional visual amphibian surveys also took place, with a focus on detecting Northern Leopard Frogs, though only Boreal Chorus Frogs were identified. Additionally, all potential roosting habitat (e.g., trees, culverts) were examined for signs of roosting bats, however none were observed.

11.4.2.2 TLSA Habitat Assessment

TLSA Habitat Classes

Important habitat classes for wildlife in the TLSA include four types of waterbodies (open water, semi-permanent/permanent, temporary, watercourses), natural upland (native prairie, treed), modified upland (cropland, pasture) and disturbance (vegetated disturbance, non-vegetated disturbance).

Waterbodies constitute approximately 11% of the TLSA, with temporary waterbodies the largest proportion with 5% (Table 11-5). The existing reservoir and canal infrastructure each make up 2% of the TLSA. There are two main canals in the TLSA: the East Branch Canal, which flows south on the western side of the Project footprint and the Snake Lake Canal, which flows east and then northeast through the footprint. The semi-permanent/permanent class, comprised mainly of anthropogenic dugouts, covers the smallest area at <2% of the TLSA.

Table 11-5: Summary of habitat classes in the Terrestrial Local Study Area

Habitat Class	Local Study Area	
	Area (ha)	% of TLSA
Natural Upland	**1,259.0**	**76.0**
• Native prairie	1,243.2	75.0
• Treed	15.8	1.0
Modified Upland	**155.7**	**9.4**
• Cropland	24.0	1.4
• Pasture	131.7	8.0
Waterbodies	**176.5**	**10.6**
• Open water	34.9	2.1
• Semi-permanent / permanent	26.9	1.6
• Temporary	81.3	4.9
• Watercourse	33.4	2.0
Disturbance	**66.7**	**4.0**
• Vegetated disturbance	45.9	2.8
• Non-vegetated disturbance	20.8	1.2
TLSA Total[1]	**1,657.9**	**100.0**

[1] Totals may not add up to exact total study area, due to rounding errors

Natural upland habitats, mostly native prairie, makes up 76% of the TLSA. Treed habitats are a very small proportion of the TLSA (1%) but were included as a distinct habitat type because tree stands have been shown to influence wildlife biodiversity in prairie landscapes (Cunningham & Johnson, 2006). Within the TLSA, there is one polygon defined as treed habitat on the southwestern edge of the Project area; trees within the Project were cut down in winter of 2022, but the remnants were not removed. Additional trees exist in the TLSA beyond the Project boundary. Downed trees and large shrubs remain on site and provide high-quality nesting habitat for migratory birds and winter cover for mammals and upland gamebirds.

Modified upland habitats (cropland, pasture) make up 9% of the TLSA and disturbance habitats (e.g., vegetated [reclaimed pipelines, historic gravel pits] and non-vegetated [industrial lease sites, roads, railways] disturbances) cover 4%. Pasture makes up 60% of these modified and disturbed habitats. Pasture and cropland are found on the western side of the study area outside of the Project footprint and a large, vegetated disturbance (e.g., historic gravel pit) is in the northeast section of the TLSA.

TLSA Wildlife Communities by Habitat

The systematic wildlife surveys (e.g., breeding surveys and point counts; see Table 11-4) identified 99 species in the TLSA. However, 39 of these species were only observed incidentally, and these observations did not include counts or locations; therefore, these species are excluded from the following habitat associations. The remaining 60 species observed during systematic surveys included two amphibian, six mammal, and 52 bird species. However, note that many species occurred in multiple habitat types, and therefore and species richness across habitat types is not additive (e.g., while there was a total of 60 species identified, many species were identified in multiple habitats, and therefore summing species richness would be misleading;

Table 11-6). Species richness expresses the total number of species observed across all systematic surveys described above, in each habitat type. The species richness percentage in Table 11-6 is a percentage of the species richness in one habitat type out of the total of 60 species observed. Unique species richness, in contrast, represents the number of species that were observed in only one habitat type; a total of 32 species were observed in only one habitat type (Table 11-6). See Appendix I-1, Figures I1-4 to I1-11 for survey point locations and transects. Appendix I2 contains lists of species from systematic surveys (Appendix I2, Table I2-1 and Table I2-2) and incidental observations (Appendix I2, Table I2-3).

Table 11-6: Summary of wildlife species richness and abundance in the Terrestrial Local Study Area recorded during systematic surveys

Habitat Group	Habitat Class	Species Richness	Species Richness (%)	Unique Species Richness	Individuals (Count)	Individuals (%)
Natural Upland	Native prairie	48	80	25	1,041	83
	Treed	11	18	1	19	1
Modified Upland	Cropland	0	0	0	0	0
	Pasture	0	0	0	0	0
Waterbody	Watercourse	6	10	0	29	2
	Open water	3	5	1	22	2
	Semiperm./ permanent	12	20	2	32	3
	Temporary	21	35	2	102	8
Disturbance	Vegetated	8	13	1	18	1
	Non-vegetated	0	0	0	0	0
Total		**N/A** (60 species across the TLSA)	**N/A**	**32**	**1,263**	**100**

There were 51 unique species recorded in natural upland habitats, with eight species found in both prairie and treed habitats. Within the natural Upland habitat, 48 species (80% of species) and 82% of all individuals were observed in native prairie. Additionally, 25 species were recorded only in native prairie habitat, including mammals (e.g., Pronghorn, White-tailed Jackrabbit), shorebirds (e.g., American Avocet), songbirds (e.g., Baltimore Oriole [*Icterus galbula*]), and waterfowl (e.g., Canada Goose). Native prairie is the largest and most sampled habitat type in the TLSA, so it is expected to contain the greatest species richness and abundance. There were 11 species observed in the treed habitat class; which included generalist species (e.g., American Robin [*Turdus migratorius*], Black-billed Magpie [*Pica hudsonia*]) and raptors (e.g., Great Horned Owl, Ferruginous Hawk). This supports findings that treed habitats are often avoided by grassland specialists and ground-nesting birds (Thompson et al, 2014), possibly due to lower native vegetative cover (Lockhart & Koper, 2018) and/or increased use by predators (e.g., raptors,

corvids; Ellison et al., 2013). When treed habitat is uncommon, as is typical in grassland ecosystems, it is particularly important to those species' dependant on this habitat (e.g., raptors, corvids).

Vegetated disturbance habitats cover 2% of the TLSA and had a species richness of 8 (13% of species) which comprised 1% of individuals. The largest vegetated disturbance area in the TLSA is a historic gravel pit with revegetated topsoil and spoil piles, including grasses and deciduous trees. Within a largely homogenous local landscape, the revegetated quarry provides localized nesting habitat for birds of prey and migratory birds, as well as undulating topography that may benefit denning mammals (Germano et al., 2016). Prey species including Richardson's Ground Squirrel, White-tailed Jackrabbits, and Meadow Voles (*Microtus pennsylvanicus*) were observed within 100 m of the quarry, which likely attracts avian and mammalian predators. For example, six species of raptor were incidentally observed roosting, nesting, or flying over the revegetated gravel quarry and raptors have nested at this site. Similarly, Coyote scat, tracks, and dig signs were observed in the quarry during each site visit since 2021 and Long-tailed Weasel tracks were observed within 50 m south of the quarry in 2023. The other vegetated disturbances in the TLSA are reclaimed pipeline rights-of-way and vegetated trails that do not support meaningful species richness (Lockhart & Koper, 2018).

There were 29 species observed in waterbodies, including 27 bird species. Of the waterbodies, temporary waterbodies had the highest richness with 21 species observed, followed by 12 species in semi-permanent/permanent waterbodies. Two amphibian species were detected in the TLSA (Boreal Chorus Frog and Northern Leopard Frog). Semi-permanent/permanent waterbodies were the only habitat type to contain both observed amphibian species. The TLSA is in the distribution ranges of other sensitive amphibians such (e.g., Plains Spadefoot and Great Plains Toad), but these species can remain dormant for years underground and only emerge to breed following significant rainfall. A high rainfall event (>100 mm) occurred in June 2022 and toads were not detected during site visits 7 - 14 days post-rain. Many of the temporary waterbodies in the TLSA have high salinity and may not provide suitable habitat for breeding toads.

Only three individuals of two reptile species (e.g., Plains Garter Snake and Wandering Garter Snake) were observed incidentally in the TLSA. No hibernacula were found, but Wandering Garter Snakes sometimes overwinter in subterranean burrows, which decreases the likelihood of detection in a prairie environment (Alberta Conservation Association, 2020). The revegetated gravel pit is the most likely hibernacula site in the TLSA; however, biologists searched the gravel pit in 2022 and 2023 for snake hibernacula and no evidence was observed. All observations of garter snakes were recorded more than 1.5 km from the gravel pit.

TLSA Species of Conservation Concern

The habitat associations for SOCC in the TLSA are based on results of systematic surveys (e.g., breeding surveys and point counts). Including incidental and systematic surveys, there were 26 SOCC observed in the TLSA; of these 19 SOCC and 123 individuals recorded during systematic surveys. These include one amphibian, two mammal, and 16 bird species (Table 11-7). It is interesting to note that no SOCC were recorded in the modified upland (e.g., cropland, pasture) and non-vegetated disturbance habitat classes. Table 11-8 is a summary of the richness and

abundance of SOCC found within the TLSA habitat classes that were recorded during systematic surveys.

Native prairie habitat had the largest species richness with 13 species and 75% of SOCC individuals counted, including eight species observed only in native prairie habitat. Three species and 3% of individuals were recorded in vegetated disturbance habitat, which corresponds with the 2% landscape coverage in the TLSA. Two habitat classes had a single SOCC individual recorded: a Bank Swallow in open water habitat and a Common Yellowthroat (*Geothlypis trichas*) in treed habitat.

Table 11-7: Summary of species richness and abundance for species of conservation concern recorded in the Terrestrial Local Study Area during systematic surveys

Habitat Group	Habitat Class	Species Richness	Species Richness (%)	Unique Species Richness	Individuals (Count)	Individuals (%)
Natural upland	Native prairie	13	68	10	92	75
	Treed	1	5	1	1	<1
Modified upland	Cropland	0	0	0	0	0
	Pasture	0	0	0	0	0
Waterbody	Watercourse	2	10	0	2	2
	Open water	1	5	0	5	4
	Semiperm./ permanent	2	10	2	12	10
	Temporary	5	26	1	7	6
Disturbance	Vegetated	3	15	1	4	3
	Non-vegetated	0	0	0	0	0
Total		**N/A** (19 species across the TLSA)	**N/A**	15	123	100

Table 11-8: Species of conservation concern recorded in the Terrestrial Local Study Area through systematic surveys and incidental observations, by habitat class

Common Name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Disturb.	Detected During Systematic Surveys[3]					Incidental Observation[4]
			Watercourse	Open Water	Semiperm. / Permanent	Temporary	Native Prairie	Treed	Vegetated	Breeding Bird Surveys	Amphibian Surveys	Sensitive sp. Point Counts	Sensitive sp. Transects	Historic FWMIS	
Amphibian															
Northern Leopard Frog	At Risk	Special Concern	-	-	11	-	-	-	-		✓				
Bird															
American White Pelican	Sensitive	-	-	5	-	-	2	-	-	✓		✓			✓
Baird's Sparrow	Sensitive	Special Concern	-	-	-	-	7	-	1	✓					
Bank Swallow	Sensitive	Threatened	-	-	1	-	-	-	-			✓			
Barn Swallow	May Be at Risk	Threatened	1	-	-	1	-	-	1	✓		✓			✓
Black-crowned Night-heron	Sensitive	-	-	-	-	-	2	-	-					✓	
Black-necked Stilt	Sensitive	-	-	-	-	1	2	-	-		✓				
Chestnut-collared Longspur	May Be at Risk	Endangered	-	-	-	-	3	-	-	✓					✓
Common Yellowthroat	Sensitive	-	-	-	-	-	-	1	-			✓			
Eared Grebe	Sensitive	-	1	-	-	-	1	-	-	✓		✓			
Eastern Kingbird	Sensitive	-	-	-	-	-	2	-	-					✓	✓
Ferruginous Hawk	At Risk	Threatened	-	-	-	-	-	-	2	✓					✓
Grasshopper Sparrow	Sensitive	-	-	-	-	2	4	-	-	✓					
Great Blue Heron	Sensitive	-	-	-	-	-	1	-	-	✓					
Long-billed Curlew	May Be at Risk	Special Concern	-	-	-	-	35	-	-	✓	✓	✓	✓		✓
Sora	Sensitive	-	-	-	-	1	-	-	-		✓				
Sprague's Pipit	Sensitive	Threatened	-	-	-	2	29	-	-	✓			✓		✓

Common Name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Disturb.	Detected During Systematic Surveys[3]					Incidental Observation[4]
			Watercourse	Open Water	Semiperm. / Permanent	Temporary	Native Prairie	Treed	Vegetated	Breeding Bird Surveys	Amphibian Surveys	Sensitive sp. Point Counts	Sensitive sp. Transects	Historic FWMIS	
Mammal															
Prairie Long-tailed Weasel	May Be at Risk	-	-	-	-	-	1	-	-				✓		
Pronghorn	Sensitive	-	-	-	-	-	3	-	-		✓				✓
SOCC only observed by incidental observations[4]															
Common Nighthawk	Sensitive	Special Concern	-	-	-	-	-	-	-						✓
Golden Eagle	Sensitive	-	-	-	-	-	-	-	-						✓
Horned Grebe	Sensitive	Special Concern	-	-	-	-	-	-	-						✓
Loggerhead Shrike	Sensitive	Threatened	-	-	-	-	-	-	-						✓
Plains Garter Snake	Sensitive	-	-	-	-	-	-	-	-						✓
Trumpeter Swan	Sensitive	-	-	-	-	-	-	-	-						✓
Wandering Garter Snake	Sensitive	-	-	-	-	-	-	-	-						✓

* Hyphen (-) indicates species not listed in source
[1] GOA. (2020a). Wild Species Status Search
[2] GOC. (2024). Species at Risk Public Registry
[3] Systematic survey detections have a GPS point associated with record
[4] Incidental observations do not have a GPS point associated with record (e.g., habitat association is not possible)

TLSA Grassland Songbirds

Most of the 2021 BBS locations were within native prairie (Appendix I1, Figure I1-5). The remaining survey points were within the following habitat classes. There were no BBS points situated within open water, semi-permanent/permanent waterbodies, pasture, cropland, and non-vegetated disturbance. To prevent multiple counts of the same breeding pairs, the results are limited to the first species record from each survey point (e.g., records from June surveys were excluded if the same species was recorded from the same survey point in May). Within these parameters, eight obligate grassland songbird species (168 observations, 569 individuals) were recorded including four SOCC (Baird's Sparrow, Chestnut-collared Longspur, Grasshopper Sparrow, and Sprague's Pipit) and four secure species (Horned Lark, Savannah Sparrow [*Passerculus sandwichensis*], Vesper Sparrow, and Western Meadowlark; Table 11-9). No obligate grassland songbirds were recorded from the survey point in the treed habitat class.

Overall, 93% of the individuals counted and all eight species were recorded within the native prairie habitat class. Only 8% of the individuals were SOCC and 90% were recorded within native prairie habitat, with 94% of secure species individuals also recorded in native prairie habitat. Chestnut-collared Longspur and Vesper Sparrow were observed exclusively in native prairie. The second greatest obligate grassland species richness occurred in vegetated (e.g., temporary) waterbodies (five species), followed by vegetated disturbance (four species), though these habitat classes only contained 4% and 2% of individuals, respectively. Horned Lark and Western Meadowlark were both found within four habitat class types and were the most abundant species recorded (77% of all individuals).

Sprague's Pipit was the most abundant grassland songbird SOCC observed in the TLSA and was recorded in native prairie and temporary waterbody habitat classes, with 94% of individuals recorded in native prairie habitat. In addition to the BBS results, Sprague's Pipit were also recorded during Area Searches in vegetated disturbance habitats (reclaimed pipelines, oil and gas well sites). They were not observed within 300 m of the vegetated gravel pit in the TLSA, modified upland habitat classes, or the treed habitat class; which are habitat types usually avoided by ground-nesting birds (Thompson, Arnold, & Amundson, 2014). This species is most often associated with large areas of intact native grassland, though will nest in lightly grazed pasture and habitats with up to 15% bare ground (Fisher & Davis, 2011; Lockhart & Koper, 2018).

Table 11-9: Number of obligate grassland songbird individuals recorded in Terrestrial Local Study Area habitat classes during May 2021 Breeding Bird Surveys

Common Name	Provincial Status[1]	SARA Status*[2]	Natural Upland	Waterbodies		Disturb.	Observed w/in 200 m	
			Native prairie	Watercourse	Vegetated	Vegetated	Open waterbodies	Pasture or cropland
Species of Conservation Concern (SOCC)								
Baird's Sparrow	Sensitive	Special Concern	7	-	-	1	✓	-
Chestnut-collared Longspur	May Be at Risk	Endangered	3	-	-	-	✓	-
Grasshopper Sparrow	Sensitive	-	4	-	2	-	-	-
Sprague's Pipit	Sensitive	Threatened	29	-	2	-	✓	-
Secure Species								
Horned Lark	Secure	-	222	1	6	4	✓	✓
Savannah Sparrow	Secure	-	71	-	8	1	✓	✓
Vesper Sparrow	Secure	-	2	-	-	-	-	-
Western Meadowlark	Secure	-	194	2	6	4	✓	✓

* Hyphen (-) indicates species not listed in source
1 GOA. (2020a). Wild Species Status Search
2 GOC. (2024). Species at Risk Public Registry
There were no BBS points situated within open water, semi-permanent/permanent waterbodies, pasture, cropland, and non-vegetated disturbance. No obligate grassland songbirds were observed in treed habitats.

The distribution of BBS points in the TLSA heavily biased the native prairie habitat class for several reasons: 1) native prairie habitat is the dominant habitat class in the area (75% coverage); 2) survey points were selected based on the BBS protocol requirement that survey points be a minimum of 400 m apart; 3) biologists did not have permission to access some of the surrounding privately-owned lands (e.g., pasture and cropland in the west); and 4) surveys could not be conducted from within the boundaries of open water wetlands. Two BBS points were located within 200 m of modified upland habitats (e.g., cropland, pasture) and three grassland songbirds were observed at these points (1-2 individuals each); all of which were secure species (Table 11-8). There were 11 BBS points located within 200 m of open water and/or semi-permanent/permanent waterbodies and six species were observed at these points (<5 individuals each), including three SOCC. These results agree with Sliwinski and Koper (2012) who found the abundance of Chestnut-collared Longspur, Horned Lark, and Sprague's Pipit increases with distance from both cropland and wetlands. In that study, Western Meadowlark and Vesper Sparrow were not affected by distance to edges; however, Savannah Sparrow abundance increased close to waterbodies. Similarly, Lockhart and Koper (2018) found that the amount of

intact grassland had less of an effect on most songbird species abundance than the amount of fragmentation (e.g., roads) and modification (e.g., conversion to pasture) of grassland habitats, which correlated with decreased abundance.

11.4.3 TRSA Baseline Results

11.4.3.1 TRSA Habitat Assessments

TRSA Habitat Classes

The habitat classes for the TRSA include four types of natural upland (native prairie, treed), modified upland (cropland, pasture), waterbodies (open water, semi-permanent/permanent, temporary, watercourses), and three types of disturbance (vegetated, non-vegetated, settlements; Table 11-10). Settlement habitat within the TRSA are primarily rural residences and localities with the largest settlement being the village of Rosemary, AB (population <500) (GOA, 2012a).

Table 11-10: Summary of habitat classes in the Terrestrial Regional Study Area

Habitat Type	Regional Study Area	
	Area (ha)	% of TRSA
Natural Upland	**45,737.2**	**51.8**
• Native prairie	45,687.2	51.7
• Treed	50.0	<0.1
Modified Upland	**29,794.7**	**33.7**
• Cropland	9,550.9	10.8
• Pasture	20,243.8	22.9
Wetlands and Watercourses	**9,583.1**	**10.8**
• Open water	3,723.4	4.2
• Semi-permanent / permanent	4,714.5	5.3
• Temporary	442.0	0.5
• Watercourse	703.2	0.8
Disturbance	**3,291.1**	**3.7**
• Vegetated disturbance	459.1	0.5
• Non-vegetated disturbance	1,943.2	2.2
• Settlement	888.8	1.0
TRSA Total[1]	**88,406.2**	**100.0**

[1] Totals may not add up to exact total study area, due to rounding errors

Wetlands and watercourses cover 11% of the TRSA and encompass both anthropogenic and natural waterbodies. The largest waterbodies in the TRSA include the San Francisco Lake and existing reservoirs (Snake Lake, Rock Lake, and Lathom Lake). The largest watercourse is the Bow River in the southwest of the TRSA, though the TRSA is intersected by a multitude of small watercourses including canal infrastructure and natural drainages.

The habitat type covering the greatest area within the TRSA was natural upland habitat, which constituted 52% of the TRSA, most of which is native prairie habitat. Treed habitats constituted a

very small proportion of the TRSA (<0.1%) but provide important nesting habitat for many migratory birds and raptors (Ellison et al., 2013).

Modified upland habitats are the second most abundant habitat group in the TRSA (34%); most of this habitat group is tame pasture (23%). Disturbed habitat types constitute a small proportion of the TRSA (4%) but may have large effects on wildlife due to fragmentation (e.g., roads or settlements).

TRSA Wildlife Communities by Habitat

Habitat association data for the TLSA were combined with FWMIS records collected using systematic survey methods (e.g., BBS and point counts) from 2012 to 2023 to create a dataset of species associated with habitat classes in the TRSA (Appendix I2, Table I2-2). Area searches and incidental or random observations were grouped with citizen science data to compile a list of incidental wildlife species observed in the TRSA (Appendix I2, Table I2-3). Overall, there were 214 species observed in the TRSA with 154 recorded via systematic surveys, which included two amphibians, 12 mammals, and 143 birds. Table 11-11 is a summary of the richness and abundance of wildlife species found within the TRSA habitat classes that were recorded using systematic surveys.

Native upland habitat again held the greatest species richness, with 136 species detected in native upland habitats, all within native prairie (Table 11-11). Of those species, 12 were also observed in treed habitats including one Boreal Chorus Frog, and 11 bird species. The Boreal Chorus Frog may have been a dispersing individual or in a wet area within the trees. Similar to the TLSA, the bird species observed in treed habitats were those with more generalist habitat requirements (e.g., American Robin, Black-billed Magpie, Yellow Warbler [*Dendroica petechia*]) and a raptor (e.g., Red-tailed Hawk). A single record of Clay-colored Sparrow (*Spizella pallida*) was the only grassland songbird recorded in treed habitats. However, treed habitat covers <1% of the TRSA landscape, so there may be sampling bias that limits detection of species in the habitat class. Furthermore, Clay-coloured Sparrows are known to select shrubby habitat, so the treed area may have represented a compromise to the limited shrub availability in the grassland habitat.

Modified upland habitats cover 34% of the TRSA (Table 11-10) and had the second highest species richness with 99 unique species recorded, including 93 species in tame pasture and 54 species in cropland. Disturbed habitats had a similar overall richness of 91 species, but the habitat class covers less 4% of the TRSA landscape. Unlike the TLSA, non-vegetated disturbance had the highest species richness of disturbed habitats with 84 species, compared to 25 species in vegetated disturbance. Species observations are associated with the GPS point recorded at the time of survey, so it is possible that there is some bias towards this habitat type due to surveys being conducted from roads.

Table 11-11: Summary of wildlife species richness and abundance in the Terrestrial Regional Study Area recorded during systematic surveys (2012-2023)

Habitat Group	Habitat Class	Species Richness	Species Richness (%)	Unique Species Richness	Individuals (Count)	Individuals (%)
Natural upland	Native prairie	136	88	23	103,304	60
	Treed	12	8	0	19	<1
Modified upland	Cropland	54	35	0	5,700	3
	Pasture	93	60	2	13,194	8
Waterbody	Watercourse	44	29	3	16,256	9
	Open water	59	38	1	726	<1
	Semiperm./ permanent	70	45	3	16,987	10
	Temporary	22	14	1	70	<1
Disturbance	Vegetated	25	16	0	547	<1
	Non-vegetated	84	54	2	15,844	9
	Settlement	33	21	0	146	<1
TRSA Total		**N/A** (154 species across the TRSA)	**N/A**	**35**	**172,793**	**100**

There were 95 species observed in waterbodies, the majority (70 species) of which were observed in semi-permanent/permanent waterbodies. Three amphibian species were detected in the TRSA (Boreal Chorus Frog, Northern Leopard Frog, Wood Frog [*Lithobates sylvatica*]), though Wood Frogs were only observed incidentally. Most amphibian observations were recorded in native prairie (28% of records). All amphibian records were within 200 m of wetlands.

TRSA Species of Conservation Concern

The habitat associations for SOCC in the TRSA are based on results of systematic surveys (e.g., breeding surveys, point counts). A summary of the species richness for each habitat class is presented in Table 11-12. Overall, there were 50 SOCC observed in the TRSA from all methods (e.g., including incidental observations), with 37 SOCC observed during systematic surveys (Tables 11-12, 11-13). The species found in each habitat class, including their federal and provincial status, are found in Table 11-13.

Table 11-12: Summary of species of conservation concern richness and abundance in the Terrestrial Regional Study Area

Habitat Group	Habitat Class	Species Richness	Species Richness (%)	Unique Species Richness	Individuals (Count)	Individuals (%)
Natural upland	Native prairie	31	83	7	1,157	65
	Treed	1	3	0	1	<1
Modified upland	Cropland	7	19	0	46	3
	Pasture	20	54	1	218	12
Waterbody	Watercourse	4	11	0	4	<1
	Open water	11	30	0	16	1
	Semiperm./ permanent	15	41	0	142	8
	Temporary	1	3	1	1	<1
Disturbance	Vegetated	4	11	0	56	3
	Non-vegetated	18	49	1	123	7
	Settlement	3	8	0	10	<1
TRSA TOTAL		**N/A** (37 species across the TRSA)	**N/A**	**10**	**1,774**	**100**

Table 11-13: Wildlife species of conservation concern observed in the Terrestrial Regional Study Area, by habitat class

Common Name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance		
			Watercourse	Open water	Semiperm. / Permanent	Temporary	Native prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated	Settlement
Amphibians													
Northern Leopard Frog	At Risk	Special Concern	-	-	16	-	-	-	-	-	-	-	-
Birds													
American Bittern	Sensitive	-	-	-	-	-	-	-	-	1	-	-	-
American Kestrel	Sensitive	-	1	-	-	-	3	-	-	1	-	-	-
American White Pelican	Sensitive	-	-	2	-	-	207	-	-	8	-	6	-
Baird's Sparrow	Sensitive	Special Concern	-	2	5	-	107	-	2	9	50	3	-
Bald Eagle	Sensitive	-	-	1	-	-	1	-	-	2	-	1	-
Bank Swallow	Sensitive	Threatened	-	-	-	-	1	-	-	-	-	-	-
Barn Swallow	May Be at Risk	Threatened	-	-	-	-	13	-	-	1	-	16	8
Black Tern	Sensitive	-	-	1	-	-	-	-	3	-	-	-	-
Black-crowned Night-Heron	Sensitive	-	-	-	-	-	3	-	-	-	-	-	1
Black-necked Stilt	Sensitive	-	-	4	29	-	11	-	-	-	2	7	-
Brewer's Sparrow	Sensitive	-	-	-	-	-	1	-	-	-	-	-	-
Chestnut-collared Longspur	May Be at Risk	Endangered[3]	-	-	2	-	240	-	7	6	-	30	-
Common Nighthawk	Sensitive	Special Concern	-	-	-	-	1	-	-	-	-	-	-
Common Yellowthroat	Sensitive	-	-	1	11	-	10	1	-	1	-	-	-
Eared Grebe	Sensitive	-	-	-	27	-	8	-	-	-	-	-	-
Eastern Kingbird	Sensitive	-	1	1	1	-	6	-	-	9	-	2	-
Ferruginous Hawk	At Risk	Threatened	1	-	3	-	28	-	1	4	-	4	-

Common Name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance		
			Watercourse	Open water	Semiperm. / Permanent	Temporary	Native prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated	Settlement
Forster's Tern	Sensitive	-	-	-	-	-	2	-	-	-	-	-	-
Golden Eagle	Sensitive	-	-	-	-	-	1	-	-	-	1	1	-
Grasshopper Sparrow	Sensitive	-	-	-	2	-	34	-	-	11	-	2	-
Great Blue Heron	Sensitive	-	-	-	1	-	8	-	-	-	-	1	-
Horned Grebe	Sensitive	Special Concern	-	-	-	-	8	-	4	1	-	-	-
Loggerhead Shrike	Sensitive	Threatened	-	-	-	-	-	-	-	-	-	2	-
Long-billed Curlew	May Be at Risk	Special Concern	1	1	1	-	53	-	9	15	1	21	-
Pied-billed Grebe	Sensitive	-	-	1	30	-	1	-	-	-	-	-	-
Prairie Falcon	Sensitive	-	-	-	-	-	1	-	-	1	-	3	-
Sandhill Crane	Sensitive	-	-	-	14	-	129	-	-	71	-	-	-
Sharp-tailed Grouse	Sensitive	-	-	-	-	-	19	-	20	6	-	-	-
Short-eared Owl	May Be at Risk	Special Concern	-	-	-	-	1	-	-	-	-	-	-
Sora	Sensitive	-	-	1	-	1	-	-	-	2	-	3	1
Sprague's Pipit	Sensitive	Threatened	-	-	3	-	208	-	-	26	-	5	-
Trumpeter Swan	Sensitive	-	-	-	-	-	20	-	-	-	-	15	-
Upland Sandpiper	Sensitive	-	-	-	-	-	7	-	-	3	-	1	-
Western Grebe	At Risk	Special Concern	-	-	-	-	17	-	-	40	-	-	-
White-faced Ibis	Sensitive	-	-	1	2	-	1	-	-	-	-	-	-
Mammals													
Pronghorn	Sensitive	-	-	-	-	-	7	-	-	-	2	-	-

* Hyphen (-) indicates species not listed in source

[1] GOA. (2020a). Wild Species Status Search

[2] GOC. (2024). Species at Risk Public Registry

[3] Recommended for Endangered status by the scientific sub-committee of the Endangered Species Conservation Committee (GOA, 2024b)

TRSA Grassland Songbirds

Grassland songbird records were limited to BBS conducted in May to July from 2012 to 2023. To prevent multiple counts of the same breeding pairs, the results were limited to the first species record from each survey point for each year. Within these parameters, the same eight obligate grassland songbird species (1,080 observations, 1,798 individuals) as the TLSA were recorded in the TRSA using systematic survey methods (Table 11-14). No grassland songbirds were recorded from treed or settlement habitat classes.

Table 11-14: Number of obligate grassland songbirds recorded in the Terrestrial Regional Study Area habitat classes, from 2012 to 2023

Common Name	Provincial Status[1]	SARA Status*[2]	Natural Upland	Modified Upland		Waterbodies				Disturbed	
			Native Prairie	Cropland	Pasture	Watercourse	Open Water	Semiperm. / Permanent	Temporary	Vegetated	Non-vegetated
Species of Conservation Concern (SOCC)											
Baird's Sparrow	Sensitive	Special Concern	37	2	8	-	2	5	-	1	-
Chestnut-collared Longspur	May Be at Risk	-[3]	14	7	4	-	-	1	-	-	2
Grasshopper Sparrow	Sensitive	-	13	-	11	-	-	2	2	-	-
Sprague's Pipit	Sensitive	Threatened	81	-	23	-	-	2	2	-	-
Secure Species											
Horned Lark	Secure	-	281	41	25	1	-	5	7	10	44
Savannah Sparrow	Secure	-	227	20	71	2	5	22	12	5	11
Vesper Sparrow	Secure	-	81	32	35	-	-	6	-	8	43
Western Meadowlark	Secure	-	400	27	100	2	7	14	9	9	17

* Hyphen (-) indicates species not listed in source
[1] GOA. (2020a). Wild Species Status Search
[2] GOC. (2024). Species at Risk Public Registry
[3] Recommended for Endangered status by the scientific sub-committee of the Endangered Species Conservation Committee (GOA, 2024b)
No grassland songbirds were recorded from treed or settlement habitat classes.

A total of 63% of the individuals were recorded within the (dominant) native prairie habitat class. Only 12% of the individuals recorded were SOCC (e.g., Baird's Sparrow, Chestnut-collared Longspur, Grasshopper Sparrow, and Sprague's Pipit) and 66% of those individuals were recorded in native prairie habitat. All eight species and 13% of all individuals were recorded in

pasture habitat (23% landscape coverage), which was the second most observed habitat class for all but two species (e.g., Chestnut-collared Longspur, Horned Lark). Additionally, all eight species and 3% of individuals were recorded in semipermanent/permanent waterbodies, which covers 5% of the TRSA. A combined 3% of individuals were associated with watercourses, open water, and temporary waterbodies, though only six SOCC individuals were found in these waterbodies.

Four secure obligate grassland species were recorded in all the upland habitat types (natural, modified, disturbed), and Savannah Sparrow and Western Meadowlark were recorded in all the habitat classes represented. Horned Lark, Savannah Sparrow, and Western Meadowlark were the most abundant grassland songbird species (76% of all individuals). Baird's Sparrow was the SOCC associated with the most diverse habitat types, and like the TLSA, Sprague's Pipit was the most abundant with 49% of SOCC individuals.

Unlike in the TLSA, grassland songbirds in the TRSA used modified upland habitats including pasture, cropland, and disturbed habitats, which may reflect the larger landscape scale and possible changes to landscape use in different years. Though studies show that obligate grassland species will nest in planted pasture, these specialists often occur in greatest abundance in native grassland (Sliwinski & Koper, 2012; Lockhart & Koper, 2018; Landry-DeBoer et al., 2023). Davis et al. (2016) showed that nesting in native grassland increased reproductive success and juvenile survival for Sprague's Pipit, Baird's Sparrow, and Chestnut-collared Longspur, compared to planted grassland. Also, female Sprague's Pipit re-nested after a failed nest only in native grassland. Though the location of survey points biases towards native prairie in the TRSA, and native prairie constitutes the largest single habitat type in the region, obligate grassland songbirds are more likely to occupy intact grassland during the nesting season.

TRSA Wildlife Movement Corridors and Habitat Connectivity

The TRSA is approximately 50% native prairie habitat, fragmented by large areas of pasture and cropland. Barriers to terrestrial movement in the TRSA include the Bow River in the southwest, a divided interprovincial highway (the TCH) that bisects the study area east-west, large natural lakes (e.g., San Francisco Lake), large off stream reservoirs (Snake Lake, Rock Lake), and rural and semi-rural human settlements (e.g., Cassils, AB). Semi-permeable barriers are prevalent throughout the TRSA and include canals and industrial infrastructure (e.g., well sites), railways, paved secondary and tertiary highways, gravel county roads, and barbed wire fencing surrounding most land sections. Vegetated disturbances such as reclaimed pipelines and modified upland habitat (pasture, cropland) are present in the TRSA, but represent minimal barriers to terrestrial movement (Alberta Conservation Association, 2023).

There were 58 Pronghorn observations recorded in the TRSA between 2012 to 2022 with 60% of the observations in native prairie, 25% recorded in modified upland habitats, and the remainder in intermittent waterbodies. Though movement of Pronghorn was not measured, only one observation was recorded north of the TCH. This may be due to bias in sampling locations, or it may support findings that major highways are barriers to movement (Robb et al., 2022). Pronghorn were recorded an average of 323 m from non-vegetated disturbances (range: 0 – 1,571 m) and 494 m from open water wetlands (range: 0 – 1,142 m). The Project area is within a continuous corridor of native prairie that is bordered to the west by the existing reservoir, a large

irrigation canal, pasture, cropland, and settlements; while Pronghorn use pasture and cropland during migration, they choose modified habitats less frequently than native prairie and may travel around the expanded reservoir to the east. If so, there is only a 1,600 m wide corridor between the northeast corner of the proposed expansion and the TCH. The proximity of the open water reservoir and large highway may either reduce movement of Pronghorn through the area or cause them to travel close to the highway. This could lead to increased stress for the animals and/or increased instances of human-wildlife conflict (e.g., vehicle collisions; Gavin & Komers, 2006; Gates, et al., 2012).

The Project area is predominantly continuous native prairie habitat and high-quality habitat for Pronghorn. The primary barrier to movement in the TLSA is the SLR; semi-permeable barriers include the canal infrastructure, and gravel roads and barbed wire fencing surrounding the site. Native prairie is also fragmented by the two canals, with associated roads, and by county roads and their ditches which surround the footprint. Vegetated disturbances such as reclaimed pipelines and the revegetated gravel pit do not represent a barrier to movement.

Pronghorn were recorded in native prairie during systematic surveys, but incidentally observed in temporary wetlands, vegetated disturbances, and tame pasture. The observations were an average of 305 m away from the nearest non-vegetated disturbance (range: 69 m – 1,000 m) and 323 m from open water wetlands (range: 25 m - 890 m).

11.4.4 Additional Project Effects on Wildlife

11.4.4.1 Noise, Vibration, and Artificial Lights

Wildlife can adjust their movement and behaviour, including courtship, reproductivity, and feeding patterns, in response to noise, vibration, and artificial light at night (e.g., see Kunc & Schmidt, 2019; Falcón, et al., 2020). Noise, vibration, and artificial light currently experienced in or nearby the Project area is predominantly from TCH traffic and CPKC railway trains. The existing roads along the Project area boundary is not busy, but semitrailers do drive the road regularly. At the Project baseline, cattle grazing and cattle management would have contributed to some noise, and the oil and gas facilities on site would have contributed to some noise and artificial lights in the Project area. For more information on the baseline levels of noise and vibration in the Project area, see Volume 2, Section 5.4.2 (Noise and Vibration).

11.4.4.2 Wildlife Attraction and Human-Wildlife Conflict

No specific surveys measured wildlife attraction to the Project area as a baseline comparison, but there were no signs of food conditioning or behaviours indicating a risk of human-wildlife conflict during any surveys, sweeps or site visits (e.g., 2021-2024). The only activities present at the Project baseline likely to attract wildlife were if remains of cattle were disposed of improperly within the Project area. While some cattle bones were observed within the Project area (see, for example, Volume 2, Section 14), no signs of improper carcass dumping, food waste nor human-wildlife encounters were reported by any personnel involved in any of the environmental work conducted on site in the preparation of this EIA.

11.4.5 Other Baseline Wildlife Indicators

11.4.5.1 Harvested Wildlife

The TLSA is privately-owned land, and neither hunting nor trapping are permitted on the property. Unsurprisingly, there are no records of harvest occurring within the TLSA. However, wildlife harvest for recreation and subsistence is widespread throughout southern Alberta. Table 11-15 lists the species available for harvest and if their presence was recorded within the TLSA and/or TRSA.

Table 11-15: Commonly harvested wildlife observed in the study areas

Common Name	Provincial Status[1]	SARA status*[2]	Observed in study area	
			TLSA	TRSA
Big Game				
Mule Deer	Secure	-	✓	✓
Pronghorn	Sensitive	-	✓	✓
White-tailed Deer	Secure	-	✓	✓
Fur-bearer				
American Badger	Sensitive	Special Concern		✓
Beaver	Secure	-	✓	✓
Coyote	Secure	-	✓	✓
Mink	Secure	-		✓
Muskrat	Secure	-	✓	✓
Short-tailed Weasel (Ermine)	Secure	-	✓	✓
Upland Game Bird				
Gray Partridge	Exotic	-	✓	✓
Ring-necked Pheasant	Exotic	-		✓
Sharp-tailed Grouse	Sensitive	-		✓
Waterfowl				
American Coot	Secure	Not at Risk		✓
American Wigeon	Secure	-		✓
Blue-winged Teal	Secure	-	✓	✓
Bufflehead	Secure	-	✓	✓
Cackling Goose	Accidental/Vagrant	-		✓
Canada Goose	Secure	-	✓	✓
Canvasback	Secure	-		✓
Cinnamon Teal	Secure	-		✓
Common Goldeneye	Secure	-		✓
Common Merganser	Secure	-	✓	✓
Gadwall	Secure	-	✓	✓
Greater Scaup	Secure	-		✓
Greater White-fronted Goose	Secure	-		✓
Green-winged Teal	Secure	-	✓	✓
Hooded Merganser	Secure	-		✓
Lesser Scaup	Secure	-	✓	✓
Mallard	Secure	-	✓	✓
Northern Pintail	Secure	-	✓	✓
Northern Shoveler	Secure	-	✓	✓
Red-breasted Merganser	Secure	-	✓	✓
Redhead	Secure	-	✓	✓
Ring-necked Duck	Secure	-		✓

Common Name	Provincial Status[1]	SARA status*[2]	Observed in study area	
			TLSA	TRSA
Ross' Goose	Secure	-		✓
Ruddy Duck	Secure	-		✓
Sandhill Crane	Sensitive	-		✓
Snow Goose	Secure	-	✓	✓
Surf Scoter	Secure	-		✓
Wilson's Snipe	Secure	-	✓	✓

* Hyphen (-) indicates species not listed in source
[1] GOA. (2020a). Wild Species Status Search
[2] GOC. (2024). Species at Risk Public Registry

11.4.5.2 Traditional Use Species and Species of Cultural Significance

The Project site is located on Treaty 7 lands, which spans the historic territories of the Siksika (Blackfoot), Kainai (Blood), Piikani (Peigan), Tsuut'ina (Sarcee), and Stoney-Nakota (comprising Bearspaw, Chiniki, and Wesley) First Nations (GOC, 1966), as well as Métis Nation Region 4 (see Figure 15-1, Volume 2, Section 15). Indigenous world views are centered on respect and appreciation for the natural environment, wherein all biotic and abiotic features of the environment have a spirit and sentience (Indigenous Corporate Training Inc., 2016). This connection to the land led to relationships between people and wildlife that have coexisted for thousands of years. TU species generally refers to plants, animals, and other organisms that have been used historically by Indigenous communities. TU species are often culturally important to these communities in addition to their practical importance. However, some species can hold Cultural Significance even if they do not have a pragmatic use, for example, species with cultural or spiritual meaning to an Indigenous community.

In general, Indigenous Peoples endemic to the Canadian Prairies harvested wildlife for food (e.g., Bison [*Bison bison*], and other ungulates, grouse), fur or bones (e.g., weasels, canids, large rodents, rabbits), and for feathers (e.g., hawks and eagles), used for clothing, shelter and ceremonial purposes (GOA, 2013; Canadian Geographic, 2025). 'Traditionally Used' wildlife species may be associated with a wide range of habitats, broadly including grasslands, forested or cliff areas for nesting, and species associated with open water.

Since a formal Traditional Land Use (TLU) or Traditional Ecological Knowledge (TEK) study has not taken place, wildlife of Traditional or Cultural importance were assessed and discussed based on review of publicly-available, online resources. This information can be refined if consultation or engagement with local Indigenous Peoples occurs in the future (see Volume 2, Section 15: Traditional Ecological Knowledge and Traditional Land Use, and Volume 1, Section 12: Public and Indigenous Engagement). Based on this information, wildlife species observed within the study areas that are likely to be or have been wildlife species of TU or Cultural Significance are described in Table 11-16 below. Many of these species are secure, common species, however some are SOCC species, including two species listed as Endangered under the AWA: Burrowing Owl and Ferruginous Hawk (GOA, 2024b).

Table 11-16: Traditional Use species observed in the study areas

Common name	Provincial status[1]	SARA status*[2]	Observed in study area	
			TLSA	TRSA
Birds of Prey				
American Kestrel	Sensitive	-		✓
Bald Eagle	Sensitive	-		✓
Burrowing Owl	At Risk (Endangered)	Endangered		✓
Cooper's Hawk	Secure	Not at Risk		✓
Ferruginous Hawk	At Risk (Endangered)	Threatened	✓	✓
Golden Eagle	Sensitive	-	✓	✓
Great Horned Owl	Secure	-	✓	✓
Northern Harrier	Secure	-		✓
Red-tailed Hawk	Secure	-	✓	✓
Rough-legged Hawk	Secure	-		✓
Sharp-shinned Hawk	Secure	-		✓
Short-eared Owl	May be at Risk	Special Concern		✓
Snowy Owl	Secure	-	✓	✓
Swainson's Hawk	Secure	-	✓	✓
Ungulates				
Mule Deer	Secure	-	✓	✓
Pronghorn	Sensitive	-	✓	✓
White-tailed Deer	Secure	-	✓	✓
Small Mammals				
American Badger	Sensitive	Special Concern		✓
American Mink	Secure	-		✓
Beaver	Secure	-	✓	✓
Common Raccoon	Secure	-		✓
Coyote	Secure	-	✓	✓
Muskrat	Secure	-	✓	✓
Red Fox	Secure	-		✓
Short-tailed Weasel	Secure	-	✓	✓
White-tailed Jackrabbit	Secure	-	✓	✓
Upland Birds				
Gray Partridge	Exotic	-	✓	✓
Ring-necked Pheasant	Exotic/Alien	-		✓
Sharp-tailed Grouse	Sensitive	-		✓

* Hyphen (-) indicates species not listed in source
[1] GOA. (2020a). Wild Species Status Search
[2] GOC. (2024). Species at Risk Public Registry

11.4.5.3 Introduced Wildlife Species

A total of six introduced species, including four songbirds and two upland game birds, were observed in the TRSA; two of these species were also observed in the TLSA (Table 11-17). Gray Partridge and Ring-necked Pheasant are valued game birds that are regularly bred and released in southern Alberta.

Table 11-17: Introduced wildlife species observed in the study areas

Common name	Observed in study area	
	TLSA	TRSA
Eurasian Collared-dove		✓
European Starling	✓	✓
Gray Partridge	✓	✓
House Sparrow		✓
Ring-necked Pheasant		✓
Rock Pigeon		✓

11.5 IMPACT ASSESSMENT

To assess the potential Project effect on wildlife and wildlife habitat, this impact assessment describes the estimated change in habitat suitability indices and movement models applicable to each sensitive indicator species from the Baseline Case to Project Case for each Project case (e.g., during construction, operation, and following reclamation). The predicted habitat changes for each indicator species are then applied to other species with similar ecological requirements that have been observed on or near the Project area. The potential effects to wildlife from all stages of the Project will help to determine the maximum (e.g., worst case), residual, and cumulative effects to wildlife, wildlife habitat, and wildlife ecology in the region.

11.5.1 Impact Assessment Methods

11.5.1.1 Project Impacts

Project impacts were assessed by comparing Baseline Cases to Project conditions in a Project Case, including the full scope of construction, and future operation scenarios (including all mitigation, reclamation, and any offsets), for assessing residual impacts.

The Project Case examined two Project activity stages:

- Project Construction (maximum impact)
- Operations (residual assessment with full mitigations)

Mitigations, including activities to reduce effects, reclaim and restore the site, or offset effects (if applicable) were then identified for each stage.

A worst-case scenario and a residual-impact scenario were then developed; the worst-case scenario (typically the maximum construction footprint) identifies the maximum extent of change that will occur among any of the Project stages prior to implementation of mitigations, while the residual-impact scenario (typically the operations footprint) identifies the change which remains after all mitigations, reclamation, and offsets (if any) are implemented. While both Project Cases were assessed (compared to Baseline), the impact assessment rating was determined from the residual-impact scenario.

11.5.1.2 Habitat Suitability Index Models

To assess Project impacts on wildlife and wildlife habitat, Habitat Suitability Index (HSI) models were developed for selected key indicator species and adapted from Multiple Species at Risk (MULTISAR): The Milk River Basin Project (GOA, 2004). The selection of wildlife species for modelling was based on the availability of pre-published HSI models and the presence of the species within the Project site, as determined through wildlife inventories. The selected HSI models included:

- Northern Leopard Frog
- Loggerhead Shrike
- Long-billed Curlew
- Sprague's Pipit
- Richardson's Ground Squirrel
- Ferruginous Hawk
- American Badger
- Migratory Waterbird Stopover

These key indicator species effectively represented the range of habitat conditions present on the TLSA and TRSA and can be used to understand habitat conditions at the baseline case and to assesses changes to habitats associated with Project developments that are also relevant for most other species.

The HSI analysis combines ecologically relevant environmental and landscape features for SOCC to support conservation and management decisions in the Grassland Natural Region of southern Alberta (MULTISAR, 2009). Species at risk and of conservation concern were defined using a provincial general status of At Risk, May Be at Risk, or Sensitive. Each species' habitat suitability model used in this analysis was a modified HSI or resource selection function (RSF) equation from MULTISAR (2020). New RSF analyses were not used to assess habitat suitability; instead, the variables detailed in the RSF equations (MULTISAR, 2020) were used, but as a part of the HSI models. An HSI model was included for migratory waterbirds, which was created to be comparable to MULTISAR (2020) equations, using similar variables and similar scales when ecologically relevant and appropriate. All HSI models were modified to include additional ecologically relevant variables that are likely to influence the suitability or quality of a habitat for a given species. The models were all calculated using the most recently available GVI (GOA, 2019b) and Agricultural Regions of Alberta Soil Inventory Database (AGRASID; GOA, 2024e) data for Alberta. Habitat suitability scores range from 0 to 1, where 0 represents unsuitable (poor quality) habitat, and 1 represents very suitable (very high-quality) habitat. Suitability scores for environmental and landscape features were those used by MULTISAR, when appropriate for this Project, and created scores for added variables based on ecological observations or following literature reviews (MULTISAR, 2021).

Terrestrial and Vegetated habitat classifications used in the Baseline Inventory Assessment were used in the HSI analysis (Table 11-18). However, waterbody classification, as well as anthropogenic disturbance variables, were categorized on a finer scale than were used for the baseline descriptions.

Table 11-18: Landscape disturbance features (terrestrial and aquatic) included in Habitat Suitability Index models

Landscape Feature	Description
Canal	Steep, non-vegetated edges; relatively constant water levels; linear; artificial; low disturbance post-construction
Ditch	Ephemeral water, mostly low laying; vegetated depression along roadway; mostly dry
Dugout	Artificial; disturbance by live-stock; seasonally fluctuating water level; some non-flowing water most of the year
Ephemeral Waterbody	Vegetated edges; lentic flow at most; low to no disturbance
Inside Berm	Steep, riprap covered slope; no planted vegetation on edges; total area is dependent on water levels within the reservoir
Inundated Area	Open water reservoir
Marsh	Lentic flow at most; relatively small to medium sized open water; established and vegetated riparian zone
Reclaimed Wellsite	Post construction and reclamation of soil type, slope, and vegetation cover; relatively flat; no to minimal treed area
Reservoir	Steep edges; deep; negligible flow; fluctuating depth; largely contains water year-round
Road	Paved, gravel, or divided highway; frequently disturbed by traffic; linear
Seasonal Marsh	Lentic flow at most; relatively small to medium sized open water; seasonal fluctuations between spring and fall in water depth and permanence
Solar Project	Assuming short to mixed grass cover under solar panel installation; not complete cover of ground from sunlight; disturbance from mowing vegetation by machine; surrounded by chain-link fence; contains solar panels (sun-following or otherwise)
Temporary Marsh	Lentic flow at most; relatively small to medium sized open water; seasonal fluctuations between spring and fall in water depth and ephemerality
Toe of Berm to Section Edge	Reclaimed grassland (plants and soil); gently sloping (less than 5°) to flat; extending away from the reservoir towards bordering township and rural road
Trail	Akin to a farmer's field road (low use but permanent tracks) or a tracked walking/biking path; infrequent disturbance by vehicles or equipment; infrequent disturbance by anthropogenic activities
Undisturbed	Undisturbed native grassland and low use pasture grassland
Wellsite	Active working well infrastructure surrounded by fencing; some disturbance from vehicles; noise disturbance by equipment; flat; low to no vegetated cover

Key Indicators

Northern Leopard Frog

The Northern Leopard Frog is a SOCC that is listed as Special Concern federally (GOC, 2024), and Threatened under the AWA (GOA, 2024b). Like many amphibians, Northern Leopard Frogs can serve as an indicator of ecosystem function, both because of their sensitivity to environmental changes and contamination, including pesticides and heavy metals, as well as their need for varied terrestrial and aquatic habitats throughout their lives (Estes-Zumpf, et al., 2022; Flynn, et al., 2021). Northern Leopard Frogs survive winter in Alberta by hibernating in waterbodies that are well oxygenated and do not freeze to the bottom. Spring breeding takes place in shallow, warm waterbodies, typically within 2 km from their overwintering habitat (GOA, 2012b). Suitable

waterbodies must have adequate emergent vegetation for females to attach their egg masses. After breeding, adults disperse to riparian or upland habitat to forage. Juvenile frogs will disperse up to 8 km from natal ponds after metamorphosis, seeking out foraging and overwintering habitat (GOA, 2012b). This combination of habitat requirements make Northern Leopard Frogs a good indicator species of healthy wetland systems in open prairie habitats.

The TLSA is within the mapped sensitivity range for Northern Leopard Frogs and is within the historic range for the species. According to the Northern Leopard Frog Reintroduction Strategy for Alberta (Kendell & Prescott, 2007), the Red Deer watershed is one of the highest priority watersheds for conservation and reintroduction of Northern Leopard Frogs, with the Berry Creek drainage area the highest priority. A second priority reintroduction area is Central Bow drainage area that extends between Calgary and Bassano. The TLSA is within the San Francisco Lake drainage area of the Red Deer watershed, which is approximately 35 km south of the Berry Creek drainage area and 25 km east of the Central Bow drainage area. As of 2007, there is a healthy population of Northern Leopard Frogs described in Brooks (~20 km east). During implementation of the 2005 to 2010 recovery plan, at least two egg masses were reintroduced to Snake Lake and the nearby Rock Lake (~7 km east) in two consecutive years (GOA, 2012b). Though there was initial success with tadpoles observed metamorphosing into subadults, subsequent monitoring has not documented overwinter survival at either site and breeding at the site has not been confirmed. Northern Leopard Frogs tend to breed in warm, standing water, in permanent waterbodies close to open areas with short vegetation (Stevens et al., 2008). They also tolerate elevated salinity more than other sensitive amphibians (COSEWIC, 2009), which is characteristic of waterbodies in the TLSA. However, there may be a lack of well-oxygenated waterbodies that do not freeze to bottom, which Northern Leopard Frogs require for overwintering habitat (GOA, 2012b).

Northern Leopard Frog HSI Model

Habitat for Northern Leopard Frogs was scored highly suitable if there was a high percentage of grass cover (≥50%), no woody vegetation cover, a high percentage of water cover (≥50%), low percentage of solnetzic soil (≤10%), close proximity to a permanent waterbody (<500 m away), and little to no anthropogenic disturbance or activities.

To estimate habitat quality for Northern Leopard Frogs (NOLF), a modified HSI equation (MULTISAR, 2020) was used:

$$\mathbf{HSI_{NOLF} = V_1 * V_2 * V_3 * V_4 * V_5 * V_6 + V_7}$$

HSI_{NOLF} = % Grass Coverage * % Woody Vegetation * % Solonetzic Soil * % Water Coverage * Distance to Watercourse * Distance to Permanent Water course * Landscape Feature Disturbance + Waterbody Type

where:

V_1 represents the percent grass coverage (GVI sites view: percent grass coverage), where:

- ≥50% grass cover was given a suitability index score of 1.0;
- 10 to 50% received a continuous score of 0.2 to 1.0; and

- <10% was scored 0.1.

V_2 was the percent woody vegetation (GVI sites view: the percentage of tree and shrub cover, halved).

- 0% was given a suitability index score of 1.0;
- 100% a score of 0.0; and
- values between 0 and 100% received a continuous score between 0.0 and 1.0.

V_3 represents percent water coverage (GVI sites view: percent water coverage), where:

- ≥50% was given a suitability index score of 1.0;
- ≤10% received a score of 0.2; and
- values between 10 and 50% received a continuous score of >0.2 to <1.0.

V_4 represents the percent of solonetzic soil (following AGRASID), where:

- ≤10% was given a suitability index score of 1.0;
- ≥30% a score of 0.1; and
- values between 10 and 30% were scored 0.2.

V_5 represent the distance to a permanent waterbody, where:

- a distance of <500 m was given a suitability index score of 1.0;
- a distance >2,000 m was scored at 0.1; and
- a distance between 500 and 2,000 m received a score between <1.0 and >0.1, respectively.

V_6 represents waterbody type, and scores were based on ecological values for the species.

- Dugout, reclaimed wetlands, and permanent marshes were scored 0.8;
- open water, reservoirs, and canals received a score of 0.6; and
- ephemeral, temporary, and seasonal marshes, a score of 0.2.

V_7 was the disturbance by landscape feature where:

- ditches were scored 0.8; and
- roads, active railway, abandoned railway, trail, pipeline, wellsite, solar projects, and berm features were given a score of 0.2.

Loggerhead Shrike

The Loggerhead Shrike, prairie subspecies (*L. ludovicianus excubitorides*) is a SOCC that is listed as Threatened federally (GOC, 2024) and Special Concern provincially, under the AWA (GOA, 1997). Loggerhead Shrikes reside in Canada's mixed grassland ecoregions of Alberta, Saskatchewan, and Manitoba during breeding, but migrate to south central United States and Mexico to during winter. They nest primarily in small trees and shrubs with a preference for thorny vegetation species and require flat grassland for foraging (Prescott & Bjorge, 1999; COSEWIC, 2014; MULTISAR, 2020). Loggerhead Shrikes are predatory carnivorous songbirds that feed primarily on insects, but also small reptiles, amphibians, birds, and mammals. Foraging activity

can be observed in thorned bushes as well as along barbed wire fences, as Loggerhead Shrike cache and preserve (e.g., impale) food items on sharp objects in the environment. They are considered a prairie indicator species because of their listed status and strong selection for native and pasture grasslands (Prescott & Bjorge, 1999). Similar to other grassland birds, the largest threat to Loggerhead Shrike is the loss of native grassland via the conversion to agricultural and industrial developments. This includes the increased energy development in Canada's prairies which increasingly contributes to habitat loss and fragmentation of intact grassland.

Loggerhead Shrike HSI Model

Habitat for Loggerhead Shrike is scored highly suitable if there was low percent shrub cover (5 to 35%), a high percentage of grass cover (≥80%), little to no slope (≤10°), if there was a farmyard within 400 m, little to no disturbance or presence of open waterbodies, and little to no anthropogenic disturbance or activities.

To estimate habitat quality for Loggerhead Shrike (LOSH), a modified HSI equation (MULTISAR, 2020) was used:

$$\mathbf{HSI_{LOSH} = [(V_1 * V_2 * V_3)^{1/3} + (0.25*farmyards)] * V_4 * V_5}$$

HSI_{LOSH} = [(% Shrub Cover * % Grass Cover * Slope)$^{1/3}$ + (0.25*Farmyard Presence)] * Waterbody Disturbance * Landscape Feature Disturbance

where:

V_1 represents the percent shrub coverage (GVI sites view: the percentage of shrub cover), where:

- 5 to 35% cover was given a suitability index score of 1.0;
- 0% cover received a score of 0.1;
- 0 to <5% received a score between >0.1
- >35 to <40% received a score between 1.0 and 0.0, respectively; and
- ≥40% a score of 0

V_2 was the percent grass coverage (GVI sites view: percent grass coverage), where:

- ≥80% grass cover was given a suitability index score of 1.0;
- 0% grass cover was scored 0.1; and
- >0 to <80% received a continuous score of >0.1 to <1.0, respectively.

V_3 represents the landscape slope where:

- ≤10° was given a suitability index score of 1.0;
- ≥30° was scored 0.0; and
- >10 to <30° received a continuous score between <1.0 and >0.

Note: There are no slopes >10° in the TLSA, so this variable was replaced with a 1.0 for the TLSA model.

V_4 was a term added to all other habitats for the presence of a farmyard where all area within 400 m of a farmyard was given a suitability score of 1.0, multiplied by 0.25, and added to the underlaying habitat value.

V_5 represents the disturbance by waterbodies where:

- open water and reservoirs were given a suitability index score of 0.0;
- reclaimed wetlands received a score of 0.2; and
- dugouts and canals received a score of 0.4.

V_6 was the disturbance by landscape feature where:

- undisturbed grassland was given a suitability index score of 1.0;
- pipelines and wellsites, a score of 0.8;
- ditches, trails, and abandoned railway lines, a score of 0.6;
- active railway lines and roads were given score of 0.2; and
- industrial areas given a score of 0.0.

Long-billed Curlew

The Long-billed Curlew is a SOCC that is listed as Special Concern both federally (GOC, 2024) and provincially (GOA, 1997), though currently under consideration for a federal status uplisting to Threatened, based on COSEWIC's recommendation (COSEWIC, 2024). They are the largest shorebird of North America with a distinctive, long, curved bill. They use their bill to feed on insects and aquatic invertebrates buried in mud. Long-billed Curlew reside in grassland and sandhill habitats, mostly in southeastern Alberta. They prefer native grasslands, infrequently breeding in cultivated fields or pasture. Nests are constructed on the ground, initially "scraped" by the male (Dechant, et al., 2003; Fellows & Jones, 2009). Long-billed Curlew have adapted anti-predatory behaviours for ground nesting, including cooperating with adjacent curlews to dive-bomb potential predators. They prefer short and/or mixed grass prairies and tolerate grazing pastures with shorter vegetation (Dechant, et al., 2003; Fellows & Jones, 2009). The largest threat to Long-billed Curlew is from native prairie grassland destruction (Foster-Willfong, 2003). Long-billed Curlew are an indicator species because of their conservation status and preference for native grassland habitat.

Long-billed Curlew HSI Model

Habitat for Long-billed Curlew is scored highly suitable if there is low to no woody vegetation (≤10%), a large proportion of native grassland (≥50%), relatively flat (<15°), little to no disturbance and presence by relatively large waterbodies (e.g., reservoirs), and undisturbed land void of anthropogenic activities.

To estimate habitat quality for Long-billed Curlew (LBCU), a modified HSI equation (MULTISAR, 2020) was used:

$$\mathbf{HSI_{LBCU} = V_1 * V_2 * V_3 * V_4 * V_5}$$

HSI_{LCBU} = % Woody Vegetation * % Native Grassland * Slope * Waterbody Disturbance * Landscape Feature Disturbance

where:

V_1 represents the percent woody vegetation (GVI sites view: the percentage of tree and shrub cover, halved).

- ≤10% wood vegetation was given a suitability index score of 1.0;

- ≥15% received a score of 0.1; and
- 0 to <10% received a continuous score of <1 to >0.1, respectively.

V_2 was the percent native grassland (GVI sites view: ≥30% native prairie and percent grass coverage), where:

- ≥50% was given a suitability index score of 1.0;
- ≤25% native grassland received a score of 0.1; and
- between >25 and <50% native grassland cover, received a continuous score of >0.1 to <1.0.

V_3 represents the landscape slope where:

- 0° slope was given a suitability index score of 1.0;
- ≥15° slope was scored 0.1; and
- >0 to <15° slope was scored continuous values between <1.0 and >0.1, respectively.

V_4 was the disturbance by waterbodies where:

- open water and reservoirs were given a suitability index score of 0.0; while
- dugouts, canals, and reclaimed wetlands were given a score of 0.4.

V_5 was the disturbance by landscape feature where:

- undisturbed grassland was given a suitability index score of 1.0;
- pipelines were scored 0.6;
- wellsites and ditches were score 0.4; and
- trails and roads were given a score of 0.2.

Sprague's Pipit

Sprague's Pipit are listed as Threatened federally (GOC, 2024) and Special Concern provincially (GOA, 1997). Sprague's Pipit reside in Canada's mixed grassland ecoregions of Alberta and Saskatchewan and are considered an obligate grassland specialist. They nest primarily on native grassland and have been shown to be less abundant in grasslands with introduced vegetation (COSEWIC, 2010). Sprague's Pipit are insectivorous, feeding on the ground. They are difficult to see, most often located from the male's impressive song flights; males will establish territories by circling high in the air while singing. They are considered a prairie indicator species because of their strong association and selectivity for native grasslands (Fisher & Davis, 2011). The largest threat to Sprague's Pipit is the conversion of native grassland to agricultural use and industrial developments. Increased energy development in Canada's prairie increases habitat loss and fragmentation of intact grassland. The density of Sprague's Pipit is also positively correlated to grassland patch size, which is further threatened from industrial fragmentation (Davis et al., 2006).

Sprague's Pipit HSI Model

Habitat for Sprague's Pipit is scored highly suitable if there is a low percentage of woody vegetation (≤15%), a high percentage of native grassland (≥25%), the absence of riparian areas, absence of ephemeral waterbodies, and little to no anthropogenic disturbance or activities.

To estimate habitat quality for Sprague's Pipit (SPPI), a modified HSI equation (MULTISAR, 2020) was used:

$$HSI_{SPPI} = V_1 * V_2 * V_3 * V_4 * V_5$$

HSI_{SPPI} = % Woody Vegetation * % Native Grassland * Riparian Areas * Waterbody Disturbance * Landscape Feature Disturbance

where:

V_1 was the percent woody vegetation (GVI sites view: the percentage of tree and shrub cover, halved) where:

- ≤15% was given a suitability index score of 1.0;
- ≥15% received a score of 0.0; and
- >0 to <15% was scored on a continuous scale of <1.0 to >0.0.

V_2 was the percent native grassland (GVI sites view: ≥30% native prairie and percent grass coverage), where

- ≥25% was given a suitability index score of 1.0;
- <25% grassland cover received a score of 0.1; and
- >0 to <25% grassland received a continuous score of >0.1 to <1.0.

V_3 was the presence of riparian areas with woody vegetation where:

- the absence or riparian areas was given a suitability index score of 1.0; and
- the presence of riparian areas was scored 0.0.

V_4 was the disturbance by the presence of ephemeral waterbodies, which was given a suitability index score of 0.4.

V_5 was the disturbance by landscape feature where:

- undisturbed grassland was given a suitability index score of 1.0;
- pipelines were scored 0.6;
- wellsites, ditches, and trails were scored 0.4; and
- roads were given a score of 0.2.

Richardson's Ground Squirrel

Richardson's Ground Squirrel are listed as a Secure species distributed throughout the grasslands and a key component of the prairie ecosystem, as a primary prey species for many predators, as well as a primary burrow excavator (Downey, 2003). Predators that rely on Richardson's Ground Squirrels for prey include Ferruginous Hawk, Swainson's Hawk, Prairie Falcon, American Badger, Coyote, Prairie Rattlesnake, and Long-tailed Weasel. In fact, Richardson's Ground Squirrels are known to make up to 89% of the diet of Ferruginous Hawks (Downey, 2003), and maintaining and enhancing prey populations was identified as a strategy in the Ferruginous Hawk Recovery Plan (GOA, 2024f). Various small mammals, garter snakes, and even bumblebees use Richardson's Ground Squirrel burrows for refuge and shelter, but perhaps most importantly, Burrowing Owls depend on these and other species' abandoned burrows, as they cannot excavate burrows (Downey, 2003).

In Alberta, Richardson's Ground Squirrels spend about 85% of their life below ground sleeping and hibernating and are active above ground for only 15% of their life (Michener, 1977). Females produce one litter (6 - 8 pups) per year, but offspring experience high mortality due to predation. Richardson's Ground Squirrels demonstrate a preference for natural prairie habitat but are opportunistic and will establish colonies in native pastures, tame pastures, cultivated fields, parkland, parks, farmyards, and ditches (Downey, 2003). Colonies exhibit greater abundance in flat, heavily grazed areas and lower abundance in tall vegetation. They can persist on islands of grassland or along ditches surrounded by cultivation. The key limiting factor to their habitat requirements may be the type of soil in which they construct their burrows, as they do not inhabit loose, sandy or dense, clay soils (Downey, 2003).

Richardson's Ground Squirrel HSI Model

Habitat for Richardson's Ground Squirrels is scored highly suitable if there is low to no woody vegetation (≤20%), with a high proportion of percent grass cover (≥20%), low to flat slope (≤15°), medium to moderately fine soil texture (according to AGRASID; GOA, 2024a), little to no disturbance or presence of open waterbodies, and little to no disturbance from anthropogenic activities.

To estimate habitat quality for Richardson's Ground Squirrel (RIGS), a modified HSI equation (MULTISAR, 2020) was used:

$$\mathbf{HSI_{RIGS} = V_1 * V_2 * V_3 * V_4 * V_5 * V_6}$$

HSI_{RIGS} = % Woody Vegetation * % Grass Cover * Slope * Soil Texture * Waterbody Disturbance * Landscape Feature Disturbance

where:

V_1 was the percent woody vegetation (GVI sites view: the percentage of tree and shrub cover, halved).

- ≤20% woody vegetation was given a suitability index score of 1.0;
- ≥40% was scored 0.0; and
- >20 to <40% was given a continuous score from <1.0 to >0.0, respectively.

V_2 was the percent grass coverage (GVI sites view: percent grass coverage), where:

- ≥20% grass cover was given a suitability index score of 1.0;
- 0% grass coverage was scored 0.4; and
- Between >0 to <20% was given a continuous score of >0.4 to <1.0.

V_3 was the landscape slope where

- ≤15° was given a suitability index score of 1.0;
- ≥30° a score of 0; and
- between >15 to <30°, a continuous score of <1.0 to >0.0.

V_4 represents soil texture (following AGRASID) where:

- medium and moderately fine soil texture were given a suitability index score of 1.0;
- moderately coarse soil texture was scored 0.6; and

- fine, coarse, and very coarse soil texture was given a score of 0.2.

V_5 was the disturbance by waterbodies where open water and reservoirs were given a suitability index score of 0, while dugouts, canals, and reclaimed wetlands were given a score of 0.2.

V_6 was the disturbance by landscape feature where undisturbed grassland, pipeline, and wellsites were given a suitability index score of 0.8, ditches and trail a score of 0.6, roads a score of 0.4.

Ferruginous Hawk

Ferruginous Hawks are federally listed as Threatened under SARA, though under consideration of a status change to Special Concern based on COSEWIC's recommendations (GOC, 2024). Provincially, Ferruginous Hawks are listed as Endangered under the AWA (GOA, 2024b). Ferruginous Hawk are apex prairie predators and depend upon endemic prairie species and grassland habitat for survival (GOA, 2024f). Nesting can occur on lone trees, cliffs, anthropogenic structures, and even on the ground in sloped areas, though most often at least 300 m away from large waterbodies. Their diet consists primarily of small mammals, especially Richardson's Ground Squirrels, which they hunt from both the ground and air. As a result, consideration of this prey source is an important part of Ferruginous Hawk conservation and recovery strategies (GOA, 2024f). Nesting and prey are both highly linked with prairie grasslands which makes them a good indicator species for prairie habitat.

Ferruginous Hawk HSI Model

Habitat for Ferruginous Hawks is scored highly suitable if it previously contained a nesting site for Ferruginous Hawks, if it contains badlands and bedrock landscapes, high HSI values for Richardson's Ground Squirrel, with little to no disturbance or presence of open waterbodies, and little to no anthropogenic activities.

To estimate habitat quality for Ferruginous Hawk (FEHA), a modified HSI equation (MULTISAR, 2020) was used:

$$\mathbf{HSI_{FEHA} = V_1 * V_2 * HSI_{RIGS} * V_4 * V_5}$$

$$\mathbf{HSI_{FEHA} = Known\ Nest\ Sites * Badland/Bedrock * HSI_{RIGS} * Waterbody\ Disturbance * Landscape\ Feature\ Disturbance}$$

where:

V_1 was the presence of known nest sites (determined using FWMIS records) for natural and artificial nest sites differentiated by at least 800 m from the next closest site.

V_2 was the presence of badlands and bedrock landscape types (determined using GVI site views), where:

- presence was given a suitability score of 1; and
- the absence of badlands and bedrock landscape, a score of null.

HSI_{RIGS} was the HSI values for Richardson's Ground Squirrel.

V_4 was the disturbance by waterbodies where:

- open water and reservoirs were given a suitability index score of 0.0; and
- dugouts, canals, reclaimed wetlands, and open water within 400 m were given a score of 0.4.

V_5 was the disturbance by landscape feature where:

- undisturbed grassland was given a suitability index score of 1.0;
- pipelines and wellsites were scored 0.8;
- ditches and trails were given a score of 0.6; and
- roads were given a score of 0.4.

American Badger

American Badger are classified provincially as a Sensitive species (GOA, 2020a), though considered Data Deficient under the AWA (GOA, 2024b). The subspecies found in Alberta (*Taxidea taxus taxus*) is also listed as Special Concern federally (GOC, 2002). American Badgers have with a wide distribution associated with grasslands and dry shrublands. They are an ecologically important mammal in grassland habitats providing several ecosystem functions. American Badgers are primary excavators of burrows which provide habitat to secondary burrow users such as Burrowing Owls. While excavating or expanding burrows, American Badgers move soil to the surface, providing aeration, redistributing nutrients, and influencing soil moisture content (Bylo et al., 2014). Their diet is carnivorous, relying on grassland rodents such as Richarson's Ground Squirrel and Northern Pocket Gophers (*Thomomys talpoides*; Scobie, 2002). As a result, although often considered a pest by ranchers and other landowners because of the hazard their burrows can present to cattle and horses, they help to control small mammal populations (Scobie, 2002). American Badger's ecological roles as a predator and primary burrow excavator makes them a good indicator species for prairie grassland habitats.

American Badger HSI Model

Habitat for American Badger is scored highly suitable if the soil texture is medium and moderately coarse, a high percentage of grass cover (≥70%), little to no slope (≤15°), little to no disturbance or presence of open waterbodies, little to no disturbance or presence of anthropogenic activities.

To estimate habitat quality for American Badger (BADG), a modified HSI equation (MULTISAR, 2020) was used:

$$\mathbf{HSI_{BADG} = V_1 * V_2 * V_3 * V_4}$$

HSI_{BADG} = Soil Texture * % Grass Cover * Slope * Waterbody Disturbance * Landscape Feature Disturbance

where:

V_1 represents soil texture (following AGRASID) where:

- medium and moderately coarse soils were given a suitability index score of 1.0;
- moderately fine soils were scored 0.4; and
- fine, coarse, and very coarse soils were given a score of 0.2.

V_2 was the percent of native grass cover (GVI sites view: percent grass coverage), where:

- ≥70% was given a suitability index score of 1.0;
- ≤20% native grass cover was scored 0.0; and
- between >20 to <70% was assigned a continuous score of from >0.0 to <1.0.

V_3 was the landscape slope where:

- ≤15° slope was given a suitability index score of 1.0;
- ≥30° slope a score of 0.0; and
- slopes between >15 to <30° received a continuous score of <1.0 to >0.0.

V_4 was the disturbance by waterbodies where:

- open water and reservoirs were given a suitability index score of 0.0;
- dugouts, canals, reclaimed wetlands, and marsh were given a score of 0.2; and
- ephemeral waterbodies were scored 0.4.

V_5 was the disturbance by landscape feature where:

- undisturbed grassland was given a suitability index score of 1.0;
- pipelines, wellsites, ditches, trail, abandoned railway were given a score of 0.8;
- active railway lines were scored 0.4; and
- roads were given a score of 0.3.

Migratory Bird Stopover

The SLR is currently used as a stopover site by migrating waterfowl, waders and shorebirds during both spring and fall migration (GOA, 2025). The proposed expansion of the reservoir will increase the surface area of the waterbody 3.6 times, from 299 ha to approximately 1,069 ha. The expansion of the reservoir surface area will add complexity to the waterbody habitat. The expansion will increase the depth of the reservoir, while increasing the area of shallow waters on the northwestern corner. Complexity increases the suitability of the habitat for a greater diversity of migratory bird species (Linhart et al., 2022). The complexity of the waterbody and associated range habitat types should offer suitable stopover habitat for a range of migrating species. For example, the deep open-water portion of the reservoir will be preferred by diving species (e.g., Common Loon), while the shallow edge habitats, will be preferred by shorebirds, waders, and dabbling waterfowl that prefer warmer, shallow waters.

Migratory Bird Stopover HSI Model

Habitat for Migratory Birds is scored highly suitable if the distance to an open waterbody was within 200 m, if an open waterbody is not anthropogenic, and if there is open water with little to no anthropogenic disturbance.

To estimate habitat quality for Migratory Waterbird (MIWA) stopover, a modified HSI equation (MULTISAR, 2020) was used:

$$\mathbf{HSI_{MIWA} = V_1 * V_2 * V_3}$$

HSI_{MIWA} = Distance to Non-reservoir Waterbody * Waterbody Type * Landscape Feature Disturbance

where:

V_1 was the distance to the nearest non-reservoir waterbody surrounded by crop, pasture, and or native grassland, where:

- ≤200 m from such a waterbody was given a suitability index score of 0.7;
- a distance of >200 m to ≤1 km was given a score of 0.6;
- >1 km from a waterbody was scored 0.4; and
- the land surrounding a waterbody, if not crop, pasture, or native grassland, was given a score of 0.4

V_1 was defined using non-reservoir waterbodies to take into account the depreciated natural waterbody habitat conditions found at reservoirs for the subsequent years after construction, while habitat reclamation is becoming established. For this reason, V_2 used a score of 0.7 for reservoirs (see below).

V_2 was the waterbody type where specific waterbodies were given ecologically relevant scores.

- Open water, intermittent shallow open water, ephemeral waterbodies, reclaimed wetlands, marshes, and temporary marshes were given a score of 1.0;
- dugouts and canals were given a score of 0.8; and
- reservoir was given a score of 0.7.

V_3 was the disturbance by landscape feature where:

- inundated area was given a score of 0.8;
- top of berm to section edge, and inside berm were given a score of 0.4;
- roads, active railway lines, abandoned railway lines, trails, ditches, pipelines, wellsites, top of berm access roads, outside berm, and residential areas were given a score of 0.2; and
- industrial areas were given a score of 0.0.

11.5.1.3 Least-Cost Path Movement Modelling

Pronghorn

Pronghorn is a SOCC within the TRSA, classified provincially as a Sensitive species (GOA, 2020a). They are a prairie-specialized ungulate species endemic to North America. As herbivores, they feed primarily on grasses, forbs, sagebrush, and other prairie plants. They are the fastest land mammal in North America and are conditional migrants; greater than 50% of Pronghorns migrate to find better overwintering habitat. Pronghorn migration is dependent on large swaths of intact grassland and routes are disrupted by semi-permeable barriers to movement (e.g., fences, roads; Poor, 2010). As such, they serve as a key indicator of terrestrial continuity and grassland connectivity. Migratory herbivores are also important as they contribute to grassland biodiversity through extensive grazing, vegetation management, fertilization (e.g., through defecation), and creating micro-scars that open the soil for species recruitment, and they influence carnivore species distribution (Milligan et al., 2023). The presence of Pronghorn can be a good indicator that the prairie habitat maintains functional migration routes in the region.

Pronghorn Least-Cost Path Modelling

Least-cost path analyses are used to calculate the paths of least resistance to species on the landscape. Landscape features are given cost values that represent the theoretical difficulty for a species to move through each landscape feature; costs represent energetic costs. Highest costs can represent an impenetrable barrier or higher likelihood of mortality (e.g., often from vehicle collisions). The analysis then calculates the path of "least cost" between two points (a source and a destination point); typically, these are ecologically and/or pragmatically relevant locations within a fixed geographic area (Adriensen, et al., 2003; Theobald, 2006). This analysis was used to consider the movement of Pronghorn migration through the TRSA, and how the expansion of the reservoir would impact theoretical, simplified, migration paths. Movement for terrestrial animals is typically longer and more variable than estimated, simulated paths of least-cost calculated using this method. However, if using ecologically relevant cost-layers for landscape features, least-cost path analysis can be a useful tool for simulating the possible responses to changes in the landscape (Theobald, 2006; Poor, 2010).

Nine locations were established to direct the least-cost path analysis through the TRSA. Each location was selected considering the natural northwestern direction of observed Pronghorn migration in the spring, and the southeastern migration in the fall (Alberta Conservation Association, 2021). Three source locations were situated on the edge of the SE quadrant of the TRSA, while six source locations span the edge of the NW and NE quadrants. The theoretical cost for landscape features were established using natural history observations of Pronghorn as they migrate through the prairies in conjunction with discussions with senior biologists and naturalists (Poor, 2010; Alberta Conservation Association, 2021).

The cost and length of migratory paths between each source-destination pair were calculated in four scenarios:

1. Baseline – capturing the landscape prior to Project activities;
2. Construction (Project) – capturing the point of maximum disturbance, after the removal of topsoil;
3. Post-construction (Operation) – capturing the landscape as it will be after construction and reclamation activities have completed, and the reservoir is filled (see Appendix I5, Figure I5-1); and
4. Cumulative Environmental Impact of other future proposed projects within the TRSA – that is, including the footprints of the additional nine proposed projects within the TRSA

The least-cost path model was allowed to simulate paths between source locations that were predicted to not pass through the Project area. This was to test if changing the habitat in the Project area (e.g., a portion of connected grassland) would still leave alternative routes within the TRSA and not create any landscape traps, peninsulas, or bottlenecks for migrating Pronghorn, and to determine whether the Project area is likely important to Pronghorn movement.

In general, Pronghorn must navigate a variety of agricultural and anthropogenic disturbances, and water features on the landscape in their annual north-south migration. A scale of 1 - 11 was used with 1 representing no "cost" (e.g., grassland, reclaimed pipeline), and 11 representing very high "cost" (e.g., large open waterbodies, energy facilities, industrial areas) to move through (Table 11-19). A 1 m pixel size was used, meaning that each meter a Pronghorn traveled accrued

a value of 1 - 11 units of cost (e.g., 1 km of travel through grassland [minimal cost of 1] would accrue 1,000 units of cost). The distance between selected source and destination locations varied. Longer paths generally incur greater cost, but it is possible to have a longer path between a source and a destination location that has a less costly path than a shorter path, depending on landscape features between the source-destination pairs. Also, paths between source location pairs represent simulated paths, not true pathways travelled by individual Pronghorn.

Although landscape features included in this analysis were similar to the ones included in the HSI analysis, some definitions varied to be more appropriate for the least-cost path analysis and or to take into account Pronghorn behaviour and use, specifically. Our scoring for the cost to travel through each landscape feature was not strictly based on theoretical physical difficulty of movement through space, but also anthropogenic disturbance frequency, and observed interaction by Pronghorn with respect to each landscape feature.

This analysis was only completed at the TRSA scale, as movement through the TLSA was deemed too small with respect to the total magnitude of annual Pronghorn north-south migration.

Table 11-19. Cost values for landscape features in the Terrestrial Regional Study Area for migratory Pronghorn used in least-cost path analysis

Landscape Type	Landscape Feature	Cost Value[1]	Definition
Vegetation Layers	Grassland	1	Short vegetation, majority grass covered, relatively flat
	Pasture	1	Short vegetation, majority grass covered, relatively flat, disturbance by past or current livestock
	Cropland	3	Agricultural disturbance, relatively flat, seasonally crop covered
	Treed Areas	5	Tall, woody vegetation consisting of trees and shrubs
	Settlements	10	Anthropogenic structures and habitation, frequent disturbance by people (e.g., farmyard)
	Agribusiness	10	Anthropogenic disturbance, no vegetation, fencing possible, frequent disturbance by equipment and people
Waterbodies	Ephemeral Waterbody	2	Natural temporary or seasonally open waterbody
	Seasonal Marsh	4	Natural, seasonally open waterbody with established vegetated edges
	Temporary Marsh	4	Natural, temporarily open waterbody with established vegetated edges, not related to seasonal water cycles
	Intermittent Shallow Open Water	6	Intermittently open shallow temporary open water body, less established vegetated edges
	Established Marsh	6	Natural, established open waterbody, vegetated edges, contains water year-round
	Dugout	7	Artificial open waterbody, fluctuates in depth seasonally, no established vegetated and sloped edges, previously or currently disturbed by livestock
	Canal	8	Artificial linear open water course, fenced, steep edges, non-vegetated edges
	Open Water	11	Natural, relatively large, open waterbody, contains water year-round, can be varying depths including deep, little flow, vegetated edges, parallel running access road
	Reservoir	11	Artificial relatively large open waterbody
Terrestrial Disturbances	Pipeline	1	Post-construction and reclamation of soil type, slope, and vegetation cover; relatively flat; no to minimal treed areas
	Trail	1	Akin to a farmer's field road (low use by permanent tracks) or a tracked walking/biking path
	Ditch	2	Ephemeral water, but mostly low laying, vegetated depression along roadway, mostly dry, vegetation periodically managed/shortened
	Abandoned Railway	3	Trains do not actively use railway; slightly raised mound of rock, ties, and rail; open and non-densely treed area

Landscape Type	Landscape Feature	Cost Value[1]	Definition
	Toe of Reservoir Berm to Section Edge	3	Post-construction and reclaimed area between the toe of the sloped berm, and the section edge; relatively flat, native grassland cover
	Gravel Road	4	Low to moderate frequency use, paralleled by ditches
	Inside Reservoir Berm	4	From the access road on top of the berm to the water edge; riprap covered; no planted vegetation
	Outside Reservoir Berm	4	From the access road on top of the berm to the toe of the sloped berm; relatively high degree of slope, reclaimed with native grassland vegetation, no woody vegetation
	Top of Reservoir Berm Access Road	4	Permanent gravel road, low to no frequency of disturbance
	Secondary Highway	5	Moderate frequency use, paved, single lane, paralleled by ditches
	Active Railway	6	Trains actively use railway; slightly raised mound of rock, ties, and rail; open and non-densely treed area
	Inundated Area	6	The open waterbody of the reservoir from the inside of the berm edge; fluctuating water levels seasonally, contains water year-round
	Barbed Wire Fence	7	Fence lines with at least one strand of barbed wire
	Divided Highway	9	High frequency disturbance, paved two-lane highway separated by ditch and mixed vegetation areas
	Residential Area	10	Anthropogenic structures and habitation, frequent disturbance by people (e.g., town center)
	Facilities	11	Anthropogenic structures pertaining to energy sector activities; cleared of vegetation; surrounded by chain-link fence; frequent disturbance
	Industrial Area	11	Anthropogenic structures, activities, and frequent disturbance by equipment and people
	Wellsite	11	Well infrastructure and machinery situated on large gravel pad, maybe surrounded by metal cattle barriers/fences; cleared of vegetation

1. Difficulty and energetic cost rating for crossing a habitat or feature (1: very low/no barrier to 11: very high/impassible)

11.5.2 Impact Assessment Results

11.5.2.1 Impacts on Wildlife and Wildlife Habitat

Northern Leopard Frog

Northern Leopard Frogs were observed within the Project area in 2021, during amphibian surveys (see section 11.4.2). However, this species was not identified again during any of the surveys, sweeps or site visits from 2022 through 2024.

Most habitat in the TLSA was assessed as low to poor quality (Appendix I5, Figure I5-2). This reflects the limited occurrence of shallow seasonal to permanent wetlands that are important habitat for Northern Leopard Frogs. No moderate quality habitat was identified. High and very high quality habitat (e.g., HSI value of ≥0.6) makes up 8% of the TLSA at Baseline.

The Northern Leopard Frog HSI model predicts poor habitat suitability throughout most of the TLSA during Construction (see Appendix I5, Figure I5-3), and decreases in available very high suitability habitat (e.g., HSI values ≥0.8) within the TLSA at Operations, but increases in high suitability habitat (e.g., HSI values of 0.6 to <0.8; see Table 11-20 and Appendix I5, Figure I5-4). Overall, habitat suitability for Northern Leopard Frogs is predicted to improve (e.g., 521% increase in HSI ≥0.6) as a result of the Project (Table 11-20).

The availability of very high, moderate, low, and poor-quality Northern Leopard Frog habitat in the TRSA is predicted to remain largely consistent from the Baseline Case to the Operations Case with <3% loss in landscape area across habitat qualities (Table 11-20). Like the TLSA, there will be a predicted increase in the area of high-quality habitat (+51%). An overall increase of 12% high and very high quality habitat is predicted in the TRSA once the Project is in Operation (Table 11-20, Appendix I5, Figure I5-5).

Table 11-20: Quality, amount, and percent change of Northern Leopard Frog habitat in the study areas across Project stage, based on Habitat Suitability Index modelling

TLSA					
Habitat Quality	**HSI Value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	47	14	14	-70.2
High	≥0.6	87	55	818	+840.2
High + V. High	*≥0.6*	*134*	*69*	*832*	*+520.9*
Moderate	≥0.4	0	0	0	No Change
Low	≥0.2	326	111	111	-66.0
Poor	<0.2	1,196	1,479	715	-40.2
TRSA					
Habitat Quality	**HSI Value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	4,639	4,635	4,635	-0.1
High	≥0.6	1,435	1,403	2,163	+50.7
High + V. High	*≥0.6*	*6,074*	*6,038*	*6,798*	*+11.9*
Moderate	≥0.4	37	37	37	No Change
Low	≥0.2	11,319	11,045	11,045	-2.4
Poor	<0.2	70,975	71,286	70,526	-0.6

The increase in the predicted availability of high-quality habitat in the TLSA is from the conversion of grassland into a large, permanent waterbody. The solonetzic soils in the TLSA, combined with the numerous ephemeral waterbodies present in the site lowered the predicted suitability of the Project location for Northern Leopard Frog in the Baseline Case, especially for overwintering sites when permanent waterbodies that do not freeze to bottom are required for survival. Expansion of the reservoir may provide overwintering habitat and connectivity for dispersal because the reservoir will hold water year-round. This will also provide an avenue for dispersal through the TLSA, and to canals that run through the TRSA. In the Operation Case, portions of the reservoir's north and western shores will be shallow, less steep, and contain riparian vegetation, which will provide better amphibian habitat when compared to deeper, steep, riprap-covered shores of the berm lined portions. The shallower, warmer waters could be highly suitable breeding habitat once reclamation of the site is complete.

High to very high quality Northern Leopard Frog habitat is predicted to increase in the TLSA from Baseline Case to Operations Case (including mitigation and reclamation) by 521%, a large increase. The effect will be long-term in duration and will occur within the TLSA, with some potential effects extending beyond the Project area through indirect effects (e.g., improved habitat within the Project area could lead to eventual dispersal of amphibians to suitable habitat near the Project area). The confidence of this assessment is "medium" as it is based on HSI modelling that has not been calibrated for this site, though the original model was developed and calibrated as part of the MultiSAR program (GOA, 2004). As the Northern Leopard Frog is a SOCC, and habitat is limited in the province, the ecological context is rated high. The overall impact on this key indicator species is rated High Positive (Table 11-30).

Loggerhead Shrike

During field programs and site visits from 2021 through 2024, Loggerhead Shrikes were observed only twice (incidentally), in the TLSA. No nests or evidence of breeding were recorded within or near the Project area. Both Loggerhead Shrike observations were of single individuals present in early spring (late April, early May), which suggests individuals that were actively migrating. No Loggerhead Shrike were observed during subsequent site visits, sweeps, or surveys that occurred later in the nesting season.

At Baseline, the majority of the TLSA (e.g., 1,161 ha) is considered moderate quality habitat, with most other area considered low to poor quality habitat (Table 11-21; Appendix I5, Figure I5-6). Only 18 ha are considered good or very good Loggerhead Shrike habitat. Construction is expected to convert all habitat within the Project area to poor quality (Appendix I5, Figure I5-7), with improvement seen at Operation only along the reclaimed berm (Appendix I5, Figure I5-8). Even with this improvement, the Project is predicted to result in an overall loss (-61%) of high and very high quality habitat for Loggerhead Shrikes in the TLSA, though the 2 ha of very high quality habitat remains unchanged across all Project cases (Table 11-21). The development of the reservoir is therefore expected to strongly affect habitat for this species, even after mitigation measures.

The TRSA contains over 14,000 ha of very high quality Loggerhead Shrike habitat at Baseline, most of which is located more than 3 km away from the Project area (Appendix I5, Figure I5-9).

Changes to Loggerhead Shrike habitat in TRSA are predicted to be fairly negligible, with most habitat quality changing by <1% across Project Cases (Table 11-21). High and very high quality habitat is expected to remain consistent, with a 0.1% loss expected by Operation, when compared to the Baseline state (Table 11-21).

Table 11-21: Quality, amount, and percent change of Loggerhead Shrike habitat in the study areas across Project stage, based on Habitat Suitability Index modelling

TLSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	2	2	2	No Change
High	≥0.6	16	5	5	-68.8
High + V. High	*≥0.6*	*18*	*7*	*7*	*-61.1*
Moderate	≥0.4	1,161	414	564	-51.4
Low	≥0.2	249	194	194	-22.1
Poor	<0.2	230	1,043	893	+288.3
TRSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	14,167	14,167	14,167	0
High	≥0.6	1,918	1,907	1,907	-0.6
High + V. High	*≥0.6*	*16,085*	*16,074*	*16,074*	*-0.1*
Moderate	≥0.4	34,707	33,962	34,111	-1.7
Low	≥0.2	25,492	25,422	25,422	-0.3
Poor	<0.2	12,121	12,936	12,786	+5.5

There is little very high- and high-quality nesting habitat available for Loggerhead Shrike within the TLSA, and likely this is the reason no evidence of Loggerhead Shrike nesting has so far been observed in the Project area. As a largely shrub-less landscape, only the southwestern edge of the Project footprint contains small trees and shrubs suitable for Loggerhead Shrike nests. However, that area has a high-water table and is largely dominated by willows, which are not preferred nesting habitat for Loggerhead Shrike. Additionally, the mature trees within that section of the Project area were cut down in 2022, which further limits the availability of nesting habitat.

Still, the Project is expected to result in a 61% loss in high to very high quality Loggerhead Shrike habitat, as well as a loss of 51% of medium quality habitat. The effect will be long-term in duration and will occur within the TLSA, with some potential effects extending beyond the Project area through indirect effects (e.g., lack of potential nesting or feeding in the area may result in reduced use of habitat immediately surrounding the Project area). The confidence of this assessment is “medium” as it is based on HSI modelling that has not been calibrated for this site, though the original model was developed and calibrated as part of the MultiSAR program (GOA, 2004). As Loggerhead Shrikes are a SOCC, the ecological context is rated high. The overall impact on this key indicator species is rated High Negative (Table 11-30).

Long-billed Curlew

During the wildlife inventory field programs, Long-billed Curlew were the most abundant SOCC observed in the TLSA, and all individuals were recorded in native prairie habitat. In 2023, they were also incidentally observed in waterbodies, pasture, and vegetated disturbance. All Long-billed Curlew were recorded during the nesting and rearing season (April to July). Several nests containing eggs or recently hatched eggs, as well as adults with young, were observed.

At Baseline, the majority of the TLSA (66%) is considered very high quality nesting habitat for Long-billed Curlew (Table 11-22, Appendix I5, Figure I5-10). Construction is expected to temporarily convert all habitat within the Project area to poor quality (Appendix I5, Figure I5-11), and the final Operation Case is expected to show slight improvements, as a result of reclamation along the reservoir berms (Appendix I5, Figure I5-12). The Project is expected to result in a 57% loss of high and very high quality habitat (Table 11-22), with a gain only expected in poor-quality habitat (+213%).

The TRSA has a mix of, predominantly, very high quality and poor quality Long-billed Curlew habitat (Appendix I5, Figure I5-13). The Project is expected to result in a further loss of all but poor quality Long-billed Curlew habitat (Table 11-22). However, modelled changes in habitat quality represent <2% change in each habitat quality class across the TRSA (Table 11-22).

Table 11-22: Quality, amount, and percent change of Long-billed Curlew habitat in the study areas across Project stage, based on Habitat Suitability Index modelling

TLSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	1,102	404	494	-55.2
High	≥0.6	66	10	11	-83.3
High + V. High	*≥0.6*	*1,168*	*414*	*505*	*-56.8*
Moderate	≥0.4	*20*	*6*	*6*	*-70.0*
Low	≥0.2	112	25	25	-77.7
Poor	<0.2	358	1,213	1,121	+213.2
TRSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	35,289	34,547	34,640	-1.8
High	≥0.6	2,376	2,335	2,336	-1.7
High + V. High	*≥0.6*	*37,665*	*36,882*	*36,976*	*-1.8*
Moderate	≥0.4	4,255	4,243	4,245	-0.2
Low	≥0.2	5,851	5,774	5,825	-0.4
Poor	<0.2	40,635	41,506	41,360	+1.8

Long-billed Curlew prefer to nest in upland prairie and tame pasture habitats and tend to move towards shallow wetlands and waterbodies while rearing offspring (Foster-Willfong, 2003). Hatching success decreases when nests occur in cropland (Devries et al., 2010) and offspring mortality has been associated with increased distance to wetlands (Foster-Willfong, 2003). Though Long-billed Curlew are considered shorebirds, they are more closely associated with

upland grassland habitat and are predicted to experience local habitat loss as a result of the Project development.

The Project is expected to result in a 57% loss in high to very high quality Long-billed Curlew nesting habitat in the TLSA, which represents a 2% loss across the TRSA. The effect will be long-term in duration and will occur within the TLSA, with some potential effects extending beyond the Project area through indirect effects (e.g., lack of potential nesting or feeding in the area may result in reduced use of habitat immediately surrounding the Project area). The confidence of this assessment is “medium” as it is based on HSI modelling that has not been calibrated for this site, though the original model was developed and calibrated as part of the MultiSAR program (GOA, 2004). As Long-billed Curlew are a SOCC, the ecological context is rated high. The overall impact on this key indicator species is rated High Negative (Table 11-30).

Sprague’s Pipit

During the field programs, Sprague’s Pipit was the SOCC grassland songbird most often observed in the TLSA. Displaying males and nests containing eggs were found most frequently in the southeastern quadrant of the Project area in native grassland habitat.

The TLSA contains 1,036 ha of very high quality Sprague’s Pipit habitat at Baseline, based on HSI modelling (Table 11-23, Appendix I5, Figure I5-14). As is the case with most species, the Construction Case is expected to temporarily convert all habitat within the Project area to poor quality, with very high quality habitat remaining in the TLSA outside of the Project area, especially to the north and east (Appendix I5, Figure I5-15). The Operation Case is expected to result large increases in moderate (2,080%) and high (380%) quality habitat, but the actual sizes of these areas will be relatively small (e.g., 109 ha and 48 ha, respectively). The Project is predicted to result in a 64% loss (663 ha) in very high quality habitat (Table 11-23, Appendix I5, Figure I5-16).

The TRSA contains a mix of predominantly very high and poor quality Sprague’s Pipit habitat at Baseline, as well as some fragments of moderate and good habitat (Appendix I5, Figure I5-17). The Project is expected to result in the loss of 567 ha of high to very high quality habitat in the TRSA, representing a loss of <2% (Table 11-23). This corresponds with similar results observed in other grassland-dependent species, including Long-billed Curlew.

Table 11-23: Quality, amount, and percent change of Sprague's Pipit habitat in the study areas across Project stage, based on Habitat Suitability Index modelling

TLSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	1,036	371	373	-64.0
High	≥0.6	10	4	48	+380.0
High + V. High	*≥0.6*	*1,046*	*375*	*421*	*-60.0*
Moderate	≥0.4	5	4	109	+2,080.0
Low	≥0.2	17	16	22	+29.4
Poor	<0.2	590	1,263	1,105	+87.3
TRSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	33,527	32,923	32,923	-1.8
High	≥0.6	3,308	3,300	3,345	+1.1
High + V. High	*≥0.6*	*36,835*	*36,223*	*36,268*	*-1.5*
Moderate	≥0.4	798	794	900	+12.8
Low	≥0.2	496	495	501	+1.0
Poor	<0.2	50,279	50,892	50,736	+0.9

Similar to the other prairie birds discussed earlier, the Project is expected to result in a large (60%) loss in high and very high quality habitat in the TLSA. The effect is expected to be long-term in duration and occur within the TLSA, as some effects will likely extend beyond the Project area, but are not expected to be notable at the regional level. The confidence of this assessment is "medium" as it is based on HSI modelling that has not been calibrated for this site, though the original model was developed and calibrated as part of the MultiSAR program (GOA, 2004). As Sprague's Pipit are a SOCC, the ecological context is rated high. The overall impact on this key indicator species is rated High Negative (Table 11-30).

Richardson's Ground Squirrel

Richardson's Ground Squirrel were not a primary focus of Project field surveys and were only recorded as incidental observations due to their abundance the lack of regulatory protections for this species in Alberta. However, their colonies are present across the TLSA in all areas that are not wetlands or waterbodies.

The majority of the TLSA (1,017 ha or 61%) is made up of very high quality Richardson's Ground Squirrel habitat, at Baseline (Table 11-24; Appendix I5, Figure I5-18). As with all species, Construction will result in temporary conversion of habitat within the Project area to poor quality (Appendix I5, Figure I5-19), but the final Operation case is expected to result in only marginal habitat improvement along the berms (e.g., from poor to low quality), but with improved habitat quality on the edge of the Project area and outer portions of the TLSA (Appendix I5, Figure I5-20). The Project is expected to result in an overall lost of 56% of good and very good quality habitat for Richardson's Ground Squirrels (Table 11-24).

The TRSA contains a mix of very high, low and poor quality habitat in near equal parts at Baseline (Table 11-24; Appendix I5, Figure I5-21). The main changes predicted to Richardson's Ground

Squirrel habitat quality in the TRSA from Baseline to Operation Case will be a loss of high and very high quality habitat (<2% overall), and a gain in poor quality habitat (6%; Table 11-24).

Table 11-24: Quality, amount, and percent change of Richardson's Ground Squirrel habitat in the study areas across Project stage, based on Habitat Suitability Index modelling

TLSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	1,017	355	451	-55.7
High	≥0.6	5	1	1	-80.0
High + V. High	*≥0.6*	*1,022*	*356*	*452*	*-55.8*
Moderate	≥0.4	50	47	53	+6.0
Low	≥0.2	284	186	240	-15.5
Poor	<0.2	302	1,069	913	+202.3
TRSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	33,559	32,930	33,026	-1.6
High	≥0.6	423	392	392	-7.3
High + V. High	*≥0.6*	*33,982*	*33,322*	*33,418*	*-1.7*
Moderate	≥0.4	6,186	6,139	6,145	-0.7
Low	≥0.2	22,370	21,406	21,460	-4.1
Poor	<0.2	25,866	27,538	27,382	+5.9

Richardson's Ground Squirrels rely on grassland habitat, which will mostly be removed as a result of Project activities. A 56% local (TLSA) loss of high and very high Richardson Ground Squirrel habitat is expected by Project Operation, as compared to the Baseline Case. This effect is expected to be long-term because the reservoir is a permanent feature. While the habitat change will be restricted to the Project area, some effects may be seen beyond the Project area, but effects are not expected to extend to the TRSA. The confidence of this assessment is "medium" as it is based on HSI modelling that has not been calibrated for this site, though the original model was developed and calibrated as part of the MultiSAR program (GOA, 2004). Richardson's Ground Squirrels are not a SOCC and are common across the prairies, therefore the loss in their habitat is not considered a of high ecological importance, though they are an important prey species and excavator for other species that are SOCC. The overall impact on this key indicator species is rated High Negative (Table 11-30).

Ferruginous Hawk

Ferruginous Hawks are a migratory raptor SOCC, listed as Endangered under the AWA (GOA, 2024b). One breeding pair has been observed nesting in the Project area each year from 2021-2024.

The majority of area in the TLSA (1,089 ha or 66%) is considered very good quality Ferruginous Hawk habitat at the Baseline, according to the HSI model (Table 11-25; Appendix I5, Figure I5-22). Construction activities are expected to temporarily convert all Ferruginous habitat within the Project area to poor quality (Appendix I5, Figure I5-23), with berms and the temporary soil storage

in the northeast expected to become high quality habitat during Operation (Appendix I5, Figure I5-24). While the Project is expected to result in a substantial gain in high quality habitat (+758%), this is at the expense of very high quality habitat. Overall, the Project is expected to result in a 56% loss in high and very high quality Ferruginous Hawk habitat (Table 11-25).

The TRSA is made up predominantly of very high quality Ferruginous Hawk habitat at Baseline, but with large portions of low and poor quality habitat as well (Table 11-25; Appendix I5, Figure I5-25). The biggest relative change expected in the TRSA as a result of the Project is a 12% increase in high quality habitat, but this is at the expense of a loss in very high quality habitat. Overall, the Project is expected to contribute to a 2% loss in Ferruginous Hawk habitat in the TRSA (Table 11-25).

Table 11-25: Quality, amount, and percent change of Ferruginous Hawk habitat in the study areas across Project stage, based on Habitat Suitability Index modelling

TLSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	1,089	380	380	-65.1
High	≥0.6	12	7	103	+758.3
High + V. High	*≥0.6*	*1,101*	*387*	*483*	*-56.1*
Moderate	≥0.4	44	41	41	-6.8
Low	≥0.2	173	170	170	-1.7
Poor	<0.2	340	1,060	963	+183.2
TRSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	34,677	33,998	33,998	-2.0
High	≥0.6	758	753	849	+12.0
High + V. High	*≥0.6*	*35,435*	*34,751*	*34,847*	*-1.7*
Moderate	≥0.4	5,444	5,401	5,401	-0.8
Low	≥0.2	18,313	18,281	18,282	-0.2
Poor	<0.2	29,212	29,970	29,873	+2.3

Although the Project reclamation will result in some increase in high quality habitat for Ferruginous Hawks compared to the Baseline Case, an overall loss in high and very high quality habitat (e.g., -56%) is expected in the TLSA, as compared to the Baseline Case. This effect is expected to be long-term because the reservoir is a permanent feature. While the habitat change will be restricted to the Project area, some effects may be seen beyond the Project area. Effects at the regional level are not expected to be notable. The confidence of this assessment is “medium” as it is based on HSI modelling that has not been calibrated for this site, though the original model was developed and calibrated as part of the MultiSAR program (GOA, 2004). Ferruginous Hawks are a SOCC, and given the known active nest within the Project area, the ecological context is rated high. Like other grassland species assessed here, the overall impact on this key indicator species is rated High Negative (Table 11-30).

American Badger

No American Badger individuals were observed in the TLSA during the field programs or any site visits from 2021 through 2024. Some Richardson's Ground Squirrel burrows contained signs of excavation from foraging American Badger during the 2023 mammal burrow survey, though no natal or overwintering dens were observed in the Project area. All dens attributed to American Badger were old without fresh excavation and with grasses growing in the throw mound.

The Baseline Case shows a predominance (66%) of high habitat suitability for American Badger in the TLSA (Table 11-26; Appendix I5, Figure I5-26). Very high habitat suitability is only seen in the southeastern portion of the study area. As for most species, the Construction Case is expected to reduce American Badger habitat suitability across the Project area to poor, though high and very high quality habitat in the TLSA but outside of the Project area will remain (Appendix I5, Figure I5-27). The Operational Case showed improvements in habitat suitability over the Construction Case, but an overall loss of habitat suitability for American Badger across the TLSA (Table 11-26; Appendix I5, Figure I5-28). HSI models predict a 47% loss in high and very high quality American Badger habitat as a result of the Project, even after mitigation activities. The small portion of very high quality habitat that is present on the eastern edge of the Project area in the Baseline Case is expected to be converted to high quality habitat by Project Operation Appendix I5, Figures I5-26 and I5-28).

The TRSA contains predominantly poor quality American Badger habitat (e.g., 43,558 ha or 49% of the TRSA; Table 11-26; Appendix I5, Figure I5-29). At 32% of the TRSA, the next most dominant habitat suitability class in the study area at Baseline, is high suitability. The Project is anticipated to result in a loss of 1% of the high and very highly suitable American Badger habitat, with changes across all habitat suitability classes predicted to remain within 2% of current (Baseline) values.

Table 11-26: Quality, amount, and percent change of American Badger habitat in the study areas across Project stage, based on Habitat Suitability Index modelling

TLSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	44	42	42	-4.6
High	≥0.6	938	327	477	-49.2
High + V. High	*≥0.6*	*982*	*369*	*519*	*-47.2*
Moderate	≥0.4	24	13	13	-45.8
Low	≥0.2	193	49	53	-72.5
Poor	<0.2	458	1,227	1,073	+134.3
TRSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	8,330	8,328	8,328	<-0.1
High	≥0.6	28,354	27,735	27,884	-1.7
High + V. High	*≥0.6*	*36,684*	*36,063*	*36,212*	*-1.3*
Moderate	≥0.4	1,428	1,418	1,418	-0.7
Low	≥0.2	6,735	6,608	6,612	-1.8
Poor	<0.2	43,558	44,317	44,163	+1.4

The lack of very high-quality habitat in the TLSA and TRSA was attributed to the widespread sandy soils throughout the region. However, the elusive and nocturnal nature of American Badgers is a challenge for detection. The largest Project-related disruption expected for American Badger is from a loss of foraging habitat since they are able to travel out of the area when the TLSA is inundated, and don't appear to be currently denning within the Project area.

American Badgers are expected to lose a large (47%) portion of suitable habitat (e.g., HSI ≥0.6) within the TLSA as a result of the Project. This effect is expected to be long-term because the reservoir is a permanent feature. While the habitat change will be restricted to the Project area, effects may be seen beyond the Project area, but are not expected to extend to the TRSA. The confidence of this assessment is "medium" as it is based on HSI modelling that has not been calibrated for this site, though the original model was developed and calibrated as part of the MultiSAR program (GOA, 2004). American Badger are a SOCC and therefore this habitat loss is considered high ecological importance. The overall impact on this key indicator species is rated High Negative (Table 11-30).

Migratory Bird Stopover

Project field surveys did not focus on surveying for migratory birds or stopover habitat in particular. In spite of the lack of targeted surveys, migratory species that use stopover habitat were identified within the TLSA during surveys and sweeps (see Appendix I2, Tables I2-1 and I2-3), as well as in the TRSA from provincial records (see Appendix I2, Table I2-2). This includes, for example, Canada Geese, Greater White-fronted Geese, and a variety of ducks.

At Baseline, almost the entire TLSA (e.g., 96%) is classified as suitable migratory stopover habitat (e.g., HSI value ≥0.6), based on the HSI model (Table 11-27; Appendix I5, Figure I5-30). Counter to the HSI models discussed above, the migratory stopover model predicts a high percentage (87%) of suitable habitat even in the Construction Case. An examination of the model parameters (Section 11.5.1) explains how the model can predict high habitat suitability even where vegetation is stripped away for construction: these areas remain within 1 km of waterbodies and canals. Realistically, an active construction site is unlikely to be used as a stopover site for migratory birds. This model should therefore be interpreted carefully as it may be generating overly optimistic habitat suitability values for the Baseline and Construction Cases. The model predicts a low negative (e.g., -3% change) in suitable (HSI ≥0.6) migratory stopover habitat within the TLSA when compared to the Baseline Case, based on HSI models (Table 11-27; Appendix I5, Figure I5-32). This is counter to what was expected, based on ecological knowledge of the value of waterbodies as migratory stopover habitat.

The HSI model indicates that the vast majority of the TRSA (95%) is suitable migratory waterbird stopover habitat, at Baseline (Table 11-27; Appendix I5, Figure I5-33). This model is driven heavily by waterbodies within the study areas, including, for example, natural wetlands and ephemeral waterbodies, as well as anthropogenic canals, dugouts, and reservoirs. Because these waterbodies are scattered throughout the TRSA, most land is considered suitable in this model. This model is likely overestimating suitable stopover habitat in the study areas, and could benefit from Project or regional calibration. Realistically, the conversion of grassland to open water reservoir is expected to be a net benefit for migrating waterbirds.

Table 11-27: Quality, amount, and percent change of habitat for migratory bird stopover in the study areas across Project stage, based on Habitat Suitability Index modelling

TLSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	949	358	358	-62.3
High	≥0.6	646	1,092	1,189	+84.1
High + V. High	*≥0.6*	*1,595*	*1,450*	*1,547*	*-3.0*
Moderate	≥0.4	0	154	57	N/A
Low	≥0.2	0	0	0	No Change
Poor	<0.2	62	53	53	-14.5
TRSA					
Habitat quality	**HSI value (0-1)**	**Baseline Case (ha)**	**Project Construction (ha)**	**Operations (ha)**	**Baseline – Operations (% change)**
Very High	≥0.8	62,238	61,647	61,647	-0.9
High	≥0.6	21,783	22,229	22,326	+2.5
High + V. High	*≥0.6*	*84,021*	*83,876*	*83,973*	*-0.1*
Moderate	≥0.4	143	298	201	+40.6
Low	≥0.2	0	0	0	No Change
Poor	<0.2	4,240	4,231	4,231	-0.2

HSI models predict a high availability of suitable (e.g., HSI ≥0.6) migratory waterbird stopover habitat within both the TLSA and TRSA, across all Cases: suitable habitat makes up 96% and 95% of the TLSA and TRSA, respectively, at Baseline, and 93% and 95%, of the TLSA and TRSA, respectively, at Operation. The model appears to be overestimating suitable habitat in at least the Baseline and Construction Cases, and so the decrease in over suitable habitat may not be representative of the actual Project effects. Regardless, since the model predicted a loss of suitable habitat from Baseline to Operations, this is being assessed as a negative Project effect. The change is expected to be small (<5%), thus the magnitude is low. As with other models described above, the changes are restricted to the Project area, but will have spillover effects to the surrounding local area (TLSA). Effects will be long-term, as the reservoir is a permanent feature. Confidence in the model is low, based on a mismatch with ecological understanding of the system. Since migratory waterfowl and suitable stopover habitat are generally abundant, this this assessment is not considered to have a high ecological context. As per the EIA Approach (Volume 2, Section 2), these factors result in a Medium Negative impact rating (Table 11-30).

Pronghorn - Least-cost Path Analysis

Least-cost paths were modelled for each source point to each destination end point identified across the TRSA for migrating Pronghorn (e.g., see Appendix I5, Figures I5-34 to I5-39). Four of 36 paths that run generally from SE to NW (and vice versa) cross through the Project area in the Baseline Case. However, these paths are extended and diverted to either side of the expanded reservoir as the footprint transitions from Baseline, to Construction, and Operation (post-reclamation). Qualitatively assessing the simulated paths, the expansion of the reservoir does not create traps or movement peninsulas that would force Pronghorn to back tracked or be stuck from continuing their migration. For further discussion, the four simulated paths were highlighted from

pair locations that pass through the Project footprint in Baseline Cases, as they were paths that would then be most likely to be affected by construction.

The change in habitat type of the Project area from Baseline to Operation Case increased path length by 0.25 and 1.72 km, and 0.47 and 0.45 km (Table 11-28; Appendix I5, Figure I5-34 to I5-37). At most, the simulated paths increased by 5.0%, which implies an increase in the cost of this path by at least 5% when connecting source locations 1 and 7.

Table 11-28: Change in cost (travel distance) between Project (Operation) and Baseline Cases

Location Pair	Baseline Distance (km)	Operation Distance (km)	Change in Distance (km)	Percent Change (%)
1-6	33.25	33.50	0.25	0.8
1-7	34.35	36.07	1.72	5.0
2-7	35.80	36.27	0.47	1.3
2-8	35.76	36.21	0.45	1.2

The length and cost of each path varies, but the cost does not change proportionally to length (e.g., Table 11-29). Therefore, while the analysis simulated paths between each pair of locations, these paths might not be routes that Pronghorn will travel, because of the high energetic costs. Because this analysis is not informed by actual Pronghorn movement data (only biologically informed costs of passing through specific landscape features), it cannot be said for certain that even if this simulation estimates a relatively high cost between two locations, that it would be too energetically costly for Pronghorn to travel. However, the analysis does allow us to suggest which route are more efficient and may identify preferred migratory paths within the TRSA. From this analysis, no simulated path identified a travel corridor that would be impassable or even relatively more expensive per unit of distance traveled than others within the TRSA.

There is relatively little change in the cost per unit of distance travelled between Baseline and Operation (Table 11-29)**.** In other words, the expansion of the reservoir may change the length of paths by a small distance (e.g., source 1 to 6), and in some cases the path changes dramatically (e.g., 1 to 7), to avoid the expanded reservoir and a large block of agriculturally disturbed land with interspersed barbed wire fences (south of the Project footprint), but does not increase the efficiency (cost/km) of travel (Table 11-29). This means that the analysis suggests that an increase in cost is largely due to increases in distance traveled, not deviation of paths into more difficult terrain. Also, the lack of change in travel efficiency suggests that the expansion of the reservoir is unlikely to increase the interaction between hypothetical Pronghorn paths with detrimental landscape features (e.g., roads) more than they do in the Baseline.

Table 11-29: The modelled distance and cost of Pronghorn migratory movements through the Terrestrial Regional Study Area between start and end points

Location Pair	Distance (km)		Cost		Cost/km	
	Baseline	Operation	Baseline	Operation	Baseline	Operation
1-2	8.59	8.60	8.81	8.91	1.03	1.04
1-3	19.04	19.01	20.16	20.37	1.06	1.07
1-4	30.84	30.76	32.29	32.58	1.05	1.06
1-5	33.80	33.73	35.85	36.18	1.06	1.07
1-6	**33.25**	**33.50**	**35.64**	**36.39**	**1.07**	**1.09**
1-7	**34.35**	**36.07**	**36.00**	**37.67**	**1.05**	**1.04**
1-8	34.28	34.26	35.64	35.68	1.04	1.04
1-9	28.95	28.95	29.20	29.25	1.01	1.01
2-1	8.59	8.60	8.81	8.91	1.03	1.04
2-3	11.01	10.99	11.79	11.88	1.07	1.08
2-4	24.66	24.66	26.19	26.29	1.06	1.07
2-5	29.32	29.30	31.39	31.50	1.07	1.08
2-6	33.96	33.91	36.20	36.45	1.07	1.07
2-7	**35.80**	**36.27**	**37.91**	**38.58**	**1.06**	**1.06**
2-8	**35.76**	**36.21**	**37.64**	**38.68**	**1.05**	**1.07**
2-9	33.81	33.87	35.15	35.36	1.04	1.04

11.5.3 Additional Project Effects on Wildlife

11.5.3.1 Noise, Vibration, and Artificial Lights

Wildlife can adjust their movement and behaviour, including courtship, reproductivity, and feeding patterns, in response to noise, vibration, and artificial light at night (e.g., see [Kunc & Schmidt, 2019; Falcón, et al., 2020]). Construction will cause increases in Noise, Vibration (see Volume 2, Section 5: Noise and Vibration), and artificial light within the Project area, but only small and short-term increases will reach beyond the TLSA. Standard mitigations will reduce the effects of noise, vibration and artificial light at night on wildlife (see Section 11.7: Mitigations and Management Actions, and Appendix I4: WMP). Artificial light at night was not measured or modelled but is expected to have a limited effect. While artificial lighting can affect both plants and animals, the short-term duration of the Project is not expected to have any substantial or long-lasting effects. Furthermore, the most harmful effect of lighting on wildlife are collisions of nocturnally-migrating birds and bats with infrastructure (e.g., communication towers, tall buildings, wind turbines). Since neither Project construction nor operation will involve or create tall infrastructure likely to cause bird or bat collisions, the greatest effect of artificial lighting doesn't apply to this Project.

Wildlife currently (e.g., Baseline Case) using and moving through the Project area are adapted to noise, vibration and artificial lights at night from traffic along the TCH and CPKC railway. As a result, the species currently present in the TRSA are already adapted to similar disturbances, and therefore any effects are expected to be small. Given the relatively short-term duration of Project Construction, the Project is expected to have a Low Negative impact rating on wildlife, as a result of noise, vibration or artificial light (see Table 11.30 below).

11.5.3.2 Wildlife Attraction and Human-Wildlife Conflict

The potential for food conditioning and other scenarios that may cause human-wildlife conflict are generally low and mostly confined to the Construction phase. Steps should be taken to avoid food conditioning, as well as other forms of human-wildlife conflict (e.g., vehicle collisions). Given the species most likely to move through the TLSA (e.g., Coyotes but not bears), it is unlikely that bear-proof garbage bins will be required on site during construction. However, if bears or Cougar are identified on or near the Project area, this or other attractant-management should be considered (GOA, 2011). Standard mitigations such as securing all garbage in closed garbage bins and removing waste daily, should minimize the likelihood of human-wildlife conflict.

Proper garbage and attractant management, as well as traffic management, are effective ways to mitigate the potential for food-conditioning and other behaviours that can lead to human-wildlife conflict (GOA, 2011). In most cases, the disturbance (e.g., vegetation removal, noise and lighting from construction vehicles and machinery) caused by construction will deter wildlife from at least the areas of the Project area under active construction, which will alone reduce the likelihood of human-wildlife conflict. Thoughtful Project planning (e.g., completing vegetation removal prior to bird nesting and wildlife breeding seasons) can further reduce human-wildlife conflict and potential Project delays as a result of wildlife creating sensitive features within or near the Project area. Further discussion on mitigations can be found in Section 11.7 (Mitigations and Management Actions) and Appendix I4 (WMP). With mitigations, Project effects are expected to be neutral to low, local and short-term. Therefore, this was given a Low Negative impact rating (Table 11-30).

11.5.4 Summary of Impact Assessment

Table 11-30: Analysis of potential residual effects on wildlife and wildlife habitat from Project activities

Impact description	Mitigation action	Direction	Key Criteria			Modifiers		Residual Impact Rating
			Magnitude	Geographical Extent	Duration	Confidence	Ecological and Social Context	
Wildlife Presence and Habitat Association Key Indicators								
Northern Leopard Frog Habitat (Amphibian SOCC)	Supporting the establishment of wetland associated vegetation in shallow areas of reservoir.	Positive	High	Local	Long-term	Medium	High Importance	High Positive
Loggerhead Shrikes Habitat (Grassland and Shrubland SOCC)	Replanting, re-establishment, and reclamation of native prairie plants in non-waterboy reservoir land.	Negative	High	Local	Long-term	Medium	High Importance	High Negative
Long-billed Curlew Habitat (Upland Prairie and Shorebird SOCC)	Replanting, re-establishment, and reclamation of native prairie plants in non-waterboy reservoir land. Shallow areas of the reservoir may provide some additional mitigation.	Negative	High	Local	Long-term	Medium	High Importance	High Negative
Sprague's Pipit Habitat (Prairie SOCC)	Replanting, re-establishment, and reclamation of native prairie plants in non-waterboy reservoir land.	Negative	High	Local	Long-term	Medium	High Importance	High Negative
Richardson's Ground Squirrel Habitat (prairie prey species and burrow excavator)	Replanting, re-establishment, and reclamation of native prairie plants in non-waterboy reservoir land.	Negative	High	Local	Long-term	Medium	N/A	High Negative
Ferruginous Hawk Habitat (Prairie Raptor SOCC)	Replanting, re-establishment, and reclamation of native prairie plants in non-waterboy reservoir land.	Negative	High	Local	Long-term	Medium	High Importance	High Negative
American Badger Habitat (prairie mammal SOCC)	Replanting, re-establishment, and reclamation of native prairie plants in non-waterboy reservoir land.	Negative	High	Local	Long-term	Medium	High Importance	High Negative

Impact description	Mitigation action	Direction	Key Criteria			Modifiers		Residual Impact Rating
			Magnitude	Geographical Extent	Duration	Confidence	Ecological and Social Context	
Wildlife Movement and Habitat Connectivity Key Indicators								
Migratory Bird Stopover Habitat	Supporting the establishment of wetland associated vegetation in shallow areas of reservoir, as well as reclaiming native grassland surrounding the reservoir.	Negative	Low	Local	Long-Term	Low	N/A	Medium Negative
Pronghorn Migration Corridor Connectivity	Replacing existing fencing and using only Pronghorn safe fencing to minimize disruptions to movement.	Negative	Low	Local	Long-term	High	N/A	Medium Negative
Other Wildlife Key Indicators								
Effects of noise, vibration and artificial light on wildlife presence and behaviour	Mitigate noise and vibration through maintenance of construction vehicles and equipment, avoiding unnecessary noise and idling, light management to reduce lighting towards the sky or beyond the Project area.	Negative	Low	Local	Short-term	Low	N/A	Low Negative
Food-conditioning wildlife and human-wildlife conflict	Attraction and food waste management during construction and operations, strict policies prohibiting feeding and harassing wildlife, wildlife sweeps prior to work activities and regular communication with Environmental Liaison to identify wildlife sensitivities and avoid conflict resulting from defensive wildlife behaviour.	Negative	Low	Local	Short-term	Low	N/A	Low Negative

11.6 CUMULATIVE EFFECTS ASSESSMENT

This section assesses how the Project may interact with other past, present, or future projects and activities, and their combined impact on Wildlife resources. For a full description of the Cumulative Effects Assessment Approach see Volume 2, Section 2.

Resources in which the Project is expected to result in high negative or medium negative residual impacts were assessed in the cumulative effects assessment. For Wildlife, this includes the following:

- Grassland Habitat Loss;
- Migratory Bird Stopover Habitat Loss; and
- Terrestrial Wildlife Migration.

While most wildlife HSI models indicated a high negative Project effect, in most cases these were all a result of the loss of grassland habitat. The results regarding migratory stopover habitat have low confidence and indicated the vast majority of habitat in both the TLSA and TRSA are suitable for migratory stopover, for each case, which therefore prevents a proper CEA analysis. Therefore, the CEA will focus on the loss of grassland habitat generally, and Project effects on terrestrial wildlife migration.

11.6.1 Effects on Each Resource from Project Types

11.6.1.1 Grassland Habitat Loss

Wildlife habitat suitability models for six different species predicted large negative Project effects at the Operation Case when compared to the Baseline Case (Section 11.5.1; Table 11-30). Although each model included different variables and model parameters, the largest factor in each was the loss of grassland habitat, which is especially critical for many species during nesting (e.g., particularly between mid-May and late-July). Some bird species can nest successfully in tame prairie or pasture habitat that is not over-grazed (Davis et al., 2016). These species typically select for habitat away from water, roads, and industrial infrastructure (Dechant, et al., 2003; Summers et al., 2011; Des Brisay, et al., 2023). Grassland breeding birds of many species have experienced a 70% decline in Canada since 1970 (GOA, 1997). In addition to grassland songbirds this analysis includes other obligate grassland species (e.g., Loggerhead Shrike, Long-billed Curlew, Sprague's Pipit, Richardson's Ground Squirrel, Ferruginous Hawk, and American Badger).

11.6.1.2 Terrestrial Wildlife Migration

Pronghorn are classified as a Sensitive species in Alberta (GOA, 2020a), known to be affected by landscape changes that fragment their habitat and limit movement. For instance, there is growing concern over industrial and residential development in the Medicine Hat area, where Pronghorn migration is already limited by major highways and fencing (Gates, et al., 2012; Seidler et al., 2014; Robb et al., 2022). Cattle farming is associated with barbed-wire fences that can hamper Pronghorn movement, as can roads and waterbodies. For a detailed discussion on barriers to movement, see Section 11.4.3.

11.6.2 Project Development Case

The Project Development Case for wildlife was assessed through land use changes from 1950 to present day (historic), the Application (e.g., land use changes as a result of the proposed SLR Expansion), and reasonably foreseeable future projects (to 2050).

11.6.2.1 Grassland Habitat Loss

Development within the TRSA has already resulted in a loss of over 24,000 ha of native grassland and pasture habitat since 1950, and an increase in cultivation of nearly 20,000 ha. Increases in industrial and residential development, anthropogenic waterbodies and roads also contribute to the loss of nesting habitat.

The Project will further contribute to the loss of grassland habitat. Future projects are expected to further decrease grassland habitat.

11.6.2.2 Terrestrial Wildlife Migration

Key projects and land use changes expected to affect Pronghorn migration are the expanded Snake Lake Reservoir (approximately 760 ha), and future industrial projects that are fenced or cause enough disturbance to deter Pronghorn from crossing (approximately 6,700 ha). Additionally, the loss of grassland and pasture reduces preferred habitat on the landscape (loss of 700 ha for the Project case, approximately 1,700 ha from future projects).

11.6.3 Cumulative Effects

Estimated cumulative effects on the wildlife resources with negative impacts are summarized in Table 11-31 below, considering all known and predicted activities within the TRSA from 1950 to 2050. Note: for grassland birds, loss of native grassland was used as the key resource for the assessment, whereas for wildlife movement a least-cost path movement model was used in place of area changes.

Table 11-31: Rating contribution of projects on the cumulative effects for each wildlife resource within the Terrestrial Regional Study Area

Project Type	Effect of Projects on Wildlife Resources	
	Grassland Habitat Loss	***Terrestrial Migration***
Past Projects and Activities	High (26% loss)	High (26% loss)
Snake Lake Reservoir	Negligible (1% loss)	Negligible (1% loss)
Future Projects and Activities	Negligible (2% loss)	Moderate (7% loss)
Overall Cumulative Effect	**High (29% loss)**	**High (34% decrease in movement space)**[a]
Relative Project Contribution	**Low (2.75% contribution)**	**Low (2.5% contribution)**

a. Note: Assessment based on Wildlife Movement Modelling

11.6.3.1 Grassland Habitat Loss

Cumulative effects calculations focused on the loss of native grassland and pasture habitat from past projects (1950 to 2024), from the Project, and anticipated future projects to 2050. The total

cumulative change to grassland and pasture within the TRSA is a loss of 23,343.40 ha, representing a 26% decrease in this land use from 1950 to 2050 (Table 11-31).

11.6.3.2 Terrestrial Wildlife Migration

Pronghorn have experienced a high cumulative loss of grazing habitat (e.g., 26% cumulative loss in grassland and pasture habitat from 1950 to 2050). During this time, there have also been numerous changes across the landscape that challenge their seasonal migration. Least-cost path modeling (see Appendix I5, Figures I5-38 to I5-39) indicate that Pronghorn movement across the TRSA is likely not greatly affected by current versus historic development, but the SLR expansion and future industrial projects will cause Pronghorn to adjust their movements. Still, these changes are expected to be low overall (e.g., increases in movement of 0.72 km [range: 0.25 - 1.72 km], on average, representing an increase in travel of 5%).

11.6.4 Relative Project Contribution

The contribution of the Project relative to the total cumulative effects was assessed as high for grassland habitat loss and terrestrial migration (Table 11-31).

The largest challenge for the survival and conservation of grassland species is loss of habitat (Birds Canada and Environment and Climate Change Canada, 2024). The steady conversion of relatively small areas of grassland to crop, pasture, or agriculture adjacent land types has led to the larger cumulative loss of native grassland across the prairies. The Project footprint makes up roughly 1.8% of the grassland available in the TRSA. Even though the expanded reservoir will be useful habitat for some species (in particular Northern Leopard Frogs and, possibly, migratory waterbirds during stopover), the Project will contribute to the cumulative loss of grassland within the TRSA and prairies as a whole. Both agricultural (including further irrigation potential expansions), residential, and energy sector projects have been proposed within the TRSA by various stakeholders.

Taking into consideration the additional planned projects that could degrade areas of native grassland within the TRSA, to 2050, the Project footprint would be the fourth largest of nine proposed projects within the TRSA, with a total disturbed footprint of roughly 920 ha. If all projects are completed, the proposed cumulative disturbance area will be 23% within the TRSA, equating 20,095 ha of disturbed land. The Project area would make up <5% of the total cumulative disturbance within the TRSA.

11.6.4.1 Grassland Habitat Loss

The Project will result in a loss of 703 ha of grassland and pasture habitat, which is a relative Project contribution of 0.8% to the cumulative effect. This is a low relative contribution, however, considering the severity of grassland habitat loss across the prairies, even small losses should be avoided, when possible, and mitigated when not.

11.6.4.2 Terrestrial Wildlife Migration

The Project will have a low relative contribution to the cumulative effect on Pronghorn migration. Pronghorn are expected to continue to move around, rather than cross through the expanded reservoir. Although crossing a reservoir is not impossible, it is unlikely as it would be the more

energy intensive option. Therefore, there is an effect, but because the area around the reservoir is not a primary migration corridor, nor is it currently particularly developed to restrict movement, Pronghorn are expected to adapt their movement relatively easily. Future projects may further restrict movement, but if most development is restricted to cultivated or otherwise developed lands, these effects are also expected to be small, as Pronghorn likely avoid those lands when possible. The greater effect on Pronghorn is the loss of grassland and pasture habitat, which follows the discussion for grassland breeding birds – a high cumulative effect, but low relative Project effect.

However, despite the least-cost path analysis showing that paths of Pronghorn movement will only increase the length of migration marginally (with respect to their total migration through the TRSA), if further projects continue to disrupt migration, even with small deviations, the cumulative costs could increase to a detrimental amount, or divert Pronghorn into movement traps, or into increased interactions with anthropogenic activities.

11.7 MITIGATIONS AND MANAGEMENT ACTIONS

Because the Project is expected to have low relative Project contribution to the cumulative effects within the TRSA, any meaningful mitigations and management actions will require coordination between the various developers and landowners across the TRSA. Additional regional mitigations and management are discussed herein. See also the Project WMP (Appendix I4).

11.7.1.1 Mitigation – Pre-Construction

Sensitive wildlife features in the Project footprint have been assessed and discussed in the baseline study (see Section 11.4). However, SOCC surveys have expired, and it is recommended that standard sensitive species surveys (e.g., those indicated by Alberta EPA's sensitive wildlife zones) be repeated before construction begins, to ensure that any new active sensitive features that may be present (e.g., nests, leks, dens, sensitive breeding ponds) are identified and appropriate protections or mitigations put in place.

Additional pre-construction wildlife sweeps will provide a final opportunity to identify any new species and wildlife features that have been created since the baseline wildlife surveys and sweeps were completed in 2021 to 2023.

- Prior to any moderate or high disturbance activities within the nesting/denning seasons, AAR Environmental Services (AARES) wildlife biologists will sweep the Project and surrounding areas for sensitive wildlife features as per the Alberta EPA Wildlife Sweep Protocol (GOA, 2020b). Where active features are found within species-specific setback distances, mitigations will be developed to reduce disturbance on active features and reduce potential impacts from construction activities. If the EID or their contractors' crews observe a previously unreported wildlife feature, they will be report this to AARES; AARES biologists will then visit the location to assess for the presence of the feature and identify the species, setback requirements, and potential mitigation to protect it.
- AARES recommends conducting wildlife sweeps prior to, and within seven days of construction to identify any additional wildlife features present. In addition, wildlife that requires salvage and relocation (by qualified personnel working under an approved wildlife

permit) will be moved using standard approved methods to maximize successful relocation.

- Scheduling construction (in particular: vegetation clearing) outside of the sensitive migratory and nesting bird, and amphibian breeding windows, will reduce the interaction between wildlife and construction, and minimize risk of harm to wildlife, in the Project area and as a result of Project activities.
- If wildlife features are found during the pre-construction wildlife sweeps, mitigations will be recommended to protect the feature (e.g., setback markers, in the case of a bird nest), or salvage and relocation (e.g., either individuals or the feature itself), if possible and appropriate

11.7.1.2 Mitigation – During Construction

- Early in the construction process, native topsoil will be removed and stored in a temporary pile/workspace for re-distribution and reclamation post-construction. Construction of the basin (including excavating the basin), and of the perimeter berm around the reservoir, will occur during the late fall and winter months to avoid sensitive periods such as bird nesting, migration, as well as amphibian reproduction. Removing grassland habitat from the footprint in the winter months will effectively reduce the suitability of the area for nesting and denning by wildlife in the following spring.
- After construction, the reservoir is scheduled to be filled with water over a period of at least 90 days; this period will be dependent on the water level of the Bow River at that time. Before filling with water, portions of the basin of the reservoir will not be suitable habitat for nesting birds as it will be covered in riprap and surrounded by the steep walls of the berm.
- Some generalist ground nesting birds such as Killdeer have been known to create nests in precarious places, such as dirt and gravel pads. To deter generalist species from nesting during the filling process of the reservoir, reflective tape, placed on flat and low sloped surfaces within the filling basin of the reservoir will act as a passive disturbance deterrent. The steep sloped, riprap-covered sides of the basin will not be conducive habitat for nesting birds. However, within the basin there will be at least one flat plateau-like step before the basin continues with a steep sloped drop into the bottom of the basin. It is the flat portion of the basin that passive deterrent reflective tape will be installed to deter any nesting birds from nesting, and those nests from being destroyed by rising reservoir water levels.
- Depending on the level of constant disturbance of the Project area, adding active deterrents and disturbance to the passive deterrents could be an adaptable mitigation strategy for deterring nesting within the footprint. Because of the large size of the footprint, driving All-terrain Vehicles or equipment on the flat nestable basin surfaces several times a day for the duration of construction, may be required to keep local birds from acclimating to any passive deterrents.
- In addition to mitigating nesting birds, ephemeral pooling water may congregate in the flat portions of the basin during construction. These pools would be susceptible to colonization by amphibians during reproduction, even with close proximity to disturbance activities. Any ephemeral pools should be monitored throughout the Project area and regularly, over the

course of the amphibian breeding season, as well as immediately before the filling of the basin, as the influx of moving, cooler water would be detrimental to reproduction and survival. Ephemeral pools could be removed during construction as they appear to reduce the chance of colonization, or the pools (if they appear) can be monitored to identify any present reproduction, and establish setbacks until reproduction is complete, or use a translocation to remove amphibians from the Project area. In most cases, pooling water should not be removed until a qualified biologist or the Project's Environmental Liaison first confirming a lack of amphibian presence.

- Reclamation of temporarily disturbed land and habitat of the Project footprint will occur after construction. To maximize the reclamation and minimize the overall reduction of native grassland by the Project, native grassland vegetation will be planted: from the top of the berm along the edge of the access road, to the edges of the section, as well as on the temporary workspaces and access that will no longer be used.
- On the berm surrounding the reservoir, an access road will separate the reclaimed grassland and the reservoir. The road will not have vegetation seeded on, or between the road and the reservoir. The access road is not predicted to act as a barrier for species wanting to travel between the grassland and waterbody habitat. However, the access road will be as reduced as possible, as it will be reserved for access to the reservoir after construction only, not for general-public travel.
- During post-construction reclamation, previously removed topsoil will be redistributed to the disturbed grassland habitat. Wildlife sweeps of both the topsoil pile and area to be reclaimed are recommended before the topsoil storage pile is to be redistributed. The topsoil pile will have a layer of cover-crop grown on it to reduce erosion and degradation of the native topsoil during storage. Wildlife may use the soil pile (e.g., for nesting or burrowing/denning), before and after seeding the cover crop. Therefore, wildlife and/or bird nest sweeps may be required to identify any wildlife and wildlife features on and around the soil pile, especially if the topsoil pile will be redistributed during the nesting and reproductive window for birds and sensitive species. If more than seven days elapse between disturbance/use of the topsoil pile during the nesting period, additional bird nest sweeps should be conducted.
- Seeding temporarily disturbed land with native grassland vegetation will occur in the first available growing season post-construction. Reclamation efforts will continue after the initial seeding. Vegetation surveys will be conducted to ensure the establishment of native vegetation on the reclaimed land, that in part will establish if additional seeding will be required. Surveys of the new shallow-water wetland areas of the reservoir (west bank) will also be surveyed to assess the development of the wetland habitat. Both the vegetation and wetland surveys will be repeated in following years to ensure successful regrowth of the native grassland and wetland habitats. Vegetation surveys will also determine if additional seeding will be required to reclaim the temporarily disturbed grassland habitat.
- Monitoring the vegetation establishment, growth, and success of both the reclaimed grassland and wetland habitats, will additionally allow for simultaneous monitoring for weed infestation. Reclaimed land will be susceptible to weed colonization, and it is likely that weed management will be required across multiple growing seasons to ensure that native grassland vegetation has adequate opportunity to successfully reestablish.

Pollution By Substances, Noise, and Light

- Substances that could be harmful to wildlife will not be used or will be limited to only those necessary for running equipment during construction. Any contamination of the Project area, and/or TLSA by construction equipment, will be prevented through proper vehicle maintenance and, using drip trays underneath any equipment, as appropriate, regular vehicle and equipment inspections, and any leaks or contaminations immediately reported, cleaned, and remediated (if required), upon discovery.
- The Project area is on private property, and noise created by construction equipment is not predicted to be an issue for wildlife or for people that live near the Project area (see Volume 2, Section 5 for more information on Noise).
- Lights, if used in large quantities or improperly managed, can be a source of disturbance for wildlife. Large sources of bright lights (associated with a residential center or otherwise), can alter the behaviour of, and be detrimental to, migratory birds (Longcore & Rich, 2004; Cabrera-Cruz et al., 2018; Burt, et al., 2023). Some construction/equipment lights may be required if construction occurs during the winter months or at night. If lights are used for construction during sensitive migratory bird periods, they will be focused on construction activities (limiting lighting the sky as much as possible), and it is recommended they be turned off immediately upon the end of each construction day they are used. By limiting the time lights are being used (e.g., avoiding nighttime hours, where possible, especially 11:00 pm until 6:00 am), and focusing their direction on the ground activities, light pollution and effects on migratory bird behaviour will be reduced.

Ferruginous Hawk Nest Re-location

- Construction will interfere with one active Ferruginous Hawk nest and will require a conservation offset. Two nest platforms will be installed in the region to offset the removal of one active Ferruginous Hawk nest that is located in the Project area. The location of the nest platforms will be chosen in consultation with Alberta EPA biologists to ensure that the sites chosen are the most appropriate and likely to be successful.
- Typical characteristics of suitable sites include: at least 1,000 m from current and future human development and disturbance, at least 800 m from other known Ferruginous Hawk territory and nesting sites, at least 400 m from a permanent waterbody, at least 800 m from active sensitive species features (e.g., Sharp-tailed Grouse lek, Burrowing Owl nest sites), within proximity of >50% grassland cover, and a Richardson's Ground Squirrel colony.
- Types of anthropogenic disturbance include vegetated disturbances (e.g., reclaimed transmission line, pipeline rights-of-way, reclaimed gravel pits and trails; Appendix I3, Plate I3-6), non-vegetated disturbances (e.g., highways, paved roads, railways, industrial sites), and settlements (e.g., human rural and urban settlements; Appendix I3, Plate I3-7).
- The wildlife damage permit required for removal of the active Ferruginous Hawk nest may dictate required monitoring to determine success of the nest relocation / habitat enhancement (e.g., whether the birds adopt the new nest / nest platform).

11.7.1.3 Additional Recommendations

Grassland Habitat

The EID owns and manages approximately 243,000 ha of land within the district, the majority of which is native prairie grassland. They already manage habitat, including restricting public access and requiring responsible use by those permitted onto the EID lands (Eastern Irrigation District, 2016). Therefore, any efforts the EID undertakes to further improve or enhance the quality of even some of that grassland habitat, has the potential to have a large positive effect on wildlife in the region.

Over-grazing reduces habitat quality of grasslands for numerous species, as briefly discussed earlier in this section. Cattle can also damage or destroy the nests of ground-nesting birds and degrade wetlands and riparian habitat. Enforcing BMPs around rangeland management and restricting cattle from particularly sensitive habitat, at least temporarily (e.g., during nesting season) may have a substantial positive effect for wildlife in the region, potentially offsetting Project losses of grassland habitat.

Terrestrial Wildlife Migration

The SSRP discusses the importance of connectivity of wildlife habitat across landscapes to prevent habitat fragmentation and isolation of populations, allow for wildlife movement necessary for their life stage or to reach seasonal resources, and reduce the potential for human-wildlife conflict (GOA, 2018). The southeast area of the province, where the Project is located, provides important corridors for wildlife movement between Alberta, Montana, and Saskatchewan. Native grassland, present within the Project area, has high ecological value for biodiversity and watershed protection. Native grassland is critical habitat for many of Alberta's listed SOCC, and therefore, maintaining intact native grassland habitat is important for the conservation of many species. According to the SSRP, the overarching management intent of regulators is to create an interconnected network of conservation efforts on private land to sustain and improve overall habitat connectivity for grassland species (GOA, 2018).

- Pronghorn safe fencing designs reduce injury and mortality, and improves speed of travel for migrating Pronghorn (Paige, 2020). Several Pronghorn-safe fencing designs also reduce materials costs and repair times for property owners (Paige, 2020). It is recommended that the Project site not be fenced, or if fences are needed, to use Pronghorn safe fence designs, where possible.
- During construction, it is possible that Pronghorn will enter inactive portions of the Project footprint. Pronghorn typically avoid anthropogenic activity and active equipment, so interaction between workers and animals should be negligible, however, due to the size and placement of the Project footprint, traffic will increase in the TRSA around the TLSA, increasing the risk for vehicle collisions with Pronghorn that may be displaced due to the Project construction. Signage and monitored speed limits should be put in place to reduce the risk of Pronghorn-vehicle collisions and human safety.
- The combination of grassland loss in conjunction with the lack of detailed knowledge of movement through the TRSA by Pronghorn creates a challenge when predicting how construction will divert movement through the TRSA. Migration through the TRSA requires crossing the TCH to move in a north-south direction. It is possible that bottlenecks will be

formed, diverting Pronghorn into concentrated crossing pattern along the TCH. Thus, the EID would be willing to work with Alberta EPA in cooperation with other industries, to discuss development of a regional pronghorn monitoring program, focussed on understanding interactions between Pronghorn, reservoirs, the CPKC mainline, TCH, and any other relevant industries (e.g., solar facilities).

11.8 CONCLUSIONS

The proposed Project would expand the existing SLR into the adjacent four quarters of land to the east and southeast, to increase water storage and availability for irrigation to license holders. The Project area is located in the DMNS of Alberta and is comprised primarily of intact native grassland habitat interspersed with temporary and semi-permanent waterbodies. The wildlife communities in the TLSA include a range of grassland specialists (e.g., grassland songbirds), prairie generalists (e.g., White-tailed Jackrabbit), grassland predators (e.g., Ferruginous Hawk), important prey species (e.g., Richardson's Ground Squirrel), and a few introduced (non-native) species (e.g., Gray Partridge). There were 26 SOCC observed in the TLSA with observations of nesting and offspring rearing by federally and provincially listed bird species (e.g., grassland songbirds, Long-billed Curlew, Ferruginous Hawk). Observations of Pronghorn grazing during the summer months and winter tracks of Long-tailed Weasel suggest the area is used for foraging by mammal SOCC year-round.

The largest change in habitat suitability for SOCC is the conversion of grassland within the Project footprint to open water reservoir. The conversion of grassland to open waterbody reservoir reduces the amount of very high and high-quality habitat for most species (approximately 1.6 - 1.8% of the TRSA). Therefore, the expansion of the SLR will differentially affect species that may occupy the Project area habitat within the TRSA.

For obligate grassland species, the conversion of high-quality grassland to poor quality reservoir would be a net loss of suitable habitat comparing Baseline to Operation Case. Reclamation of the berm and toe-of-the-berm to section edge will be effective at raising the quality of some construction-degraded land, but the change in raised character and increased slope of the berm limits the maximum suitability for species that prefer flat land.

The increase in open waterbody habitat will benefit Northern Leopard Frog. Waterbodies throughout the study area are used for breeding by secure amphibian species (e.g., Boreal Chorus Frog). Northern Leopard Frogs were observed during visual surveys in 2021 only, but no evidence was found to suggest the presence of a resident or breeding population within the TLSA. Additional records for this species were recorded for the TRSA. If appropriate overwintering habitat were accessible and available for dispersing Northern Leopard Frogs, this may be able to help support the regional population.

The SLR will provide both breeding and avenues for Northern Leopard Frog dispersal. Northern Leopard Frogs require connected bodies of water to disperse through the landscape. Migratory waterbirds are similar, in that they require bodies of water on the landscape to support their periodic stopovers during migration. The waterbodies provide safety and food to refuel for their continued journeys. Also, the diversity of waterbodies and shoreline habitats will provide a range

of suitable habitats for a diverse group of migratory waterbirds post-reclamation, though current models may need to be refined to better understand Project effects on these birds.

Comparing Baseline to Operation, the SLR expansion will affect potential migratory paths of Pronghorn. However, relative to distances travelled over the course of an entire migration (ranging from 330 km to 888 km; Jakes, et al., 2018), the change to paths that would run through the TLSA would add minimal costs. Also, the least-cost path analysis did not identify any major barriers, movement traps, or areas with simulated paths, within the TRSA, that would be more difficult to traverse than others.

Species of interest to hunters and trappers, including subsistence, recreational, and Indigenous traditional use, are present in the TLSA, but these activities are not known to occur because of the restricted access and private land designation. The wider TRSA contains approximately 50% native grassland habitat, but is fragmented by pasture, cropland, and anthropogenic habitats.

11.9 REFERENCES

Adriensen, F., Chardon, J., De Blust, G., Swinnen, E., Villalba, S., Gulinck, H., & Matthysen, E. (2003). The application of 'least-cost' modelling as a functional landscape model. *Landscape and Urban Planning, 64*, 233-247. Retrieved from https://doi.org/10.1016/S0169-2046(02)00242-6

Alberta Biodiversity Monitoring Institute. (2020). *Status in Alberta - Pronghorn*. Retrieved April 15, 2024, from https://beta.abmi.ca/species/antilocapra-americana#habSuitability

Alberta Conservation Association. (2020). *Garter Snake (Thamnophis spp.) surveys at historical den sites in Alberta, 2017-2019.* Alberta Conservation Association. Retrieved August 28, 2024, from https://www.ab-conservation.com/downloads/report_series/AB-Garter-Snake-Hibernaculum-Survey-2017-2019-Data-Report.pdf

Alberta Conservation Association. (2021). *Pronghorn road crossing enhancement (Pronghorn Xing).* Retrieved from https://www.ab-conservation.com/downloads/annual_summaries/wildlife/aca_summary_2020_2021_pronghorn_road_crossing_enhancement%20(Pronghorn%20Xing).pdf

Alberta Conservation Association. (2023). *2022/23 project summary report - Pronghorn road crossing enhancement.* Alberta Conservation Association. Retrieved from https://www.ab-conservation.com/downloads/annual_summaries/wildlife/aca_summary_2022-2023_pronghorn_road_crossing_enhancement.pdf

Barrett, M. (1982). Distribution, behaviour, and mortality of Pronghorns during a severe winter in Alberta. *The Journal of Wildlife Management, 46*(4), 991-1002. Retrieved from https://doi.org/10.2307/3808232

Bazin, R., & Baldwin, F. (2007). *Canadian Wildlife Service standardized protocol for the survey of Yellow Rails (Coturnicops noveboracensis) in the Prairie Northern Region.* Winnipeg, Manitoba: Environment Canada.

Bechard, M., & Schmutz, J. (1995). Ferruginous Hawk (Buteo Regalis). In A. Poole, & F. Gill (Eds.), *The Birds of North America* (Vol. 172). Philadelphia, PA: Academy of Natural Sciences.

Birds Canada and Environment and Climate Change Canada. (2024). The state of Canada's birds report. Accessed from Nature Counts. Retrieved from https://doi.org/10.71842/8bab-ks08

Burt, C., Kelly, J., Trankina, G., Silva, C., Khalighifar, A., Jenkins-Smith, H., . . . Horton, K. (2023). The effects of light pollution on migratory animal behaviour. *Trends in Ecology & Evolution, 38*(4), 355-368. Retrieved from https://doi.org/10.1016/j.tree.2022.12.006

Bylo, L., Koper, N., & Molloy, K. (2014). Grazing intensity influences ground squirrel and American Badger habitat use in mixed-grass prairies. *Rangeland Ecology & Management, 67*(3), 247-254. Retrieved from https://doi.org/10.2111/REM-D-13-00152.1

Cabrera-Cruz, S., Smolinksy, J., & Buler, J. (2018). Light pollution is greatest within migration passage areas for nocturnally-migrating birds around the world. *Nature, 8*(3261). doi:10.1038/s41598-018-21577-6

Canadian Geographic. (2025). *Indigenous Peoples Atlas of Canada*. Retrieved from Lifeways: Metis: https://indigenouspeoplesatlasofcanada.ca/article/lifeways/

Christie, K., Jensen, W., Schmidt, J., & Boyce, M. (2015). Long-term changes in Pronghorn abundance index linked to climate and oil development in North Dakota. *Biological Conservation, 192*, 445-453. Retrieved from http://dx.doi.org/10.1016/j.biocon.2015.11.007

COSEWIC. (2009). *Northern Leopard Frog (Lithobates pipiens): COSEWIC assessment and status report 2009*. (Committee on the Status of Endangered Wildlife in Canada (COSEWIC)) Retrieved September 10, 2024, from https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/northern-leopard-frog-2009.html

COSEWIC. (2010). COSEWIC assessment and status report on the Sprague's Pipit Anthus spragueii in Canada. *Committee on the Status of Endangered Wildlife in Canada.*, ix - 34 pp. Ottawa. Retrieved from Committee on the Status of Endangered Wildlife In Canada (COSEWIC).: https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/cosewic/sr_Sprague's%20Pipit_0810_e.pdf

COSEWIC. (2014). COSEWIC assessment and status report on the Loggerhead Shrike (Lanius ludovicianus) in Canada. *Date modified January 6, 2015*, xiii - 51 pp. Ottawa: Committee on the Status of Endangered Wildlife in Canada. Retrieved from https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/loggerhead-shrike-lanius-ludovicianus-2014.html

COSEWIC. (2021). *COSEWIC assessment process, categories, and guidelines.* Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Retrieved from https://www.canada.ca/content/dam/eccc/migration/cosewic-cosepac/94d0444d-369c-49ed-a586-ec00c3fef69b/assessment_process_and_criteria_e.pdf

COSEWIC. (2024). COSEWIC assessment and status report on the Long-billed Curlew Numenius americanus in Canada. xiv - 56 pp. Ottawa: Committee on the Status of Endangered Wildlife in Canada. Retrieved from https://ecprccsarstacct.z9.web.core.windows.net/files/SARAFiles/00020606-CS_DT0034-en-Assessment-and-Status-Report-Long-billed-Curlew_2024.pdf

Cunningham, M., & Johnson, D. (2006). Proximate and landscape factors influence grassland bird distributions. *Ecological Applications, 16*(3), 1062-1075. Retrieved from https://doi.org/10.1890/1051-0761(2006)016[1062:PALFIG]2.0.CO;2

Davis, S. K., Brigham, R. M., Shaffer, T. L., & James, C. P. (2006). Mixed-grass prairie passerines exhibit weak and variable responses to patch size. *The Auk, 123*(3), 807-821. Retrieved from https://doi.org/10.1093/auk/123.3.807

Davis, S., Ludlow, S., & McMaster, D. (2016). Reproductive success of songbirds and waterfowl in native mixed-grass pasture and planted grasslands used for pasture and hay. *The Condor, 118*(4), 815-834. Retrieved from https://www.jstor.org/stable/90009369

Dechant, J. A., Sondreal, M., Johnson, D., Igl, L., Goldade, C., Rabie, P., & Euliss, B. (2003). *Effects of management practices on grassland birds: Long-billed Curlew.* Jamestown, North Dakota: U.S. Department of Interior; U.S. Geological Survey, Northern Prairie Wildlife Research Center. Retrieved from https://pubs.usgs.gov/unnumbered/93872/report.pdf

Des Brisay, P. G., Burns, L. D., Ellison, K., Anderson, W. G., Leonard, M., & Koper, N. (2023). Oil infrastructure has greater impact than noise on stress and habitat selection in three grassland songbirds. *Environmental Management, 71*, 393-404. Retrieved from https://doi.org/10.1007/s00267-022-01752-2

Devries, J., Rimer, S., & Walsh, E. (2010). Cropland nesting by Long-billed Curlews in southern Alberta. *The Prairie Naturalist, 42*(3/4), 123-129. Retrieved from https://digitalcommons.unl.edu/tpn/243/

Downey, B. (2003). *Survey protocol for the Richardson's Ground Squirrel.* Retrieved from Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 69.: https://open.alberta.ca/publications/077852826x#:~:text=After%20reviewing%20the%20time%20allocation,cost%20effective%20and%20should%20yield

Dubois, S., & Fraser, D. (2013). A framework to evaluate wildlife feeding in research, wildlife management, tourism and recreation. *Animals, 3*(4), 978-994. doi:https://doi.org/10.3390/ani3040978

Dunn, J., & Alderfer, J. (2006). *Field guide to the birds of North America* (6th ed.). National Geographic.

Eastern Irrigation District. (2016). EID public access information. Eastern Irrigation District. Retrieved from https://www.eid.ca/public_access.html

eBird. (2021). eBird: An online database of bird distribution and abundance [web application]. *eBird*. Ithaca, New York. Retrieved from http://www.ebird.org

Eder, T., & Kennedy, G. (2011). *Mammals of Canada.* Edmonton: Lone Pine Publishing.

Ellison, K., Ribic, C., Sample, D., Fawcett, M., & Dadisman, J. (2013). Impacts of tree rows on grassland birds and potential nest predators: a removal experiment. *PLOS One, 8*(4). Retrieved from https://doi.org/10.1371/journal.pone.0059151

Estes-Zumpf, W., Addis, B., Marsicek, B., Lee, M., Nelson, Z., & Murphy, M. (2022). Improving sustainability of long-term amphibian monitoring: The value of collaboration and community science for indicator species management. *Ecological Indicators, 134*, 108451. Retrieved from https://doi.org/10.1016/j.ecolind.2021.108451

Falcón, J., Torriglia, A., Attia, D., Viénot, F., Gronfier, C., Behar-Cohen, F., . . . Hicks, D. (2020). Exposure to atificial light at night and the consequences for flora, fauna, and ecosystems. *Frontiers in Neuroscience*. doi:10.3389/fnins.2020.602796

Fellows, S. D., & Jones, S. L. (2009). *Status assessment and conservation action plan for the Long-billed Curlew (Numenius americanus).* Washington, D.C.: U.S. Department of

Interior, Fish and Wildlife Service, Biological Technical Publication, FWS/BTP-R6012-2009. Retrieved from https://whsrn.org/wp-content/uploads/2019/02/statusassessment_conservationactionplan_lbcu.pdf

Fisher, C., & Acorn, J. (1998). *Birds of Alberta.* Edmonton: Lone Pine Publishing.

Fisher, R., & Davis, S. (2011, April). Habitat use by Sprague's Pipits (Anthus Spragueii) in native pastures and planted, non-native hay fields. *The Auk, 128*(2), 273-282. Retrieved from https://doi.org/10.1525/auk.2011.10148

Flynn, R. W., Iacchetta, M., de Perre, C., Lee, L., Sepúlveda, M. S., & Hoverman, J. T. (2021). Chronic per-/polyfluoroalkyl substance exposure under environmentally relevant conditions delays development in Northern Leopard Frog (Rana pipens) larvae. *Environmental Toxicology and Chemistry*, 711-716. doi:10.1002/etc.4690

Foster-Willfong, J. M. (2003). Census methodology and habitat use of Long-billed Curlews (Numenius americanus) in Saskatchewan. University of Regina. Retrieved from Master of Science Thesis. University of Regina.

Gates, C. J., Suitor, M., Jakes, A., Boyce, M., Kunkel, K., & Wilson, K. (2012). *The influence of land use and fences on habitat effectiveness, movements and distribution of Pronghorn in the grasslands of North America* (Vol. Fencing for Conservation). (M. Somers, & M. Hayward, Eds.) New York, NY: Springer. Retrieved from https://doi.org/10.1007/978-1-4614-0902-1_15

Gavin, S., & Komers, P. (2006). Do Pronghorn (Antilocapra americana) perceive roads as a predation risk? *Canadian Journal of Zoology, 84*, 1775-1780. Retrieved from https://doi.org/10.1139/z06-175

Germano, D., Machado, R., Godinho, S., & Santos, P. (2016). The impact of abandoned/disused marble quarries on avifauna in the anticline of Estremoz, Portugal: does quarrying add to landscape biodiversity? *Landscape Research, 41*(8), 880-891. Retrieved from http://dx.doi.org/10.1080/01426397.2016.1174772

Government of Alberta (GOA). (1997). Wildlife Regulation. *Current as of November 29, 2024*. Edmonton, Alberta: Alberta King's Printer. Retrieved from https://open.alberta.ca/publications/1997_143

GOA. (2000a). Environmental Protection and Enhancement Act (RSA 2000, c. E-12). *Current as of June 21, 2024*. Edmonton, Alberta: Alberta King's Printer. Retrieved from https://open.alberta.ca/publications/e12

GOA. (2000b). Alberta Wildlife Act (RSA 2000, c. W-10). *Current as of December 15, 2022*. Edmonton, Alberta: Alberta King's Printer. Retrieved from https://www.qp.alberta.ca/documents/Acts/W10.pdf.

GOA. (2000c). Agricultural Pests Act (RSA 2000 c. A-8) (Alta. Reg. 184/2001). *Current as of December 7, 2023*. Retrieved from https://open.alberta.ca/dataset/a08

GOA. (2004, March 1). *Multisar: The Milk River Basin project habitat suitability models for selected wildlife management species.* Environment and Parks. Edmonton, AB: Sustainable

Resource Development. Retrieved 2024, from https://open.alberta.ca/publications/0778529827#summary

GOA. (2006). *Natural Regions and Subregions of Alberta.* Edmonton: Natural Regions Committee. Retrieved August 28, 2024, from https://www.albertaparks.ca/media/2942026/nrsrcomplete_may_06.pdf

GOA. (2011). Best management practices: Managing waste management facilities for bears and wildlife. Alberta: Fish & Wildlife Division, Environment and Sustainable Resources Development. Retrieved March 2025, from https://open.alberta.ca/publications/best-management-practices-managing-waste-management-facilities-for-bears-and-wildlife

GOA. (2011). *Recommended land use guidelines for protection of selected wildlife species and habitat within Grassland and Parkland Natural Regions of Alberta.* Government of Alberta, Fish and Wildlife Division. Retrieved from https://open.alberta.ca/publications/3054250

GOA. (2012a). *2012 Municipal Affairs population list.* Edmonton: Government of Alberta Municipal Affairs. Retrieved from http://municipalaffairs.gov.ab.ca/documents/msb/2012_pop.pdf

GOA. (2012b, October 1). *Alberta Northern Leopard Frog Recovery Plan 2010-2015.* Alberta Environment and Sustainable Resource Development. Retrieved August 28, 2024, from https://open.alberta.ca/publications/9781460105436

GOA. (2013). *Aboriginal Peoples of Alberta: Yesterday, today, and tomorrow.* Retrieved March 2025, from https://web.archive.org/web/20140403200635/http://www.aboriginal.alberta.ca/documents/AboriginalPeoples.pdf

GOA. (2013). *Sensitive Species Inventory Guidelines. Environment and Sustainable Resource Development. Edmonton, AB.* Government of Alberta. Retrieved from https://open.alberta.ca/dataset/93d8a251-4a9a-428f-ad99-7484c6ebabe0/resource/f4024e81-b835-4a50-8fb1-5b31d9726b84/download/2013-sensitivespeciesinventoryguidelines-apr18.pdf

GOA. (2015a). *Alberta wetland classification system.* Edmonton: Alberta Environment and Sustainable Resource Development, Water Policy Branch, Policy and Planning Division. Retrieved August 28, 2024, from https://open.alberta.ca/dataset/92fbfbf5-62e1-49c7-aa13-8970a099f97d/resource/1e4372ca-b99c-4990-b4f5-dbac23424e3a/download/2015-alberta-wetland-classification-system-june-01-2015.pdf

GOA. (2015b). *Alberta wetland identification and delineation directive.* Edmonton: Alberta Environment and Parks. Retrieved from https://open.alberta.ca/publications/9781460123638

GOA. (2017a). *Rat control in Alberta.* Edmonton: Alberta Agriculture and Forestry. Retrieved August 28, 2024, from https://open.alberta.ca/dataset/72d4cf13-6ac2-47e8-9795-0aee48f036e2/resource/3beebb7e-b29e-4b74-80e0-4eb7a80cdb52/download/682-2.pdf

GOA. (2017b, December). Alberta public lands glossary of terms. *Updated December 2020*. Alberta Environment and Parks. Retrieved January 2021, from https://open.alberta.ca/publications/alberta-public-lands-glossary-of-terms#summary

GOA. (2017c). *Alberta Merged Wetland Inventory*. Retrieved 2023, from https://geospatial.alberta.ca/titan/rest/services/environment/alberta_merged_wetland_inventory/MapServer/

GOA. (2018). *South Saskatchewan Regional Plan 2014-2024.* Edmonton: Alberta Environment and Parks. Retrieved from https://open.alberta.ca/publications/9781460139417

GOA. (2019a). *Aerial wildlife survey report - Provincial Pronghorn Antelope survey summary 2017.* Alberta Environment and Parks. Retrieved from https://open.alberta.ca/publications/provincial-pronghorn-antelope-survey-summary-2017

GOA. (2019b). Grassland Vegetation Inventory (GVI). Edmonton, Alberta: Alberta Environment and Parks. Retrieved July 7, 2024, from https://extranet.gov.ab.ca/srd/geodiscover/srd_pub/biota/Vegetation/GrasslandVegetationInventory.zip

GOA. (2020a). *Wild species status search*. Retrieved 2025, from https://www.alberta.ca/lookup/wild-species-status-search.aspx

GOA. (2020b). *Wildlife sweep protocols - Sensitive Species Inventory Guidelines.* Edmonton, AB. Retrieved from https://open.alberta.ca/dataset/d15221f2-f6d8-4671-8b49-d8fff6eab2b6/resource/6968392a-9e05-4bd8-bd76-ea107ba86c1c/download/aep-wildlife-sweep-protocols-sensitive-species-inventory-guidelines-2020.pdf

GOA. (2021a). *Wildlife sensitivity maps*. Retrieved from Ferruginous Hawk Zone: https://www.alberta.ca/wildlife-sensitivity-maps.aspx

GOA. (2021b). Master schedule of standards and conditions. *Updated April 2021*. Retrieved 2022, from https://open.alberta.ca/publications/master-schedule-of-standards-and-conditions

GOA. (2022). Fisheries and Wildlife Management Information System (FWMIS) Data. *FWMIS species observation records within the TRSA, 2012-2022*. Alberta Environment and Protected Areas. Retrieved January 2024

GOA. (2023). *2023 Alberta Guide to Hunting Regulations.* Alberta Forestry and Parks. Retrieved from https://open.alberta.ca/publications/1485-4287

GOA. (2024a). Master schedule of standards and conditions. *Updated February 2024*. Retrieved April 12, 2024, from https://open.alberta.ca/publications/master-schedule-of-standards-and-conditions

GOA. (2024b). *Species at risk assessed in Alberta.* Retrieved January 30, 2025, from https://open.alberta.ca/publications/species-assessed-by-the-conservation-committee-alberta-species-at-risk

GOA. (2024c). *750K Base Map plus Hydrologic Unit Code 8 & 10 Watersheds of Alberta Map.* Retrieved from https://open.alberta.ca/opendata/gda-7857b6fb-96c5-4bc5-ac3a-9017778fd183

GOA. (2024d). *Alberta timber harvest planning and operating ground rules framework for renewal.* Edmonton. Retrieved from https://open.alberta.ca/publications/timber-harvest-planning-and-ogr-2024

GOA. (2024e). *Soil Inventory Database (AGRASID) and LSRS Ratings by Quarter Section.* Alberta Agriculture and Irrigation. Retrieved from https://www.alberta.ca/agricultural-regions-of-alberta-soil-inventory-database

GOA. (2024f). *Alberta Ferruginous Hawk recovery plan.* Retrieved August 28, 2024, from Alberta Species at Risk Recovery Plan No. 41: https://open.alberta.ca/publications/alberta-ferruginous-hawk-recovery-plan#:~:text=The%20ferruginous%20hawk%2C%20a%20migratory,listed%20as%20Endangered%20in%20Alberta.

GOA. (2025). *Fish and Wildlife Internet Mapping Tool - Public*. Retrieved from Fish and Wildlife Internet Mapping Tool (FWIMT): https://www.alberta.ca/access-fwmis-data

Government of Canada (GOC). (1966). Treaty and Supplementary Treaty no. 7. Ottawa, ON. Retrieved August 28, 2024, from https://www.rcaanc-cirnac.gc.ca/eng/1100100028793/1581292336658

GOC. (1994). Migratory Birds Convention Act and Regulations (S.C. 1994, c. 22). *Act current to 2024-06-20 and last amended on 2017-12-12*. Ottawa: Minister of Justice. Retrieved from Canada.ca: https://laws-lois.justice.gc.ca/eng/acts/m-7.01/

GOC. (2002). Species at Risk Act (S.C. 2002, c. 29). *Current to June 28, 2023. Last amended on February 3, 2023*. Ottawa: Environment and Natural Resources. Retrieved from https://laws.justice.gc.ca/eng/acts/s-15.3/

GOC. (2018). General pesting periods of migratory birds: Technical information on risk factors. *Updated 2018-10-30*. Environment and Climate Change Canada. Retrieved June 2024, from https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods.html

GOC. (2023). *North American Breeding Bird Survey*. Retrieved from Breeding Bird Survey instructions: https://www.canada.ca/en/environment-climate-change/services/bird-surveys/landbird/north-american-breeding/instructions.html

GOC. (2024). *Species at risk public registry.* Retrieved March 2025, from https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html

Guiasu, R. (2016). *Non-native species and their role in the environment.* Leiden, Netherlands: Brill. Retrieved from https://doi.org/10.1163/9789047426134

Huston, M. (1994). *Biological diversity: the coexistence of species on changing landscapes.* Cambridge, United Kingdom: Cambridge University Press. Retrieved from https://doi.org/10.1086/419325

iNaturalist community. (2024). Observations of all species from Alberta, Canada observed between 2012-2024. Retrieved July 17, 2024, from http://www.inaturalist.org

Indigenous Corporate Training Inc. (2016). *Indigenous worldviews vs. Western worldviews*. Retrieved July 17, 2024, from https://www.ictinc.ca/blog/indigenous-worldviews-vs-western-worldviews

Jakes, A. F., Gates, C. C., Decesare, N. J., Jones, P. F., Goldberg, J. F., Kunkel, K. E., & M., H. (2018). Classifying the migration behaviors of Pronghorn on their northern range. *Journal of Wildlife Management, 82*(6), 1229-1242. doi:10.1002/jwmg.21485

Jeschke, J. (2014). General hypotheses in invasion ecology. *Diversity and Distributions, 20*, 1229-1234. Retrieved from https://doi.org/10.1111/ddi.12258

Jones, P. F., Grue, M., Suitor, M., Bender, D. J., Gates, C., Eslinger, D., & Landry-Deboer, J. (2015). Variability in the selection patterns of Pronghorn: Are they really native prairie obligates? *The Prairie Naturalist, 47*, 94-109.

Kendell, K., & Prescott, D. (2007). *Northern Leopard Frog reintroduction strategy for Alberta - technical report.* Edmonton, AB: Alberta Conservation Association. Retrieved from https://www.ab-conservation.com/downloads/report_series/Nrthrn-Leopard-Frog-Reintro-Strategy-Alberta.pdf

Kunc, H. P., & Schmidt, R. (2019). The effects of anthropogenic noise on animals: a meta-analysis. *Biology Letters, 12*(11). doi:10.1098/rsbl.2019.0649

Landry-DeBoer, J., Jones, P., Downey, B., Rose, P., Taylor, K., Verhage, M., . . . Moltzahn, A. (2023). Diversity selection patterns of five grassland songbirds in dry-mixed grasslands of Alberta. *Avian Conservation and Ecology, 18*(1), 16. Retrieved from https://doi.org/10.5751/ACE-02425-180116

Linhart, R., Hamilton, D., Paquet, J., & Gratto-Trevor, C. (2022). Evidence of differing staging strategies between adult and juvenile Semipalmated Sandpipers highlights the importance of small staging sites in Atlantic Canada. *Ornithology, 140*(056). Retrieved from https://doi.org/10.1093/ornithology/ukac056

Linscott, J., & Senner, N. (2021). Beyond refueling: Investigating the diversity of functions of migratory stopover events. *Ornithological Applications, 123*, 1-14. doi:https://doi.org/10.1093/ornithapp/duaa074

Lockhart, J., & Koper, N. (2018). Northern prairie songbirds are more strongly influenced by grassland configuration than grassland amount. *Landscape Ecology, 33*, 1543-1558. Retrieved from https://doi.org/10.1007/s10980-018-0681-5

Longcore, T., & Rich, C. (2004). Ecological light pollution. *Frontiers in Ecology and the Environment, 2*(4), 191-198. Retrieved from https://doi.org/10.1890/1540-9295(2004)002[0191:ELP]2.0.CO;2

McCarthy, T. M., & Seavoy, R. J. (1994). Reducing nonsport losses attributable to food conditioning: human and bear behavior modification in an urban environment. *Ninth International Conference on Bear Research and Management, February 23-28, 1992*, *9*, pp. 75-84. Missoula, Montana. Retrieved from https://doi.org/10.2307/3872686

Michener, G. R. (1977). Effect of climatic conditions on the annual activity and hibernation cycle of Richardson's Ground Squirrels and Columbian ground squirrels. *Canadian Journal of Zoology, 55*, 693-703. Retrieved from https://doi.org/10.1139/z77-091

Milligan, M. C., Johnston, A. N., Beck, J. L., Taylor, K. L., Hall, E., Knox, L., . . . Kauffman, M. J. (2023). Wind-energy development alters Ppronghorn migration at multiple scales. *Ecology and Evolution*, e9687. Retrieved from https://doi.org/10.1002/ece3.9687

MULTISAR. (2009). *A multi-species conservation strategy for species at risk in the Grassland Natural Region of Alberta - 2008-2009 Report - No.122.* Retrieved from https://open.alberta.ca/dataset/f298a313-89d0-4e98-8d60-c5eacbdb768e/resource/8b6e7aa1-e4fe-4225-bed0-5f6e44365832/download/2009-sar122-multisar-conservationsargrassland-2008-2009report-mar2009.pdf

MULTISAR. (2020). *A multi-species conservation value modelling within the Grasslands Natural Region of Alberta - No. 165.* Retrieved from https://open.alberta.ca/dataset/f97b7320-2d51-48c2-96e3-ff5005239334/resource/087f591d-3e9a-47f4-8c06-e54d947bde19/download/aep-sar-165-multisar-multi-species-conservation-value-modelling-grasslands-albe

MULTISAR. (2021). *A multi-species conservation strategy for species at risk in the Grassland Natural Region of Alberta - 2018-2019 Report - No.164.* Retrieved from https://open.alberta.ca/dataset/491c91cd-ada6-450b-a8c2-9040428c652f/resource/c6c3fa91-311e-4860-a912-1f27e25f4a6c/download/aep-multisar-grassland-2018-2019-report-sar-no-164.pdf

National Research Council. (1995). *Wetlands: Characteristics and boundaries.* National Academy Press: Washington D.C.

Paige, C. (2020). *Alberta landholder's guide to wildlife friendly fencing.* Sherwood Park: Alberta Conservation Association. Retrieved from https://www.ab-conservation.com/downloads/educational_materials/brochures/ACA_Wildlife_Friendly_Fencing.pdf

Poor, E. (2010). Modeling Pronghorn migration corridors in the northern great plains. Duke University. Retrieved from https://hdl.handle.net/10161/2171

Prescott, D. C., & Bjorge, R. R. (1999). *Status of the Loggerhead Shrike (Lanius ludovicianus) in Alberta.* Edmonton, AB: Alberta Environment and Wildlife Management Division and Alberta Conservation Association. Retrieved from https://open.alberta.ca/publications/0778508226#summary

Ralph, C. (1993). *Handbook of field methods for monitoring landbirds* (Vol. 144). United States Department of Agriculture - Forest Service. Retrieved from

https://www.birdpop.org/docs/pubs/Ralph_et_al_1993_Handbook_of_Field_Methods_for_Monitoring_Landbirds.pdf

Robb, B., Merkle, J., Sawyer, H., Beck, J., & Kauffman, M. (2022). Nowhere to run: semi-permeable barriers affect Pronghorn space use. *Journal of Wildlife Management, 86*(4). Retrieved from https://doi.org/10.1002/jwmg.22212

Sauer, J., Hines, J., Fallon, J., Pardieck, K., Ziolowski, D., & Link, W. (2015). *The North American Breeding Bird Survey (BSS), results and analysis 1966-2013.* Laurel, Maryland: USGS Patuxent Wildlife Research Center. Retrieved from https://www.usgs.gov/tools/north-american-breeding-bird-survey-results-and-analysis#science

Scobie, D. (2002). *Status of the American Badger (Taxidea taxus) in Alberta.* Retrieved from Alberta Sustainable Resource Development, Fish and Wildlife Division, and Alberta Conservation Association, Wildlife Status Report No. 43.: https://open.alberta.ca/publications/0778519880

Seidler, R. G., Long, R. A., Berger, J., & Beckmann, J. (2014). Identifying impediments to long-distance mammal migrations. *Conservation Biology, 29*(1), 99-109. Retrieved from https://doi.org/10.1111/cobi.12376

Selsky, A. (2017). *Brutal western US winter has been terrible for animals.* Associated Press. Retrieved from https://www.statesmanjournal.com/story/news/2017/01/27/brutal-western-us-winter-has-been-terrible-animals/97162350/

Sheriff, K. (2006). *Modeling temporal and spatial variation in Pronghorn antelope population dynamics in southern Alberta in relation to environmental gradients (Master's thesis, University of Calgary, Calgary, Canada).* doi:10.11575/PRISM/1554

Sievers, M., Hale, R., Parris, K., & Swearer, S. (2017). Impacts of human-induced environmental change in wetlands on aquatic animals. *Cambridge Philosophical Society - Biological Reviews, 93*(1), 529-554. Retrieved from https://doi.org/10.1111/brv.12358

Sliwinski, M., & Koper, N. (2012). Grassland bird responses to three edge types in a fragmented mixed-grass prairie. *Avian Conservation and Ecology, 7*(2), 6. doi:10.5751/ACE-00534-070206

Stantec Environmental Consulting Ltd. (2018). *Springbank off-stream reservoir project environmental impact assessment.* Edmonton: Alberta Transportation.

Stevens, S., Page, D., & Prescott, D. (2008). *Habitat suitability index for the Northern Leopard Frog in Alberta: model derivation and validation.* Edmonton: Alberta Sustainable Resource Development, Fish and Wildlife Division. Retrieved from https://open.alberta.ca/dataset/778ed08f-d41f-4eae-8ec7-3269c6d27b8d/resource/29ae93a2-89fd-410b-99c9-fd5151e3c6a4/download/2008-sar132-hsi-northernleopardfrog-alberta-mar2008.pdf

Summers, P. D., Cunnington, G., & Fahrig, L. (2011). Are the negative effects of roads on breeding birds caused by traffic noise? *Journal of Applied Ecology, 48*(6), 527-1534. Retrieved from https://doi.org/10.1111/j.1365-2664.2011.02041.x

Theobald, D. (2006). Exploring the functional connecctivity of landscapes using landscape networks. *Connectivity Conservation*, 416-443. Retrieved from https://doi.org/10.1017/CBO9780511754821.019

Thompson, S., Arnold, T., & Amundson, C. (2014). A multiscale assessment of tree avoidance by prairie birds. *The Condor Ornithological Applications, 116*, 303-315. doi:10.1650/CONDOR-13-072.1

Wikelski, M., Tarlow, E., Raim, A., Diehl, R., Larkin, R., & Visser, G. (2003). Costs of migration in free-flying songbirds. *Nature, 423*(704). Retrieved from https://doi.org/10.1038/423704a

Appendix I

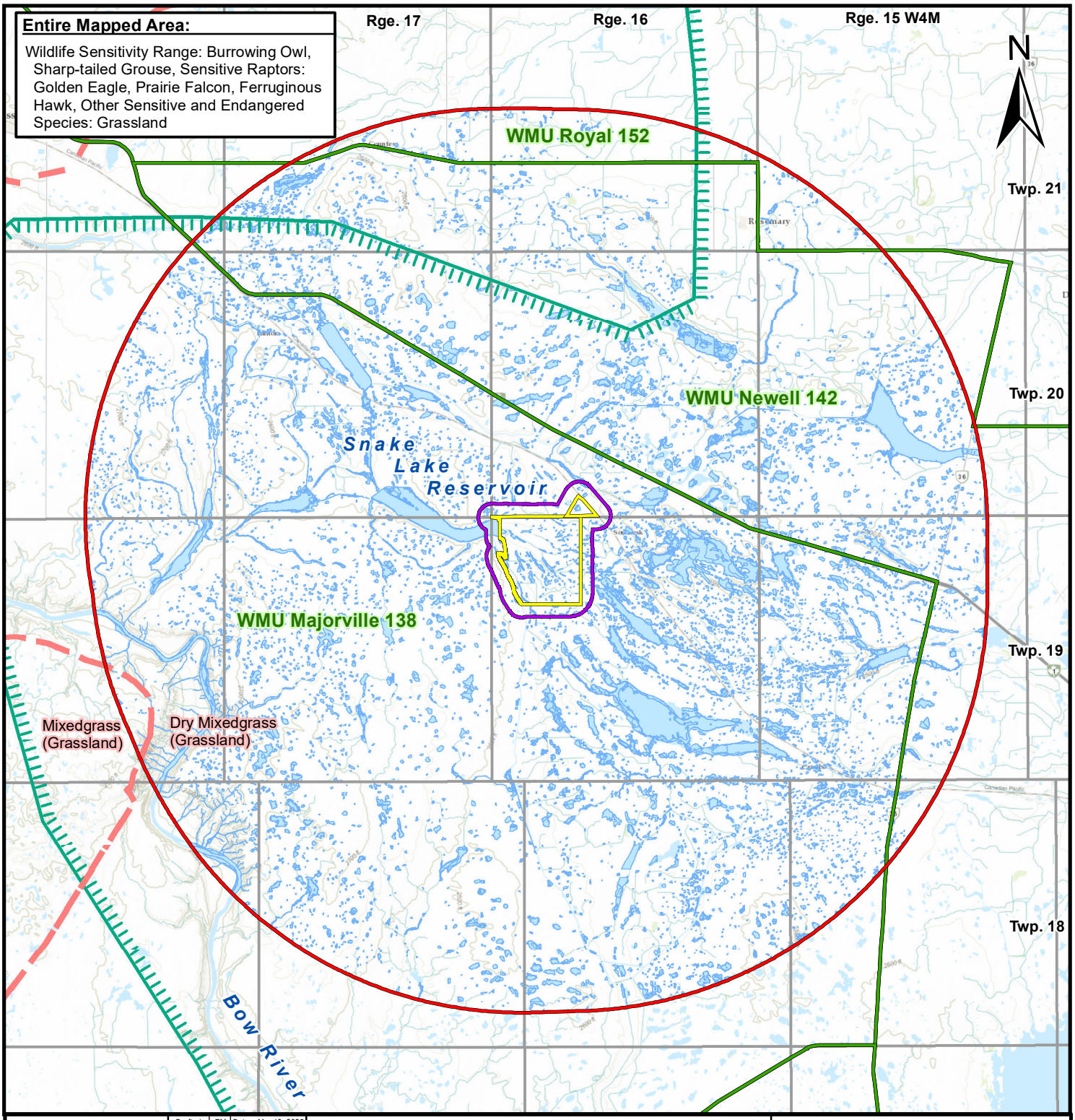
Appendices

Figures

Tables

Photo Plates

Appendix I1: Baseline and Study Area Figures



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CAD Survey		Revision:	0

Data Sources:
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ATS Grid: AltaLIS 2007.
Sensitive Amphibian Range (2024); Alberta Merged Wetland Inventory (2020); Environmentally Significant Areas (2014); Wildlife Management Units (2024); and Hydrologic Unit Code 8 Watersheds of Alberta; Government of Alberta. Alberta Irrigation Districts, Alberta Agriculture & Rural Development (2009) AltaLIS (2023), Municipal Boundaries and Natural Areas

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

- Terrestrial Local Study Area
- Terrestrial Regional Study Area
- Snake Lake Reservoir Expansion Project Area
- Sensitive Amphibians Ranges
- Natural Subregions Boundary
- Wetlands and Drainages
- Wildlife Management Zones

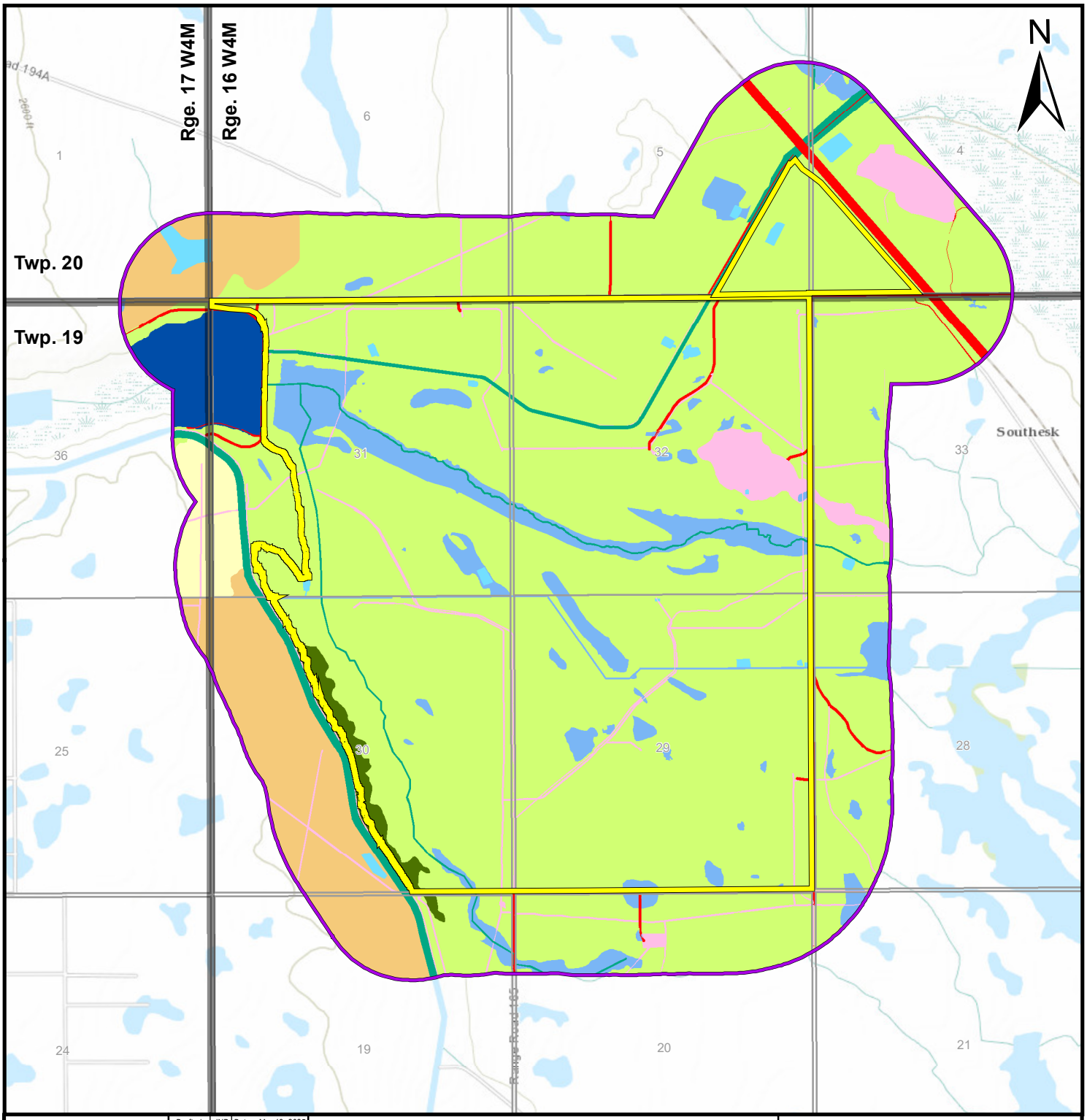
EID

Wildlife Sensitivity Zones in the Terrestrial Regional Study Area

March 2025

REF: AARES21-127 (Wildlife)

Figure I1-1



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PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Type:

- Canal/Watercourse
- Cropland
- Dugout
- Native Prairie
- Non-vegetated Disturbance
- Pasture
- Reservoir
- Treed
- Vegetated Disturbance
- Wetland

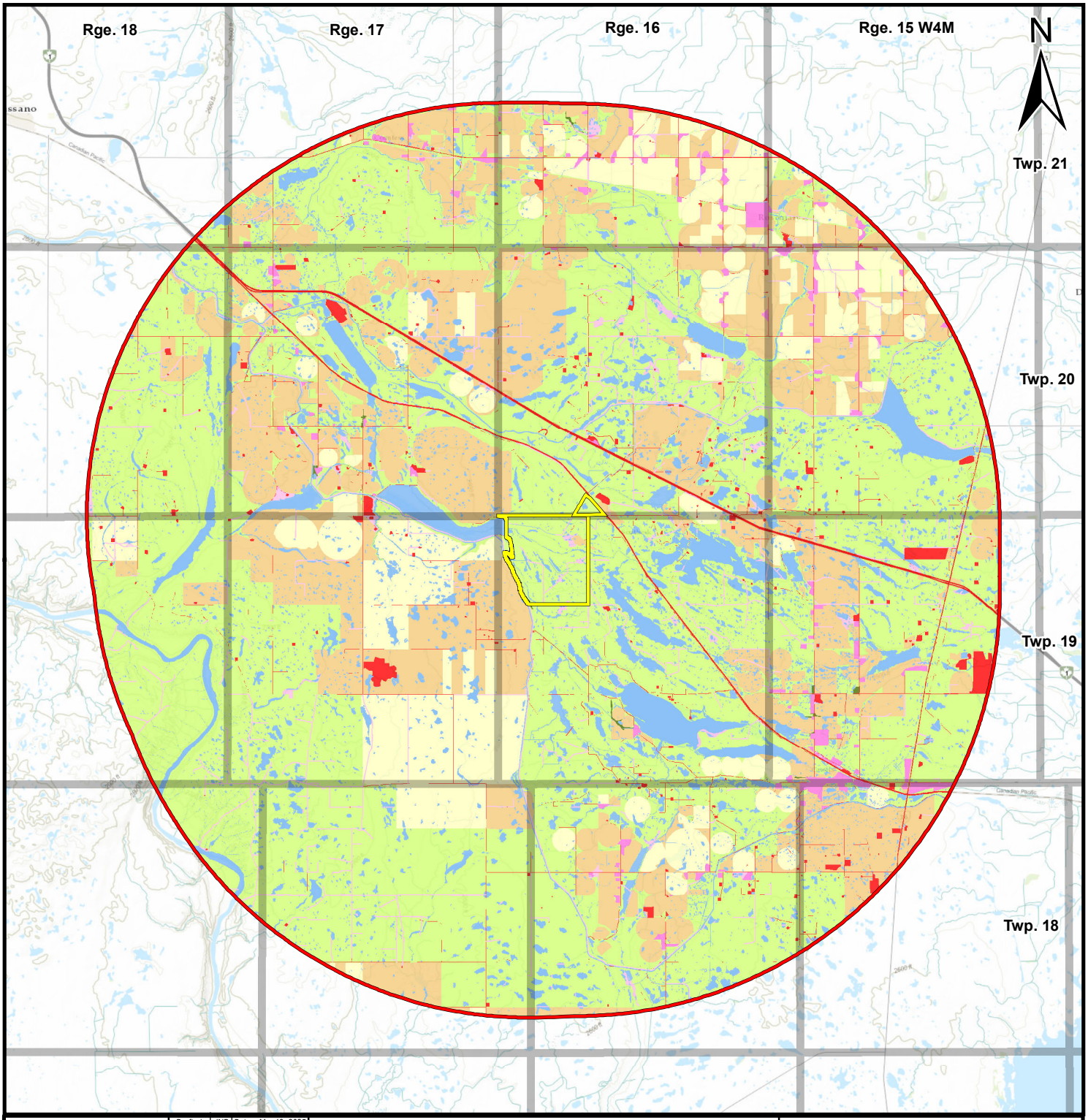
EID

Habitat Types in the Terrestrial Local Study Area

March 2025

REF.: AARES21-127 (Wildlife)

Figure I1-2



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CAD Survey		Revision:	0

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.
GVI: Open Government Licence - Alberta
(https://open.alberta.ca/licence)

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Type:

- Cropland
- Pasture
- Native Prairie
- Settlement
- Non-vegetated Disturbance
- Treed
- Open water
- Vegetated Disturbance

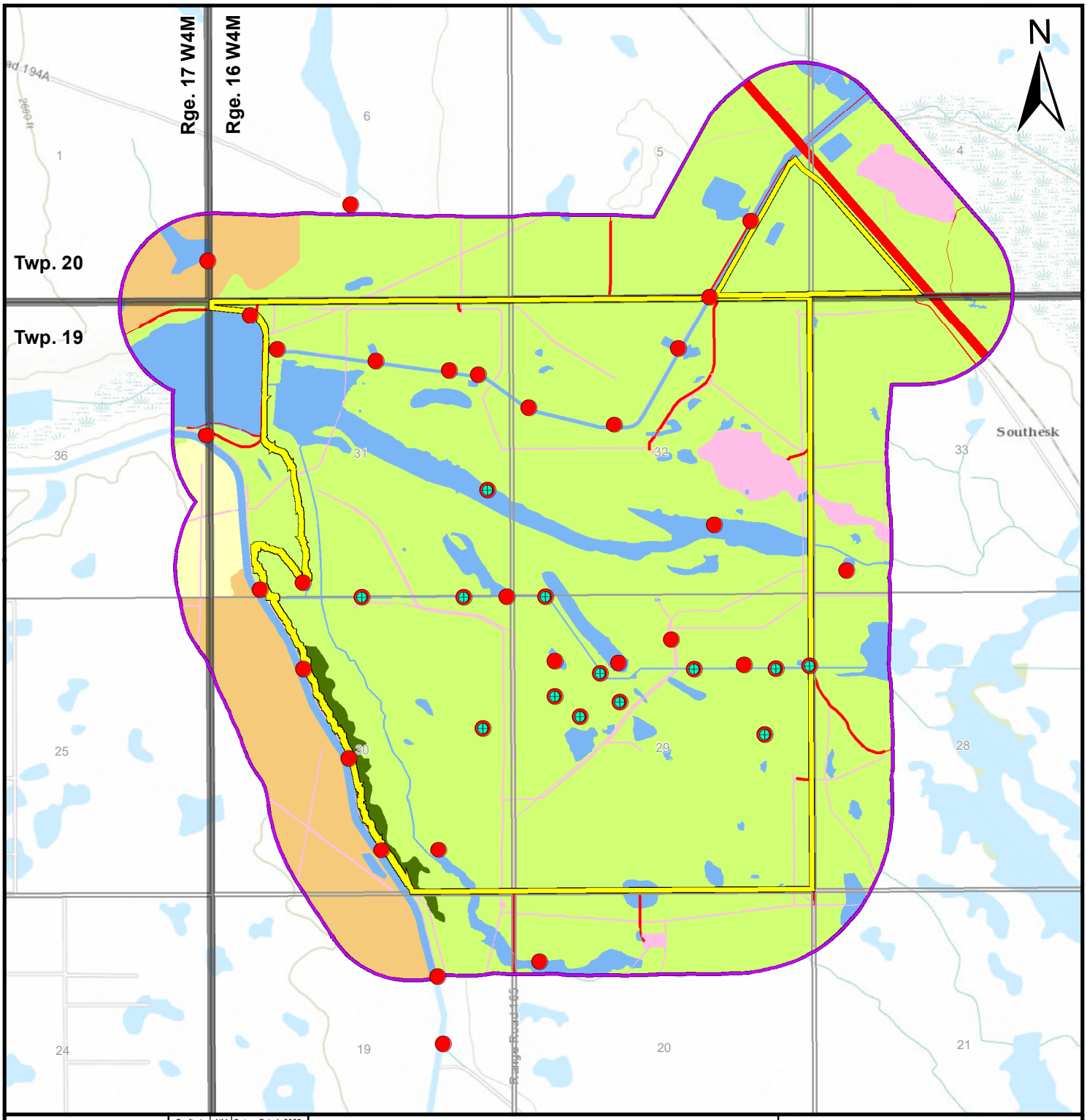
EID

Habitat Types in the Terrestrial Regional Study Area

March 2025

REF.: AARES21-127
(Wildlife)

Figure I1-3



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KML		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Approximate location is based on field survey

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Snake Lake Reservoir Expansion Project Area
- Terrestrial Local Study Area (TLSA)

Survey Locations*:

- Amphibian Auditory Survey Point
- Amphibian Visual Survey

Habitat Type:

- Cropland
- Native Prairie
- Pasture
- Treed
- Waterbodies
- Non-vegetated Disturbance
- Vegetated Disturbance

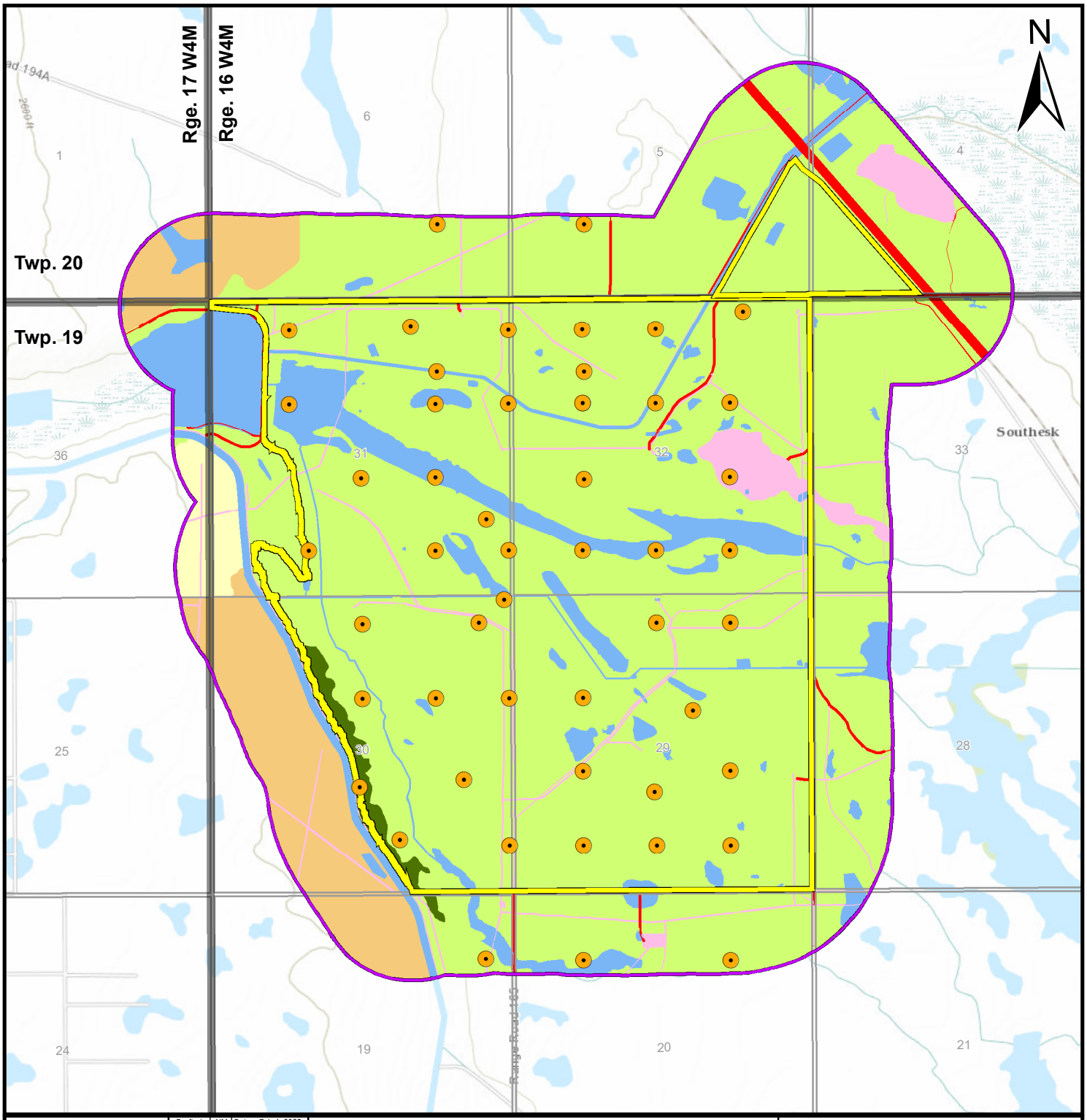
EID

Amphibian Survey Locations in the Terrestrial Local Study Area

February 2025

REF.: AARES21-127 (Wildlife)

Figure I1-4



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KML		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Approximate location based on field survey.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Snake Lake Reservoir Expansion Project Area
- Terrestrial Local Study Area (TLSA)

Survey Locations*:

- Breeding Bird Survey Point

Habitat Type:

- Cropland
- Native Prairie
- Pasture
- Treed
- Waterbodies
- Non-vegetated Disturbance
- Vegetated Disturbance

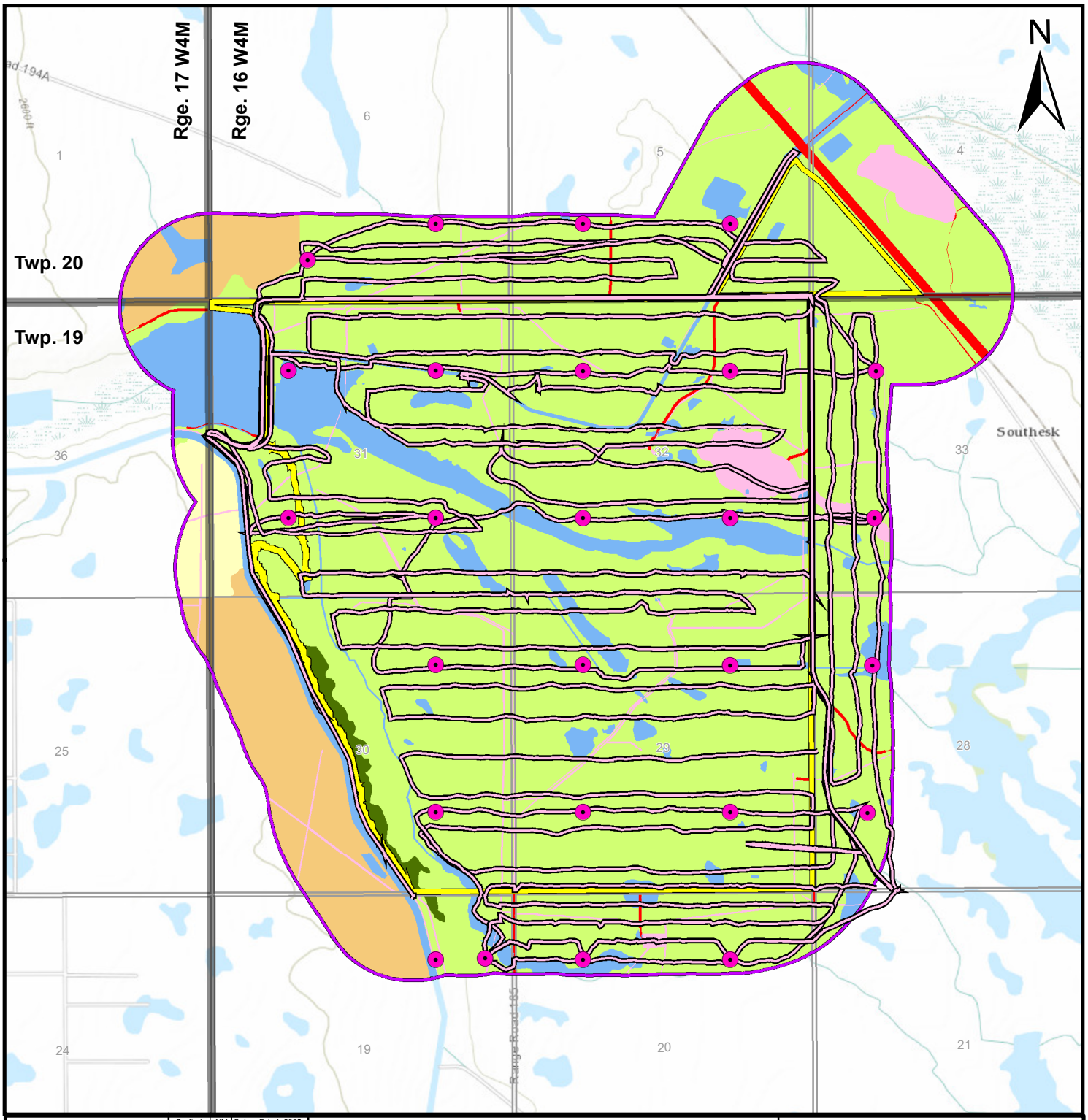
EID

Breeding Bird Survey Locations in the Terrestrial Local Study Area

February 2025

REF.: AARES21-127 (Wildlife)

Figure I1-5



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KML		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Approximate location based on field survey.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Snake Lake Reservoir Expansion Project Area
- Terrestrial Local Study Area (TLSA)

Survey Locations*:

- Burrowing Owl Call Playback Location
- Burrowing Owl Search Transects

Habitat Type:

- Cropland
- Native Prairie
- Pasture
- Treed
- Waterbodies
- Non-vegetated Disturbance
- Vegetated Disturbance

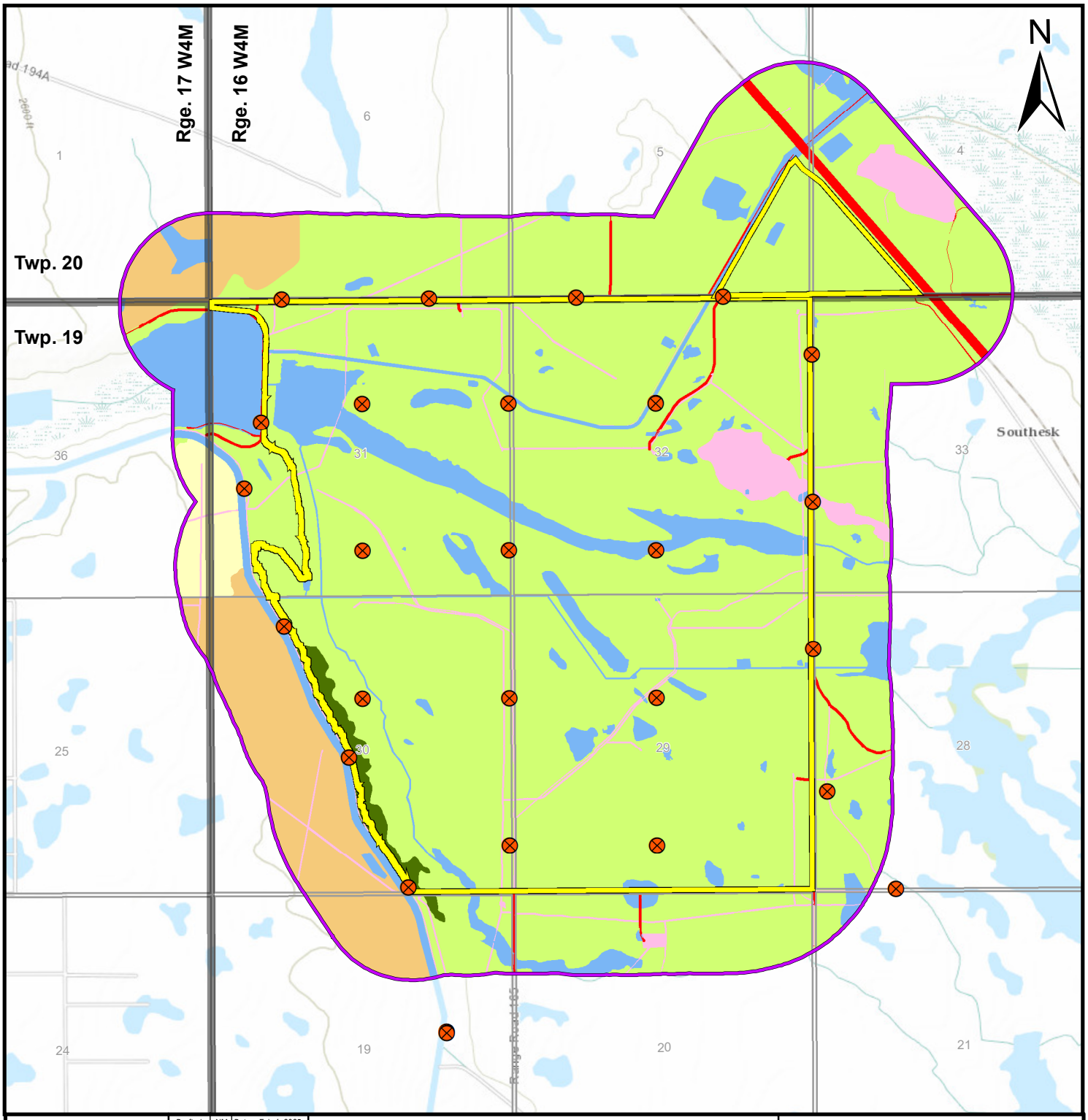
EID

Burrowing Owl Survey Tracks and Locations in the Terrestrial Local Study Area

February 2025

REF.: AARES21-127 (Wildlife)

Figure I1-6



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KML		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Approximate location based on field survey.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Snake Lake Reservoir Expansion Project Area
- Terrestrial Local Study Area (TLSA)

Survey Locations*:

- Common Nighthawk Survey Point

Habitat Type:

- Cropland
- Native Prairie
- Pasture
- Treed
- Waterbodies
- Non-vegetated Disturbance
- Vegetated Disturbance

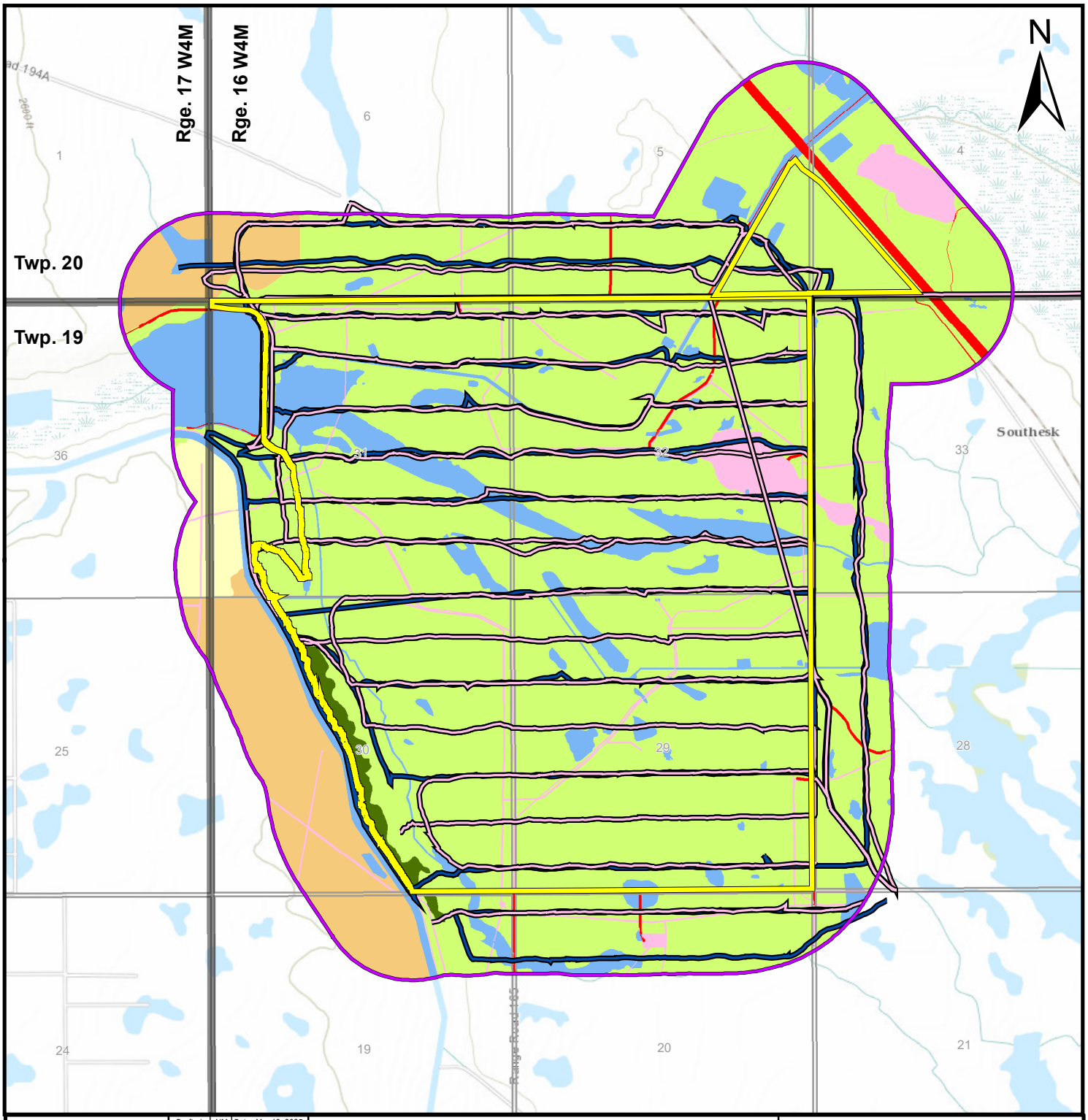
EID

Common Nighthawk Survey Locations in the Terrestrial Local Study Area

February 2025

REF.: AARES21-127 (Wildlife)

Figure I1-7



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KML		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Approximate location based on field survey.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Snake Lake Reservoir Expansion Project Area
- Terrestrial Local Study Area (TLSA)

Survey Locations*:

- Sharp-tailed Grouse Survey Transects (April 2021)
- Sharp-tailed Grouse Survey Transects (May, 2021)

Habitat Type:

- Cropland
- Native Prairie
- Pasture
- Treed
- Waterbodies
- Non-vegetated Disturbance
- Vegetated Disturbance

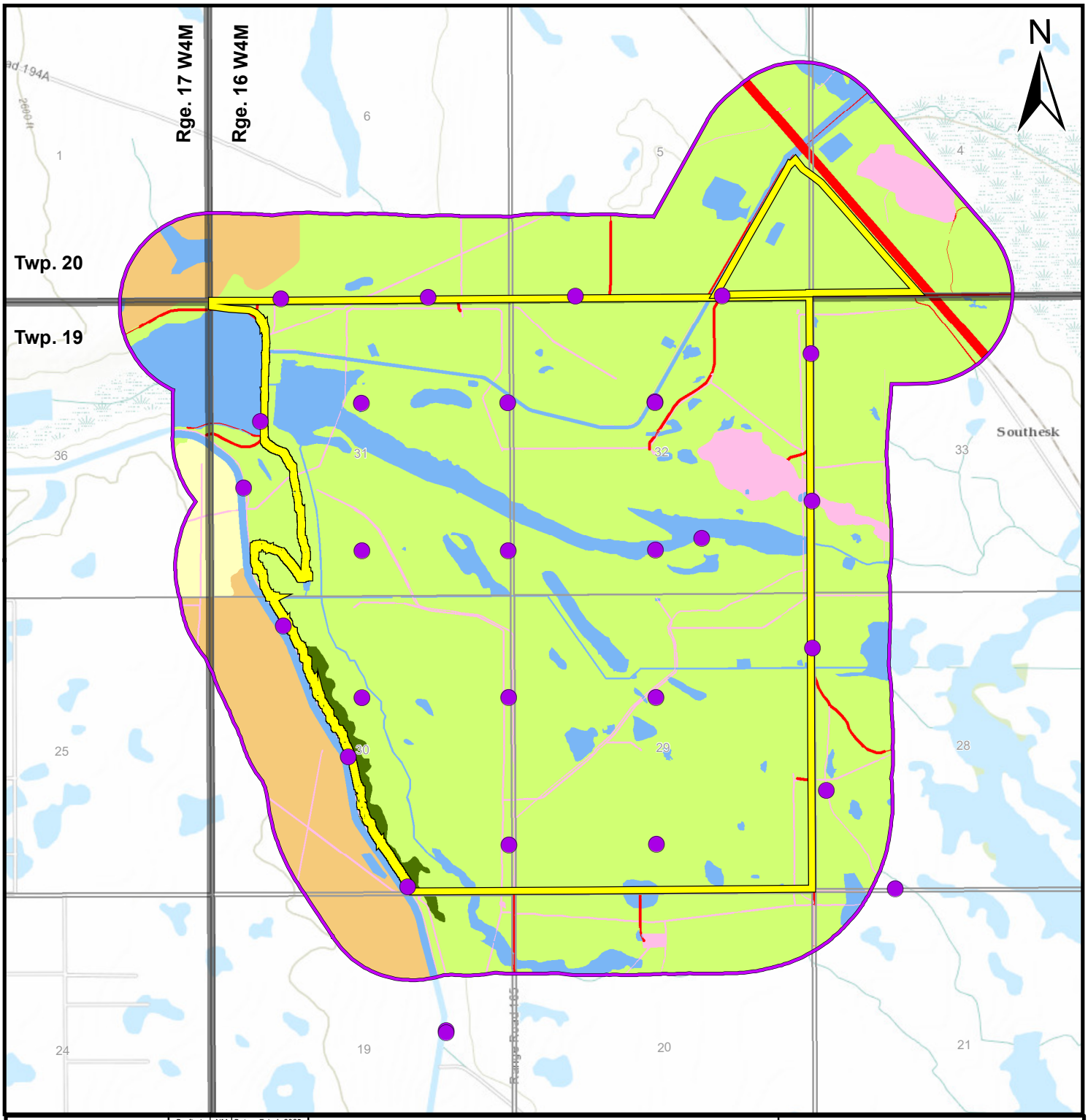
EID

Sharp-tailed Grouse Survey Tracks in the Terrestrial Local Study Area

March 2025

REF.: AARES21-127 (Wildlife)

Figure I1-8



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KML		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Approximate location based on field survey.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Snake Lake Reservoir Expansion Project Area
- Terrestrial Local Study Area (TLSA)

Survey Locations*:

- Short-eared Owl Survey Point

Habitat Type:

- Cropland
- Native Prairie
- Pasture
- Treed
- Waterbodies
- Non-vegetated Disturbance
- Vegetated Disturbance

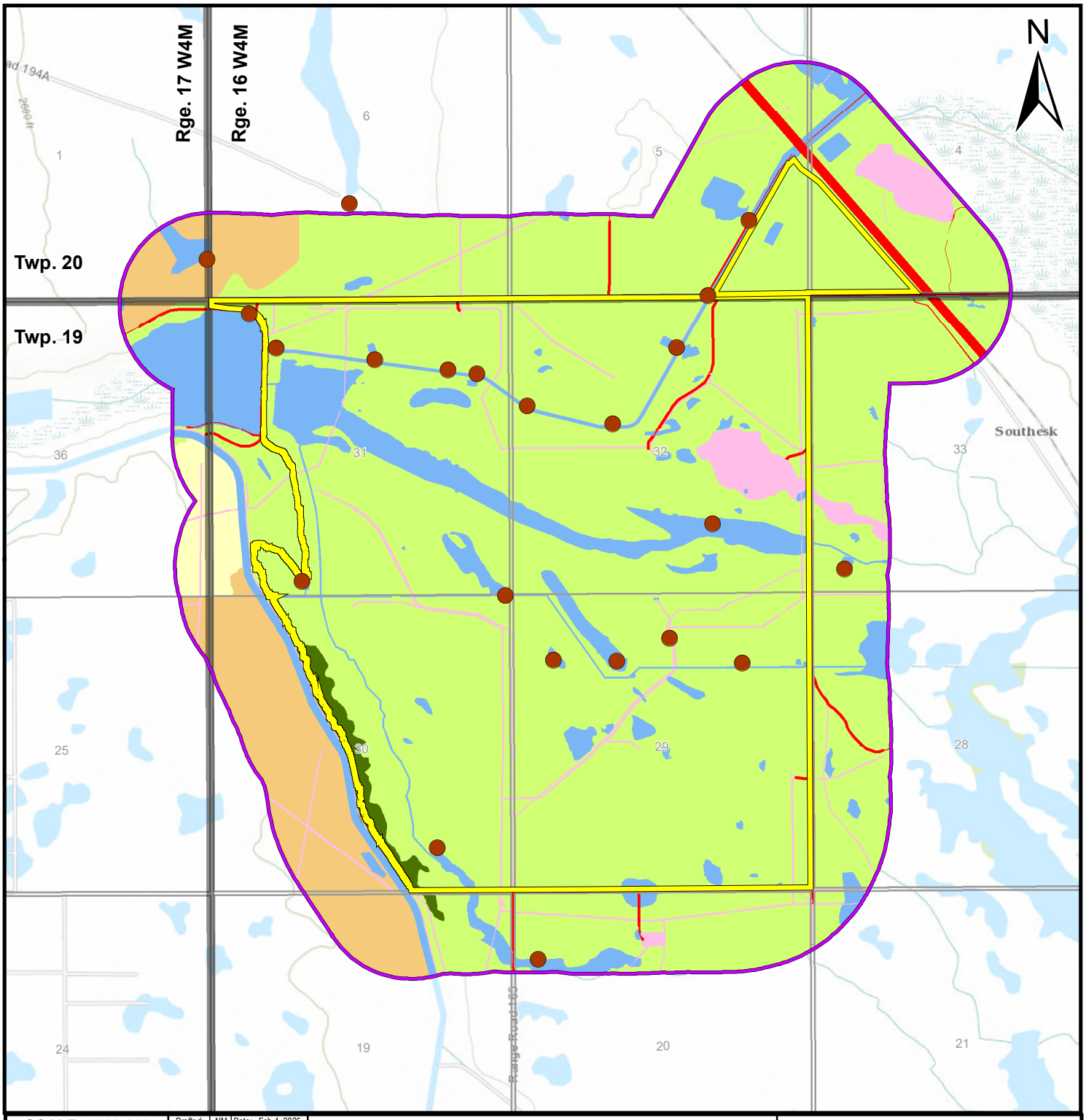
EID

Short-eared Owl Survey Locations in the Terrestrial Local Study Area

February 2025

REF.: AARES21-127 (Wildlife)

Figure I1-9



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Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Approximate location based on field survey.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Snake Lake Reservoir Expansion Project Area
- Terrestrial Local Study Area (TLSA)

Survey Locations*:

- Yellow Rail Survey Point

Habitat Type:

- Cropland
- Native Prairie
- Pasture
- Treed
- Waterbodies
- Non-vegetated Disturbance
- Vegetated Disturbance

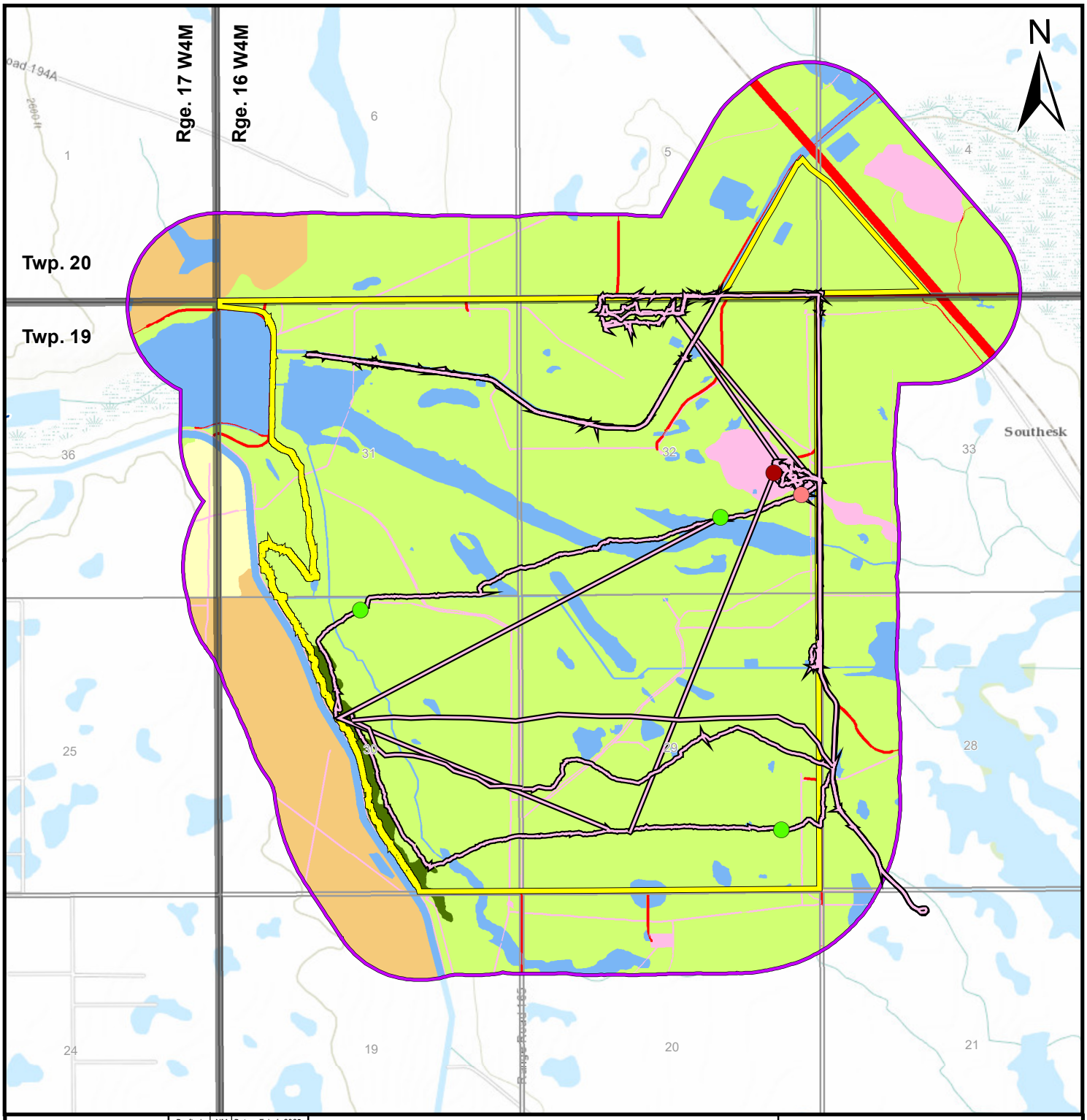
EID

Yellow Rail Survey Locations in the Terrestrial Local Study Area

February 2025

REF.: AARES21-127 (Wildlife)

Figure I1-10



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Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
KML		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Approximate location based on field survey.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Snake Lake Reservoir Expansion Project Area
- Terrestrial Local Study Area (TLSA)

Survey Locations*:

- Winter Mammal Survey Tracks

Wildlife Tracks and Features*:

- Coyote Den
- Ground Squirrel Colony
- Long-tailed Weasel tracks

Habitat Type:

- Cropland
- Native Prairie
- Pasture
- Treed
- Waterbodies
- Non-vegetated Disturbance
- Vegetated Disturbance

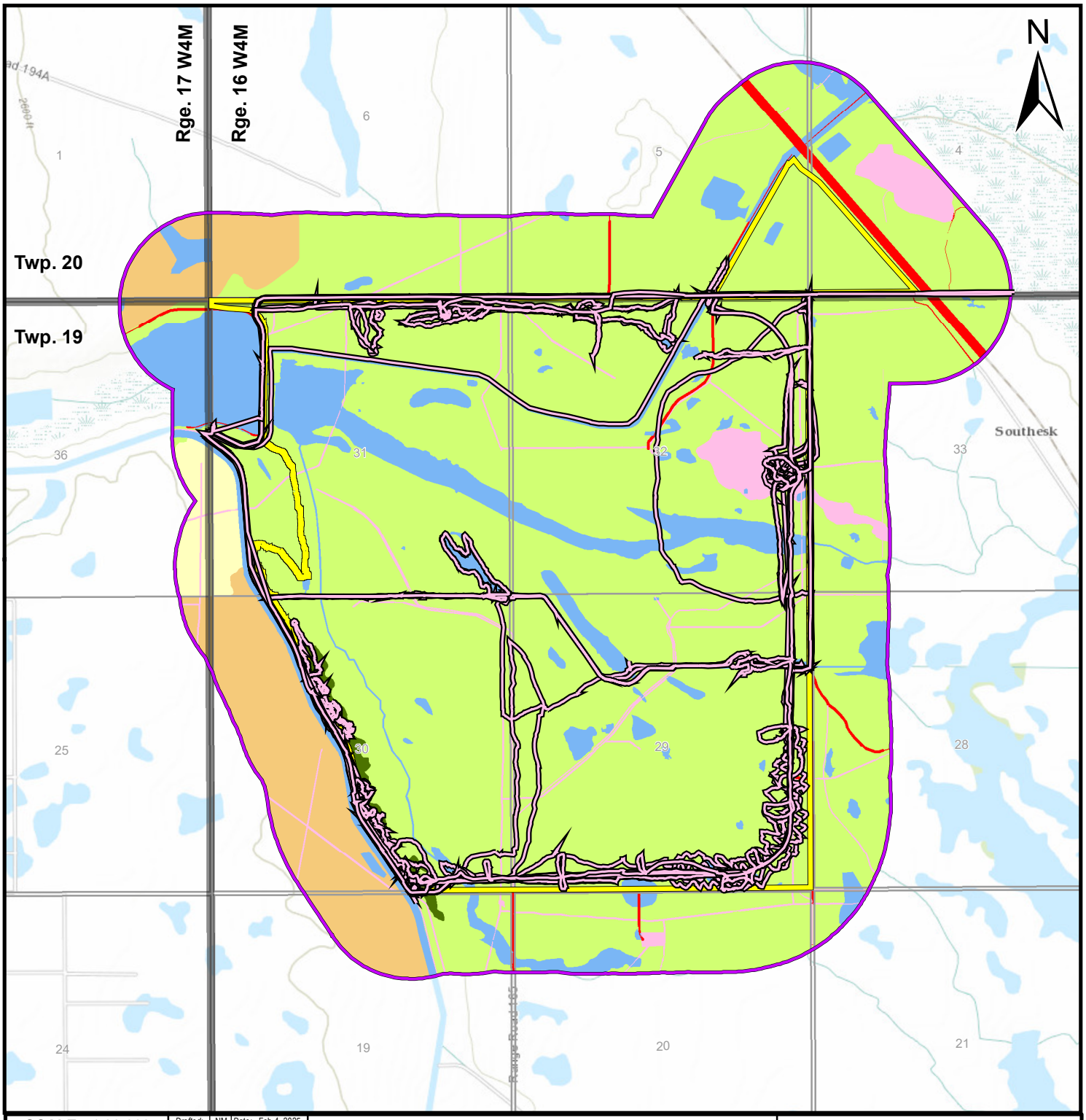
EID

2023 Winter Mammal Tracking Survey in the Terrestrial Local Study Area

February 2025

REF.: AARES21-127 (Wildlife)

Figure I1-11



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KML		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Approximate location based on field survey.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Snake Lake Reservoir Expansion Project Area
- Terrestrial Local Study Area (TLSA)

Sweep Locations*:

- 2022 Wildlife Sweep Tracks

Habitat Type:

- Cropland
- Native Prairie
- Pasture
- Treed
- Waterbodies
- Non-vegetated Disturbance
- Vegetated Disturbance

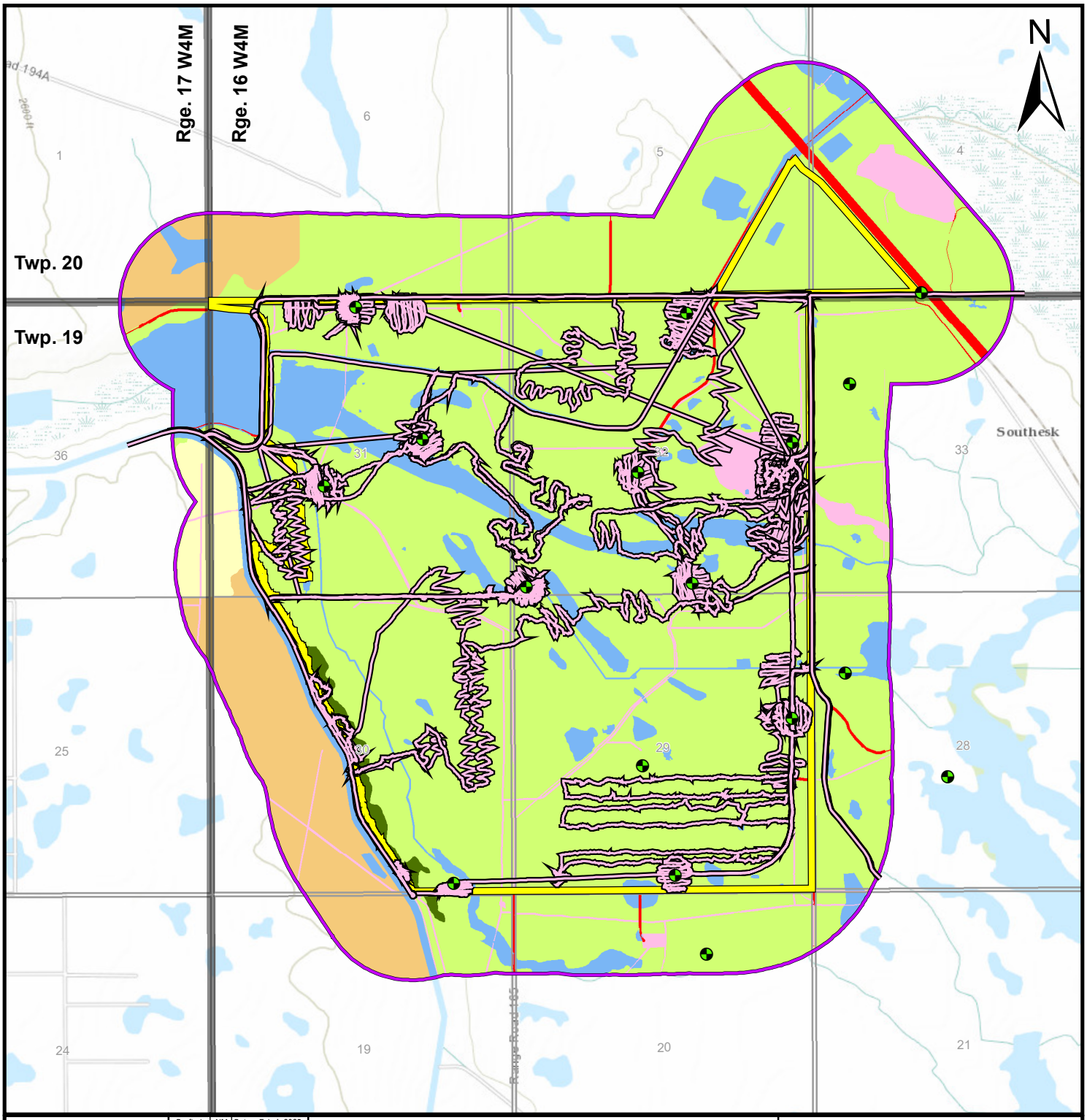
EID

2022 Wildlife Sweep Tracks in the Terrestrial Local Study Area

February 2025

REF.: AARES21-127 (Wildlife)

Figure I1-12



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200 0 200 400

Drafted:	NM	Date:	Feb 4, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
KML		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Approximate location based on field survey.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Snake Lake Reservoir Expansion Project Area
- Terrestrial Local Study Area (TLSA)

Sweep Locations*:

- Geotechnical Investigation Location
- 2023 Wildlife Sweep Tracks

Habitat Type:

- Cropland
- Native Prairie
- Pasture
- Treed
- Waterbodies
- Non-vegetated Disturbance
- Vegetated Disturbance

EID

2023 Wildlife Sweep Tracks and Geotechnical Investigation Locations in the Terrestrial Local Study Area

February 2025

REF.: AARES21-127 (Wildlife)

Figure I1-13

Appendix I2: Tables

Table I2-1: Wildlife species observed in the Terrestrial Local Study Area during 2021 systematic surveys, by habitat class

Common name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance	
			Watercourse	Open Water	Semiperm / permanent	Temporary	Native Prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated
Amphibians												
Boreal Chorus Frog	Secure	-	✓		✓	✓						
Northern Leopard Frog	At Risk	Special Concern			✓							
Birds												
American Avocet	Secure	-					✓					
American Crow	Secure	-					✓					
American Robin	Secure	-					✓	✓				
American White Pelican	Sensitive	-		✓			✓					
Baird's Sparrow	Sensitive	Special Concern					✓					
Baltimore Oriole	Secure	-					✓					
Bank Swallow	Sensitive	Threatened			✓							
Barn Swallow	May Be at Risk	Threatened	✓			✓					✓	
Black-billed Magpie	Secure	-				✓	✓	✓				
Black-crowned Night-heron	Sensitive	-					✓					
Black-necked Stilt	Sensitive	-				✓	✓					
Brewer's Blackbird	Secure	-	✓				✓					
Brown-headed Cowbird	Secure	-				✓	✓					

Common name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance	
			Watercourse	Open Water	Semiperm / permanent	Temporary	Native Prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated
California Gull	Secure	-					✓					
Canada Goose	Secure	-					✓					
Chestnut-collared Longspur	May Be at Risk	Endangered					✓					
Clay-colored Sparrow	Secure	-			✓	✓	✓	✓				
Common Loon	Secure	-					✓					
Common Yellowthroat	Sensitive	-						✓				
Double-crested Cormorant	Secure	-		✓								
Eared Grebe	Sensitive	-					✓					
Eastern Kingbird	Sensitive	-					✓					
European Starling	Exotic	-					✓					
Ferruginous Hawk	At Risk	Threatened									✓	
Gadwall	Secure	-				✓					✓	
Grasshopper Sparrow	Sensitive	-					✓					
Great Blue Heron	Sensitive	-					✓					
Great Horned Owl	Secure	-					✓	✓				
Hermit Thrush	Secure	-					✓					
Horned Lark	Secure	-	✓		✓	✓	✓				✓	
House Wren	Secure	-					✓					
Killdeer	Secure	-				✓	✓				✓	

Common name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance	
			Watercourse	Open Water	Semiperm / permanent	Temporary	Native Prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated
Least Flycatcher	Secure	-					✓					
Lesser Scaup	Secure	-				✓						
Long-billed Curlew	May Be at Risk	Special Concern					✓					
Mallard	Secure	-				✓	✓					
Northern Shoveler	Secure	-	✓			✓	✓					
Red-tailed Hawk	Secure	-			✓		✓					
Red-winged Blackbird	Secure	-	✓		✓	✓	✓	✓				
Ring-billed Gull	Secure	-		✓		✓	✓					
Savannah Sparrow	Secure	-			✓	✓	✓				✓	
Sora	Sensitive	-				✓						
Spotted Sandpiper	Secure	-					✓					
Sprague's Pipit	Sensitive	Threatened				✓	✓					
Swainson's Hawk	Secure	-				✓	✓					
Vesper Sparrow	Secure	-				✓	✓					
Western Kingbird	Secure	-					✓	✓				
Western Meadowlark	Secure	-	✓		✓	✓	✓				✓	
White-crowned Sparrow	Secure	-			✓			✓				
Willet	Secure	-			✓	✓	✓	✓				
Wilson's Snipe	Secure	-			✓		✓	✓				
Yellow Warbler	Secure	-					✓	✓				

Common name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance	
			Watercourse	Open Water	Semiperm / permanent	Temporary	Native Prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated
Mammals												
Beaver	Secure	-					✓				✓	
Long-tailed Weasel	May Be at Risk	-					✓					
Pronghorn	Sensitive	-					✓					
Richardson's Ground Squirrel	Secure	-					✓					
White-tailed Deer	Secure	-					✓					
White-tailed Jackrabbit	Secure	-					✓					

* hyphen (-) indicates species not listed in source

[1] Government of Alberta (GOA). (2024a). Wild Species Status Search

[2] Government of Canada (GOC). (2024). Species at Risk Public Registry

TRSA observations exclude those reported in the TLSA

Table I2-2: Provincial records of species identified in the Terrestrial Regional Study Area during systematic surveys, by habitat class (2013-2023)

Common Name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance		
			Watercourse	Open Water	Semiperm / permanent	Temporary	Native Prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated	Settlement
Amphibians													
Boreal Chorus Frog	Secure	-	✓	✓	✓		✓	✓		✓		✓	✓
Northern Leopard Frog	At Risk	Special Concern				✓							
Birds													
Alder Flycatcher	Secure	-			✓								
American Avocet	Secure	-		✓	✓		✓		✓	✓	✓	✓	
American Bittern	Sensitive	-								✓			
American Coot	Secure	-		✓	✓		✓		✓	✓		✓	
American Crow	Secure	-	✓		✓		✓		✓	✓	✓	✓	
American Goldfinch	Secure	-					✓						✓
American Kestrel	Sensitive	-	✓				✓			✓			
American Pipit	Secure	-					✓			✓		✓	✓
American Robin	Secure	-				✓	✓	✓		✓		✓	
American Tree Sparrow	Secure	-										✓	
American White Pelican	Sensitive	-		✓			✓			✓		✓	
American Wigeon	Secure	-		✓	✓		✓		✓	✓		✓	
Baird's Sparrow	Sensitive	Special Concern		✓	✓		✓		✓	✓	✓	✓	
Bald Eagle	Sensitive	-		✓			✓			✓		✓	

Common Name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance		
			Watercourse	Open Water	Semiperm / permanent	Temporary	Native Prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated	Settlement
Baltimore Oriole	Secure	-					✓						✓
Bank Swallow	Sensitive	Threatened					✓						
Barn Swallow	May Be at Risk	Threatened					✓			✓		✓	✓
Belted Kingfisher	Secure	-	✓										
Black Tern	Sensitive	-		✓						✓			
Black-billed Magpie	Secure	-	✓		✓	✓	✓	✓	✓	✓		✓	✓
Black-crowned Night-Heron	Sensitive	-		✓	✓		✓				✓	✓	✓
Black-necked Stilt	Sensitive	-					✓				✓		
Blue Jay	Secure	-					✓						
Blue-winged Teal	Secure	-		✓	✓		✓			✓		✓	✓
Bonaparte's Gull	Secure						✓			✓		✓	
Brewer's Blackbird	Secure	-	✓	✓	✓	✓	✓		✓	✓		✓	✓
Brewer's Sparrow	Sensitive	-					✓						
Brown-headed Cowbird	Secure	-		✓	✓		✓		✓	✓	✓	✓	✓
Bufflehead	Secure	-		✓	✓		✓			✓		✓	
Cackling Goose	Accidental/ Vagrant	-					✓			✓			
California Gull	Secure	-			✓	✓	✓		✓	✓		✓	
Canada Goose	Secure	-	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Canvasback	Secure	-		✓	✓		✓			✓			
Chestnut-collared Longspur	May Be at Risk	Endangered			✓		✓		✓	✓		✓	

Common Name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance		
			Watercourse	Open Water	Semiperm / permanent	Temporary	Native Prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated	Settlement
Chipping Sparrow	Secure	-								✓			
Cinnamon Teal	Secure	-		✓	✓		✓						
Clay-colored Sparrow	Secure	-		✓		✓	✓	✓	✓	✓		✓	
Cliff Swallow	Secure	-	✓				✓			✓		✓	
Common Goldeneye	Secure	-		✓	✓		✓		✓	✓			
Common Grackle	Secure	-		✓		✓	✓					✓	✓
Common Loon	Secure	-		✓			✓						
Common Merganser	Secure	-		✓			✓			✓			
Common Nighthawk	Sensitive	Special Concern					✓						
Common Raven	Secure	-	✓	✓	✓		✓		✓	✓	✓	✓	
Common Redpoll	Secure	-					✓			✓		✓	
Common Tern	Secure	-					✓					✓	
Common Yellowthroat	Sensitive	-		✓	✓		✓	✓		✓			
Dark-eyed Junco	Secure	-					✓			✓		✓	
Double-crested Cormorant	Secure	-	✓	✓	✓		✓			✓		✓	
Downy Woodpecker	Secure	-					✓						
Eared Grebe	Sensitive	-			✓		✓						
Eastern Kingbird	Sensitive	-	✓	✓	✓		✓			✓		✓	
European Starling	Exotic	-	✓		✓	✓	✓			✓		✓	✓
Ferruginous Hawk	At Risk	Threatened	✓		✓		✓		✓	✓		✓	

Common Name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance		
			Watercourse	Open Water	Semiperm / permanent	Temporary	Native Prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated	Settlement
Forster's Tern	Sensitive	-					✓						
Fox Sparrow	Secure	-					✓						
Franklin's Gull	Secure	-		✓	✓		✓		✓	✓	✓	✓	
Gadwall	Secure	-		✓	✓	✓	✓		✓		✓	✓	✓
Golden Eagle	Sensitive	-					✓				✓	✓	
Grasshopper Sparrow	Sensitive	-			✓		✓			✓		✓	
Gray Partridge	Exotic/Alien	-					✓			✓			
Great Blue Heron	Sensitive	-			✓		✓					✓	
Great Horned Owl	Secure	-			✓								✓
Greater Scaup	Secure	-					✓						
Greater White-fronted Goose	Secure	-	✓				✓			✓		✓	
Greater Yellowlegs	Secure	-	✓	✓	✓		✓						
Green-winged Teal	Secure	-	✓	✓	✓		✓		✓	✓		✓	
Gyrfalcon	Secure	-					✓			✓			
Hermit Thrush	Secure	-					✓						
Herring Gull	Secure	-					✓					✓	
Hooded Merganser	Secure	-		✓									
Horned Grebe	Sensitive	Special Concern					✓		✓	✓			
Horned Lark	Secure	-	✓	✓	✓	✓	✓		✓	✓	✓	✓	
House Finch	Secure	-					✓			✓			

Common Name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance		
			Watercourse	Open Water	Semiperm / permanent	Temporary	Native Prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated	Settlement
House Wren	Secure	-					✓			✓		✓	✓
Killdeer	Secure	-	✓	✓	✓		✓		✓	✓	✓	✓	✓
Lapland Longspur	Secure	-	✓				✓		✓	✓		✓	
Least Flycatcher	Secure	-					✓						
Least Sandpiper	Secure	-		✓	✓								
Lesser Scaup	Secure	-	✓	✓	✓	✓	✓		✓			✓	
Lesser Yellowlegs	Secure	-			✓				✓	✓			
Loggerhead Shrike	Sensitive	Threatened										✓	
Long-billed Curlew	May Be at Risk	Special Concern	✓	✓	✓		✓		✓	✓	✓	✓	
Long-billed Dowitcher	Secure	-	✓										
Mallard	Secure	-	✓	✓	✓		✓		✓	✓	✓	✓	
Marbled Godwit	Secure	-	✓		✓	✓	✓		✓	✓	✓	✓	
Marsh Wren	Secure	-		✓	✓		✓			✓			
Merlin	Secure	-					✓			✓			✓
Mountain Bluebird	Secure	-					✓						
Mourning Dove	Secure	-			✓		✓			✓		✓	✓
Nelson's Sparrow	Secure	-		✓			✓						
Northern Flicker	Secure	-					✓						
Northern Harrier	Secure	-	✓	✓	✓		✓		✓	✓		✓	✓
Northern Pintail	Secure	-	✓	✓	✓		✓		✓	✓		✓	
Northern Shoveler	Secure	-	✓	✓	✓	✓	✓		✓	✓	✓	✓	

Common Name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance		
			Watercourse	Open Water	Semiperm / permanent	Temporary	Native Prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated	Settlement
Northern Shrike	Secure	-					✓		✓	✓			
Pectoral Sandpiper	Secure	-	✓	✓									
Pied-billed Grebe	Sensitive	-		✓	✓		✓						
Prairie Falcon	Sensitive	-					✓			✓		✓	
Red-breasted Merganser	Secure	-					✓						
Red-necked Grebe	Secure	-					✓					✓	
Red-necked Phalarope	Secure	Special Concern					✓						
Red-tailed Hawk	Secure	-	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Red-winged Blackbird	Secure	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Redhead	Secure	-	✓		✓		✓		✓	✓			
Ring-billed Gull	Secure	-	✓	✓	✓		✓		✓	✓	✓	✓	✓
Ring-necked Duck	Secure	-			✓		✓		✓			✓	
Ring-necked Pheasant	Exotic/Alien	-							✓			✓	
Rock Dove	Exotic/Alien	-			✓		✓			✓		✓	✓
Rough-legged Hawk	Secure	-	✓				✓			✓		✓	✓
Ruddy Duck	Secure	-			✓		✓		✓	✓			
Sandhill Crane	Sensitive	-			✓		✓			✓			
Savannah Sparrow	Secure	-			✓		✓			✓			
Say's Phoebe	Secure	-					✓		✓				
Sharp-tailed Grouse	Sensitive	-					✓		✓	✓			

Common Name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance		
			Watercourse	Open Water	Semiperm / permanent	Temporary	Native Prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated	Settlement
Short-billed Dowitcher	Undetermined	-			✓								
Short-eared Owl	May Be at Risk	Special Concern					✓						
Snow Bunting	Secure	-					✓			✓			
Snow Goose	Secure	-	✓	✓	✓		✓		✓	✓		✓	
Snowy Owl	Secure	-					✓			✓			
Solitary Sandpiper	Secure	-							✓	✓			
Song Sparrow	Secure	-		✓									
Sora	Sensitive	-		✓		✓				✓		✓	✓
Spotted Sandpiper	Secure	-	✓				✓		✓	✓		✓	
Sprague's Pipit	Sensitive	Threatened			✓		✓			✓		✓	
Surf Scoter	Secure	-					✓						
Swainson's Hawk	Secure	-		✓	✓		✓		✓	✓		✓	✓
Swainson's Thrush	Secure	-					✓			✓			
Tree Swallow	Secure	-	✓		✓	✓	✓			✓		✓	
Trumpeter Swan	Sensitive	-					✓					✓	
Tundra Swan	Secure	-		✓	✓		✓		✓	✓		✓	
Upland Sandpiper	Sensitive	-					✓			✓		✓	
Vesper Sparrow	Secure	-	✓		✓	✓	✓		✓	✓	✓	✓	
Western Grebe	At Risk	Special Concern					✓			✓			
Western Kingbird	Secure	-	✓				✓	✓		✓		✓	

Common Name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance		
			Watercourse	Open Water	Semiperm / permanent	Temporary	Native Prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated	Settlement
Western Meadowlark	Secure	-	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
White-crowned Sparrow	Secure	-		✓			✓	✓				✓	
White-faced Ibis	Sensitive	-		✓	✓		✓						
Willet	Secure	-	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Wilson's Phalarope	Secure	-		✓	✓		✓		✓	✓		✓	
Wilson's Snipe	Secure	-	✓	✓	✓		✓	✓	✓	✓		✓	✓
Yellow Warbler	Secure	-					✓	✓		✓		✓	
Yellow-headed Blackbird	Secure	-	✓	✓	✓		✓		✓	✓		✓	✓
Yellow-rumped Warbler	Secure	-					✓						
Mammals													
Beaver	Secure	-					✓				✓		
Coyote	Secure	-					✓						
Long-tailed Weasel	May Be at Risk	-					✓						
Mink	Secure	-	✓										
Mule Deer	Secure	-					✓						
Muskrat	Secure	-			✓								
Pronghorn	Sensitive	-					✓				✓		
Raccoon	Secure	-					✓						
Richardson's Ground Squirrel	Secure	-			✓		✓			✓			
Short-tailed Weasel	Secure	-					✓						

Common Name	Provincial Status[1]	SARA Status*[2]	Waterbodies				Natural Upland		Modified Upland		Disturbance		
			Watercourse	Open Water	Semiperm / permanent	Temporary	Native Prairie	Treed	Cropland	Pasture	Vegetated	Non-vegetated	Settlement
White-tailed Deer	Secure	-					✓						
White-tailed Jackrabbit	Secure	-					✓						

* hyphen (-) indicates species not listed in source

[1] GOA. (2024a). Wild Species Status Search

[2] GOC. (2024). Species at Risk Public Registry

TRSA observations exclude those reported in the TLSA

Table I2-3: Wildlife species recorded only as incidental observations in the study areas, compiled from Project surveys (2021-2023) and public databases (2012-2023)

Common Name	Provincial Status[1]	SARA Status*[2]	Incidentally Observed in	
			TLSA	TRSA
Amphibians				
Wood Frog	Secure	-		✓
Birds				
Alder Flycatcher	Secure	-	✓	✓
American Golden-plover	Secure	-		✓
Baird's Sandpiper	Secure	-		✓
Black-bellied Plover	Secure	-		✓
Black-capped Chickadee	Secure	-	✓	✓
Blackpoll Warbler	Secure	-		✓
Blue-winged Teal	Secure	-	✓	
Brown Thrasher	Secure	-		✓
Bufflehead	Secure	-	✓	
Burrowing Owl	At Risk	Endangered		✓
Caspian Tern	Sensitive	Not at Risk		✓
Cedar Waxwing	Secure	-		✓
Chipping Sparrow	Secure	-	✓	
Cliff Swallow	Secure	-	✓	
Common Merganser	Secure	-	✓	
Common Nighthawk	Sensitive	Special Concern	✓	
Common Raven	Secure	-	✓	
Common Tern	Secure	-	✓	
Cooper's Hawk	Secure	-		✓
Dunlin	Secure	-		✓

Common Name	Provincial Status[1]	SARA Status*[2]	Incidentally Observed in	
			TLSA	TRSA
Eastern Meadowlark	Accidental/Vagrant	-		✓
Eurasian Collared-dove	Exotic/Alien	-		✓
Franklin's Gull	Secure	-	✓	
Golden Eagle	Sensitive	-	✓	
Golden-crowned Kinglet	Secure	-		✓
Gray Catbird	Secure	-		✓
Gray Partridge	Exotic/Alien	-	✓	
Great Horned Owl	Secure	-	✓	
Green-winged Teal	Secure	-	✓	
Hairy Woodpecker	Secure	-		✓
House Sparrow	Exotic/Alien	-		✓
Hudsonian Godwit	Sensitive	-		✓
Lark Bunting	Sensitive	Threatened		✓
Lark Sparrow	Secure	-		✓
Lazuli Bunting	Secure	-		✓
Lincoln's Sparrow	Secure	-	✓	✓
Loggerhead Shrike	Sensitive	Threatened	✓	
Marbled Godwit	Secure	-	✓	
Mourning Dove	Secure	-	✓	
Northern Harrier	Secure	-	✓	
Northern Pintail	Secure	-	✓	
Northern Rough-winged Swallow	Secure	-		✓
Northern Shrike	Secure	-	✓	
Olive-sided Flycatcher	May Be at Risk	Special Concern		✓
Orange-crowned Warbler	Secure	-		✓

Common Name	Provincial Status[1]	SARA Status*[2]	Incidentally Observed in	
			TLSA	TRSA
Ovenbird	Secure	-		✓
Pacific Loon	Secure	-		✓
Palm Warbler	Secure	-		✓
Peregrine Falcon	At Risk	Not on Schedule 1		✓
Pine Siskin	Secure	-		✓
Piping Plover	At Risk	Endangered		✓
Red Crossbill	Secure	-		✓
Red-breasted Merganser	Secure	-	✓	
Red-breasted Nuthatch	Secure	-		✓
Red-eyed Vireo	Secure	-		✓
Redhead	Secure	-	✓	
Rock Ptarmigan	Accidental/ Vagrant	-		✓
Rock Wren	Secure	-		✓
Ross' Goose	Secure	-		✓
Ruby-crowned Kinglet	Secure	-		✓
Sabine's Gull	Secure	-		✓
Sanderling	Secure	-		✓
Semipalmated Plover	Secure	-		✓
Semipalmated Sandpiper	Secure	-		✓
Sharp-shinned Hawk	Secure	-		✓
Snow Bunting	Secure	-	✓	
Snow Goose	Secure	-	✓	
Snowy Owl	Secure	-	✓	
Song Sparrow	Secure	-	✓	
Stilt Sandpiper	Secure	-		✓

Common Name	Provincial Status[1]	SARA Status*[2]	Incidentally Observed in	
			TLSA	TRSA
Swamp Sparrow	Secure	-	✓	✓
Thick-billed Longspur	May Be at Risk	Threatened		✓
Trumpeter Swan	Sensitive	-	✓	
Tundra Swan	Secure	-	✓	
Turkey Vulture	Secure	-		✓
White-throated Sparrow	Secure	-		✓
Wilson's Phalarope	Secure	-	✓	
Wilson's Warbler	Secure	-		✓
Yellow-headed Blackbird	Secure	-	✓	
Yellow-rumped Warbler	Secure	-	✓	
Mammals				
American Badger	Sensitive	Special Concern		✓
Coyote	Secure	-	✓	
Meadow Vole	Secure	-		✓
Mule Deer	Secure	-	✓	
Muskrat	Secure	-	✓	✓
Northern Pocket Gopher	Secure	-		✓
Red Fox	Secure	-		✓
Short-tailed Weasel	Secure	-	✓	✓
Snowshoe Hare	Secure	-		✓
Reptiles				
Plains Garter Snake	Sensitive	-	✓	✓
Wandering Garter Snake	Sensitive	-	✓	✓

* hyphen (-) indicates species not listed in source
[1] GOA. (2024a). Wild Species Status Search
[2] GOC. (2024). Species at Risk Public Registry
TRSA observations exclude those reported in the TLSA

Table I2-4: Wildlife species' status, setbacks, and detections in the Project area, during Project sweeps, surveys and site visits (2021-2024)

Common name	Scientific name	Provincial status[1]	AWA status[2,3]*	COSEWIC status[4]*	SARA status[4]*	Species detected on site in 2021 (blank = not detected)	Species detected on site 2022-2024 (blank = not detected)	Recommended species-specific setback (m)[5, 7]**
Amphibians								**Breeding pond**
Boreal Chorus Frog	*Pseudacris maculata*	Secure	-	-	-	✓	✓	0
Canadian Toad	*Anaxyrus hemiophrys*	May Be at Risk	Data Deficient	Not at Risk	-			100
Great Plains Toad	*Anaxyrus cognatus*	Sensitive	Special Concern	Special Concern	Special Concern			100
Northern Leopard Frog	*Lithobates pipiens*	At Risk	Threatened	Special Concern	Special Concern	✓		100
Plains Spadefoot	*Spea bombifrons*	May Be at Risk	-	Not at Risk	-			100
Birds								**Nests, leks**
Alder Flycatcher	*Empidonax alnorum*	Secure	-	-	-	✓	✓	50
American Avocet	*Recurvirostra americana*	Secure	-	-	-	✓	✓	100
American Bittern	*Botaurus lentiginosus*	Sensitive	-	-	-			200
American Crow	*Corvus brachyrhynchos*	Secure	-	-	-		✓	0
American Kestrel	*Falco sparverius*	Sensitive	-	-	-			100
American Robin	*Turdus migratorius*	Secure	-	-	-	✓	✓	30-50

Common name	Scientific name	Provincial status[1]	AWA status[2,3]*	COSEWIC status[4]*	SARA status[4]*	Species detected on site in 2021 (blank = not detected)	Species detected on site 2022-2024 (blank = not detected)	Recommended species-specific setback (m)[5, 7]**
American White Pelican	*Pelicanus erythrorhynchos*	Sensitive	-	Not at Risk	-	✓	✓	1000
Baird's Sparrow	*Centronyx bairdii*	Sensitive	-	Special Concern	Special Concern	✓		100
Bald Eagle	*Haliaeetus leucocephalus*	Sensitive	-	Not at Risk	-			1,000 (Mar 15 – Jul 15) 100 (Jul 16 – Mar 14)
Baltimore Oriole	*Icterus galbula*	Secure	-	-	-		✓	50
Bank Swallow	*Riparia riparia*	Sensitive	-	Threatened	Threatened	✓		100
Barn Swallow	*Hirundo rustica*	May Be at Risk	-	Special Concern	Threatened	✓	✓	100
Black Tern	*Chlidonias niger*	Sensitive	-	Not at Risk	-			1,000 (May 1 – Jul 31) 100 (Aug 1 – Apr 30)
Black-billed Magpie	*Pica hudsonia*	Secure	-	-	-	✓	✓	0
Black-crowned Night-heron	*Nycticorax nycticorax*	Sensitive	-	-	-			100
Black-necked Stilt	*Himantopus mexicanus*	Sensitive	-	-	-	✓	✓	100
Blue-winged Teal	*Spatual discors*	Secure	-	-	-	✓	✓	100
Bobolink	*Dolichonyx oryzivorus*	Sensitive	-	Special Concern	Threatened			200
Brewer's Blackbird	*Euphagus cyanocephalus*	Secure	-	-	-	✓	✓	0
Brewer's Sparrow	*Spizella breweri*	Sensitive	-	-	-			50

Common name	Scientific name	Provincial status[1]	AWA status[2,3]*	COSEWIC status[4]*	SARA status[4]*	Species detected on site in 2021 (blank = not detected)	Species detected on site 2022-2024 (blank = not detected)	Recommended species-specific setback (m)[5, 7]**
Brown Thrasher	*Toxostoma rufum*	Secure	-	-	-		✓	30-50
Brown-headed Cowbird	*Molothrus ater*	Secure	-	-	-	✓	✓	0
Bufflehead	*Bucephala albeola*	Secure	-	-	-	✓	✓	100
Burrowing Owl	*Athene cunicularia*	At Risk	Endangered	Endangered	Endangered			500 (Apr 1 – Aug 15) 100 (Aug 16 – Mar 31)
California Gull	*Larus californicus*	Secure	-	-	-		✓	100
Canada Goose	*Branta canadensis*	Secure	-	-	-	✓	✓	100
Chestnut-collared Longspur	*Calcarius ornatus*	May Be at Risk	Endangered[6]	Endangered	Endangered	✓	✓	100
Chipping Sparrow	*Spizella passerina*	Secure	-	-	-		✓	30-50
Clark's Grebe	*Aechmophorus clarkii*	May Be at Risk	-	-	-			100
Clay-colored Sparrow	*Spizella pallida*	Secure	-	-	-	✓	✓	50
Cliff Swallow	*Petrochelidon pyrrhonota*	Secure	-	-	-		✓	50
Common Loon	*Gavia immer*	Secure	-	Not at Risk	-	✓	✓	100
Common Merganser	*Mergus merganser*	Secure	-	-	-		✓	100
Common Nighthawk	*Chordeiles minor*	Sensitive	-	Special Concern	Special Concern		✓	100

Common name	Scientific name	Provincial status[1]	AWA status[2,3]*	COSEWIC status[4]*	SARA status[4]*	Species detected on site in 2021 (blank = not detected)	Species detected on site 2022-2024 (blank = not detected)	Recommended species-specific setback (m)[5, 7]**
Common Raven	*Corvus corax*	Secure	-	-	-		✓	0
Common Tern	*Sterna hirundo*	Secure	-	Not at Risk	-		✓	100
Common Yellowthroat	*Geothlypis trichas*	Sensitive	-	-	-	✓		50
Double-crested Cormorant	*Phalacrocorax auritus*	Secure	-	Not at Risk	-	✓	✓	100
Eared Grebe	*Podiceps nigricollis*	Sensitive	-	-	-	✓		100
Eastern Kingbird	*Tyrannus tyrannus*	Sensitive	-	-	-		✓	50
European Starling	*Sturnus vulgaris*	Exotic/ Alien	-	-	-		✓	0
Ferruginous Hawk	*Buteo regalis*	At Risk	Endangered	Special Concern	Threatened	✓	✓	1000 (Mar 15 – Jul 15) 100 (Jul 16 – Mar 14)
Forster's Tern	*Sterna forsteri*	Sensitive	-	Data Deficient	-			200 (May 1 – Jul 31) 200 (Aug 1 – Apr 31)
Franklin's Gull	*Leucophaeus pipixcan*	Secure	-	-	-		✓	100
Gadwall	*Mareca strepera*	Secure	-	-	-	✓	✓	100
Golden Eagle	*Aquila chrysaetos*	Sensitive	-	Not at Risk	-		✓	1000 (Mar 15 – Jul 15) 100 (Jul 16 – Mar 14)
Grasshopper Sparrow	*Ammodramus savannarum*	Sensitive	-	-	-	✓		50
Gray Partridge	*Perdix perdix*	Exotic/Alien	-	-	-		✓	0

Common name	Scientific name	Provincial status[1]	AWA status[2,3]*	COSEWIC status[4]*	SARA status[4]*	Species detected on site in 2021 (blank = not detected)	Species detected on site 2022-2024 (blank = not detected)	Recommended species-specific setback (m)[5, 7]**
Great Blue Heron	*Ardea herodias*	Sensitive	-	-	-	✓		1000 (May 1 – Jul 31) 100 (Aug 1 – Apr 30)
Great Horned Owl	*Bubo virginianus*	Secure	-	-	-	✓	✓	100
Green-winged Teal	*Anas crecca*	Secure	-	-	-		✓	100
Hermit Thrush	*Catharus guttatus*	Secure	-	-	-	✓		50
Horned Grebe	*Podiceps auritus*	Sensitive	-	Special Concern	Special Concern		✓	500
Horned Lark	*Eremophila alpestris*	Secure	-	-	-	✓	✓	50
House Wren	*Troglodytes aedon*	Secure	-	-	-	✓	✓	30-50
Killdeer	*Charadrius vociferus*	Secure	-	-	-	✓	✓	50
Lark Bunting	*Calamospiza melanocorys*	Sensitive	-	Threatened	Threatened			100
Loggerhead Shrike	*Lanius ludovicianus*	Sensitive	Special Concern	Threatened	Threatened		✓	400
Long-billed Curlew	*Numenius americanus*	May Be at Risk	Special Concern	Threatened	Special Concern	✓	✓	100
Mallard	*Anas platyrhynchos*	Secure	-	-	-	✓	✓	100
Marbled Godwit	*Limosa fedoa*	Secure	-	-	-		✓	100
Mourning Dove	*Zenaida macroura*	Secure	-	-	-	✓		50
Nelson's Sparrow	*Ammospiza nelsoni*	Secure	-	-	-	✓		50

Common name	Scientific name	Provincial status[1]	AWA status[2,3]*	COSEWIC status[4]*	SARA status[4]*	Species detected on site in 2021 (blank = not detected)	Species detected on site 2022-2024 (blank = not detected)	Recommended species-specific setback (m)[5, 7]**
Northern Harrier	*Circus hudsonius*	Secure	-	Not at Risk	-	✓	✓	100
Northern Pintail	*Anas acuta*	Secure	-	-	-	✓		100
Northern Shoveler	*Spatula clypeata*	Secure	-	-	-	✓	✓	100
Pied-billed Grebe	*Podilymbus podiceps*	Sensitive	-	-	-			500
Piping Plover	*Charadrius melodus*	At Risk	Endangered	Endangered	Endangered			200 (Apr 15 – Jul 31) 100 (Aug 1 – Apr 14)
Prairie Falcon	*Falco mexicanus*	Sensitive	Special Concern	Not at Risk	-			1000 (Mar 15 – Jul 15) 100 (Jul 16 – Mar 14)
Red-tailed Hawk	*Buteo jamaicensis*	Secure	-	-	-	✓	✓	100
Red-winged Blackbird	*Agelaius phoeniceus*	Secure	-	-	-	✓	✓	0
Ring-billed Gull	*Larus delawarensis*	Secure	-	-	-	✓	✓	100
Ring-necked Pheasant	*Phasianus colchicus*	Exotic/ Alien	-	-	-		✓	0
Rough-legged Hawk	*Buteo lagopus*	Secure	-	-	-		✓	100
Sandhill Crane	*Grus canadensis*	Sensitive	-	-	-			100
Savannah Sparrow	*Passerculus sandwichensis*	Secure	-	-	-	✓	✓	50
Sharp-tailed Grouse	*Tympanuchus phasianellus*	Sensitive	-	-	-			500 (Mar 15 – Jun 15) 100 (Jun 16 – Mar 14)

Common name	Scientific name	Provincial status[1]	AWA status[2,3]*	COSEWIC status[4]*	SARA status[4]*	Species detected on site in 2021 (blank = not detected)	Species detected on site 2022-2024 (blank = not detected)	Recommended species-specific setback (m)[5, 7]**
Short-eared Owl	*Asio flammeus*	May Be at Risk	-	Threatened	Special Concern			100
Snow Bunting	*Plectrophenax nivalis*	Secure	-	-	-		✓	50
Snow Goose	*Anser caerulenscens*	Secure	-	-	-	✓		100
Song Sparrow	*Melospiza melodia*	Secure	-	-	-	✓	✓	50
Sora	*Porzana carolina*	Sensitive	-	-	-	✓		100
Sprague's Pipit	*Anthus spragueii*	Sensitive	Special Concern	Threatened	Threatened	✓	✓	100
Swainson's Hawk	*Buteo swainsoni*	Secure	-	-	-	✓	✓	100
Swainson's Thrush	*Catharus ustulatus*	Secure	-	-	-	✓		50
Swamp Sparrow	*Melospiza georgiana*	Secure	-	-	-		✓	50
Thick-billed Longspur	*Rhynchophanes mccownii*	May Be at Risk	Endangered[6]	Threatened	Threatened			200
Trumpeter Swan	*Cygnus buccinator*	Sensitive	Special Concern	Not at Risk	-	✓	✓	Waterbody is protected: 800 (Apr 1 – Sep 30) 500 (Oct 1 – Mar 31)
Upland Sandpiper	*Bartramia longicauda*	Sensitive	-	-	-			100
Vesper Sparrow	*Pooecetes gramineus*	Secure	-	-	-	✓	✓	50

Common name	Scientific name	Provincial status[1]	AWA status[2,3]*	COSEWIC status[4]*	SARA status[4]*	Species detected on site in 2021 (blank = not detected)	Species detected on site 2022-2024 (blank = not detected)	Recommended species-specific setback (m)[5, 7]**
Western Grebe	*Aechmophorus occidentalis*	At Risk	Threatened	Special Concern	Special Concern			1,000 (Apr 1 – Jul 31) 1,000 (Aug 1 – Mar 31)
Western Kingbird	*Tyrannus verticalis*	Secure	-	-	-	✓	✓	50
Western Meadowlark	*Sturnella neglecta*	Secure	-	-	-	✓	✓	50
White-crowned Sparrow	*Zonotrichia leucophrys*	Secure	-	-	-	✓		50
White-faced Ibis	*Plegadis chihi*	Sensitive	-	-	-		✓	100
Willet	*Tringa semipalmata*	Secure	-	-	-	✓	✓	100
Wilson's Phalarope	*Phalaropus tricolor*	Secure	-	-	-		✓	100
Wilson's Snipe	*Gallinago delicata*	Secure	-	-	-	✓	✓	100
Yellow Rail	*Coturnicops noveboracensis*	Undetermined	-	Special Concern	Special Concern			350
Yellow Warbler	*Dendroica petechia*	Secure	-	-	-	✓		30-50
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	Secure	-	-	-		✓	0
Yellow-rumped Warbler	*Dendroica coronata*	Secure	-	-	-		✓	30-50

Common name	Scientific name	Provincial status[1]	AWA status[2,3]*	COSEWIC status[4]*	SARA status[4]*	Species detected on site in 2021 (blank = not detected)	Species detected on site 2022-2024 (blank = not detected)	Recommended species-specific setback (m)[5, 7]**
Mammals: Bats								**Hibernacula (H), maternity roost (MR)**
Big Brown Bat	*Eptesicus fuscus*	Secure	-	-	-			H: 100 (Oct 1 – May 31) MR: 100 (May 15 – Sep 30)
Hoary Bat	*Lasiurus cinereus*	Sensitive	Endangered[6]	Endangered	-			MR: 100 (May 15 – Sep 30)
Little Brown Myotis	*Myotis lucifugus*	May Be at Risk	Endangered	Endangered	Endangered			H: 100 (Oct 1 – May 31) MR: 100 (May 15 – Sep 30)
Long-eared Bat	*Myotis evotis*	Sensitive	-	-	-			H: 100 (Oct 1 – May 31) MR: 100 (May 15 – Sep 30)
Silver-haired Bat	*Lasionycteris noctivagans*	Sensitive	Endangered	Endangered	Endangered			MR: 100 (May 15 – Sep 30)
Western Small-footed Myotis	*Myotis ciliolabrum*	Sensitive	Special Concern	-	-			H: 100 (Oct 1 – May 31) MR: 100 (May 15 – Sep 30)
Mammals: Terrestrial								**Den, maternal den (MD)**
American Badger	*Taxidea taxus*	Sensitive	Data Deficient	Special Concern	Special Concern		✓	100
Beaver	*Castor canadensis*	Secure	-	-	-	✓		50

Common name	Scientific name	Provincial status[1]	AWA status[2,3]*	COSEWIC status[4]*	SARA status[4]*	Species detected on site in 2021	Species detected on site 2022-2024	Recommended species-specific setback (m)[5, 7]**
						(blank = not detected)		
Bobcat	*Lynx rufus*	Sensitive	-	-	-			MD: 100
Coyote	*Canis latrans*	Secure	-	-	-	✓	✓	MD: 50
Grizzly Bear	*Ursus arctos*	At Risk	Threatened	Special Concern	Special Concern			750
Least Weasel	*Mustela nivalis*	Secure	-	-	-		✓	30
Long-tailed Weasel	*Mustela frenata*	May Be at Risk	-	Not at Risk[8]	-	✓	✓	100
Meadow Vole	*Microtus pennsylvanicus*	Secure	-	-	-		✓	0
Mule Deer	*Odocoileus hemionus*	Secure	-	-	-	✓	✓	Does not den
Muskrat	*Ondatra zibethicus*	Secure	-	-	-	✓		30
Pronghorn	*Antilocapra americana*	Sensitive	-	-	-	✓	✓	Does not den
Richardson's Ground Squirrel	*Spermophilus richardsonii*	Secure	-	-	-	✓	✓	0
White-tailed Deer	*Odocoileus virginianus*	Secure	-	-	-	✓		Does not den
White-tailed Jackrabbit	*Lepus townsendii*	Secure	-	-	-	✓	✓	Does not den
Reptiles								**Hibernacula**
Bullsnake	*Pituophis catenifer*	Sensitive	-	Special Concern	Special Concern			500
Plains Garter Snake	*Thamnophis radix*	Sensitive	-	-	-		✓	500

Common name	Scientific name	Provincial status[1]	AWA status[2,3]*	COSEWIC status[4]*	SARA status[4]*	Species detected on site in 2021	Species detected on site 2022-2024	Recommended species-specific setback (m)[5, 7]**
						(blank = not detected)		
Prairie Rattlesnake	*Crotalus viridis*	Sensitive	Special Concern	Special Concern	Special Concern			500
Wandering Garter Snake	*Thamnophis elegans*	Sensitive	-	-	-		✓	500

* Hyphen (-) indicates species not listed in source
** Recommended setback when feature is active, unless otherwise specified.
1 GOA. 2020a. Wild Species Status Search.
2 GOA. 2024b. Alberta *Wildlife Act: Wildlife Regulation.*
3 GOA 2024c. Species at risk assessed in Alberta.
4 GOC 2024. Species at Risk Public Registry - Species Search.
5 Stantec. 2013. Best Management Practices.
6 Recommended for Endangered status by the scientific sub-committee of the Endangered Species Conservation Committee (GOA 2024c).
7 Setbacks based on BMPs and species status, but should be adjusted by a Qualified Wildlife Biologist based on the Project activities and animal behaviour.
8 COSEWIC status is reported for the Prairie Long-tailed Weasel (subspecies; *Mustela frenata* longicauda). This subspecies is within range of the Project.

Appendix I3: Photo Plates

Plate I3-1: Open water habitat – Existing Snake Lake Reservoir.

(September 28, 2023; 12N 410063 5613286; 8-3-20-17 W4M)

Plate I3-2: Semi-permanent/permanent wetland habitat in the study area.

(June 08, 2023; 12N 415304 5611024; 1-31-19-16 W4M)

Plate I3-3: Temporary watercourse habitat.

(June 17, 2022; 11-29-19-16 W4M)

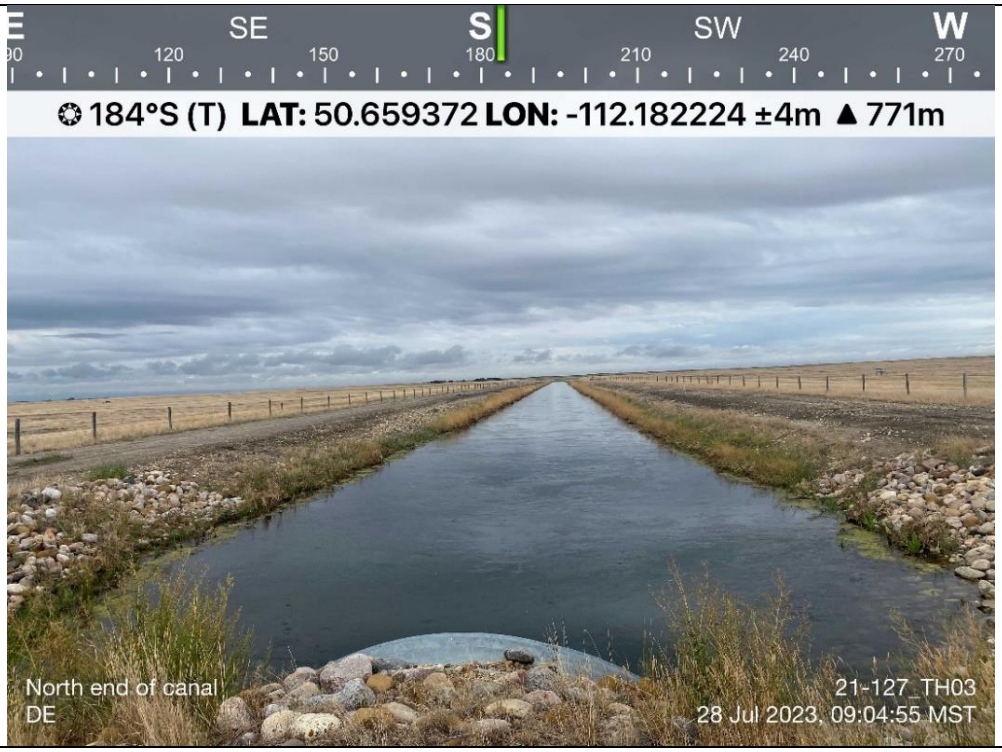


Plate I3-4: Anthropogenic permanent water body habitat.

(July 28, 2023; 12N 416437 5612616; 15-32-19-16 W4M)

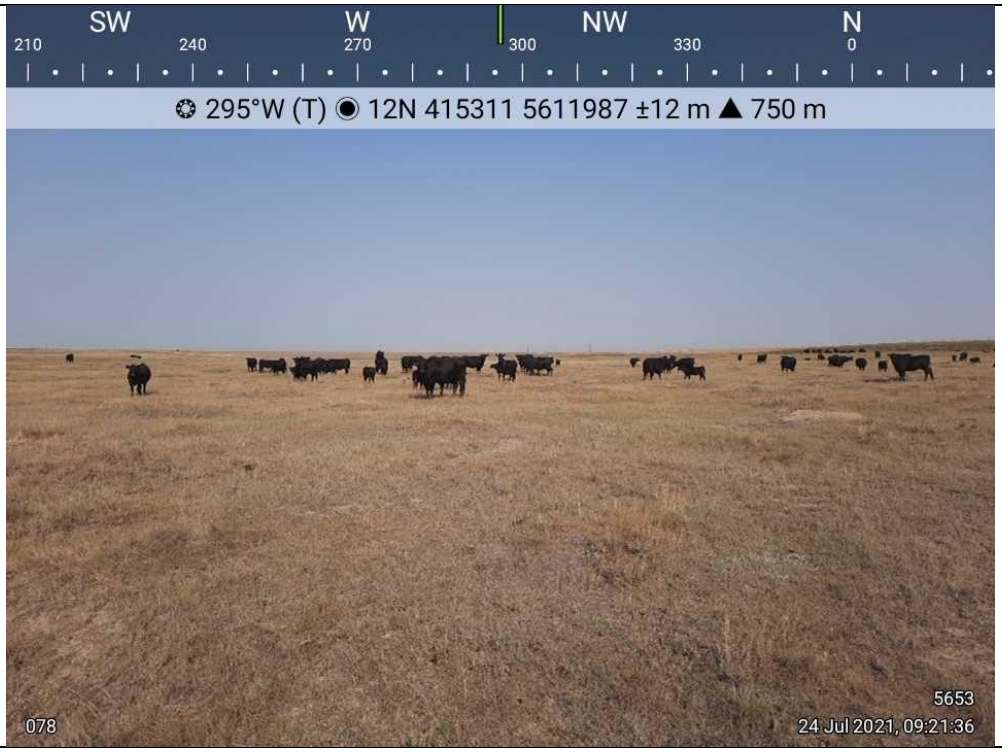


Plate I3-5: Example of pasture habitat.

(July 24, 2021; 9-31-19-16 W4M)

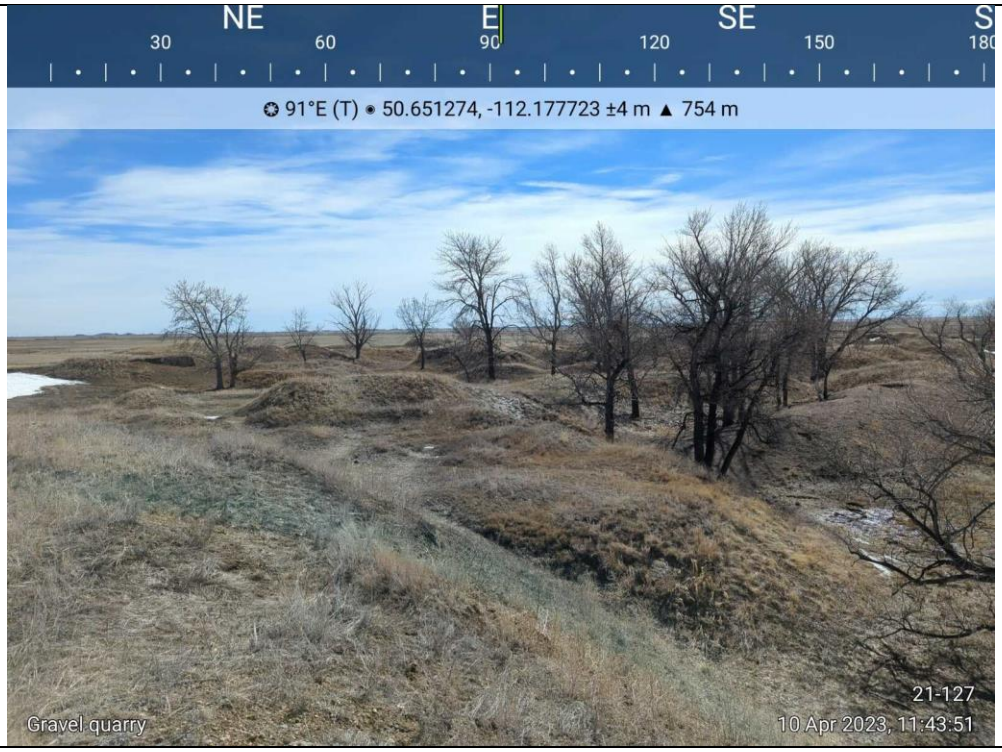


Plate I3-6: Vegetated disturbance habitat - revegetated gravel quarry.

(April 10, 2023; 12N 416742 5611708; 8-32-19-16 W4M)

Plate I3-7: Non-vegetated disturbance - road intersection through the study area.

(May 31, 2022; 12N 416437 5612616; 15-32-19-16 W4M)

Plate I3-8: Example of native prairie habitat.

(June 17, 2023; 12N 414408 5613817; 11-6-20-16 W4M)

Plate I3-9: Treed habitat - has since been removed.

(March 17, 2023; 12N 414777 5609599; 9-30-19-16 W4M)

Plate I3-10: Active Ferruginous Hawk nest.

(May 5, 2023)

Appendix I4: Wildlife Management Plan

Appendix I4:

Wildlife Management Plan

Table of Contents

Tables

Abbreviations

AARES	AAR Environmental Services
ABMI	Alberta Biodiversity Monitoring Institute
Alberta EPA	Government of Alberta Environment and Protected Areas
AWA	Alberta *Wildlife Act*
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
ECCC	Environment and Climate Change Canada
EIA	Environmental Impact Assessment
EID	Eastern Irrigation District
EPEA	*Environmental Protection and Enhancement Act*
EL	Environmental Liaison
FTOR	Final Terms of Reference
FWMIS	Fisheries and Wildlife Management Information System
FWIMT	Fisheries and Wildlife Internet Mapping Tool
GOA	Government of Alberta
GOC	Government of Canada
MBCA	*Migratory Birds Convention Act*
MPE	MPE, a division of Englobe
MSSC	Master Schedule of Standards and Conditions
Project	Proposed Snake Lake Reservoir Expansion Project
SARA	*Species At Risk Act*
SLR	Snake Lake Reservoir
SOCC	Species of Conservation Concern
SSIG	Sensitive Species Inventory Guidelines
WMP	Wildlife Management Plan

1 INTRODUCTION

1.1 Project Description

The Eastern Irrigation District (EID) is working with MPE, a division of Englobe (MPE), AAR Environmental Services (AARES), and other partners, to design and apply for regulatory approvals for an expansion of the Snake Lake Reservoir (SLR) in the County of Newell, Alberta. If approved, the expansion would occur on EID-owned land 22 km southeast of Bassano and 19 km northwest of Brooks. The SLR Expansion Project (the Project) proposes to expand the current SLR into four sections south and east of the current reservoir (i.e., sections 29, 30, 31, and 32 in Township 19, Range 16, west of the fourth meridian) by constructing an earthen berm that will be approximately 8 km long and up to 20 m in height. The Project would increase the total volume of water stored from 19.25 million m^3 (15,600 ac-ft) to 87.4 million m^3 (70,900 ac-ft) and would support licensed users downstream by providing the additional security of a full years' water supply, even in drought years. The expanded capacity will help meet Alberta's goals for climate change resiliency by capturing spring runoff water from the Bow River and conveying it to offsite storage, enhancing water sustainability for irrigated farming, and by maintaining summer flows in the Bow River, as the expanded reservoir will reduce the need to directly draw from the river during droughts.

1.1.1 Project Setting and Wildlife Concerns

The Project is proposed on private land owned by the EID and located in the Dry Mixedgrass Natural Subregion of the Grasslands Natural Region of Alberta (Government of Alberta [GOA], 2006). The Project area consists of native grassland and pasture habitats, with wetlands and drainage features, scant treed areas, and areas associated with past human uses such as canals, gravel quarries, wellsites, pipelines, and old access trails. The SLR and the East Branch Canal occur immediately west of the Project along with several access roads and trails. The land was used for cattle grazing until 2021.

The Project area provides high-quality habitat for sensitive grassland species and contains known sensitive wildlife features (e.g., sensitive raptor nest). As required by the Final Terms of Reference (FTOR; Volume 2, Appendix A), this Wildlife Management Plan (WMP) outlines strategies and mitigations to avoid or minimize Project effects on wildlife and wildlife habitat. This may need to be updated in the future to include any requirements outlined in pending regulatory approvals (e.g., Alberta's *Environmental Protection and Enhancement Act* [EPEA], and *Water Act* [GOA, 2000a; GOA, 2000b]. Until EPEA and *Water Act* approvals are received, additional wildlife and wildlife habitat protections are required, to ensure compliance with environmental regulations (see Section 2.0). Those requirements and recommendations are also outlined herein. Project personnel should report any wildlife concerns, questions, or important sightings to the Environmental Liaison (EL) for the Project, who will be a qualified environmental specialist or subcontractor.

1.1.2 Regulatory Context

This WMP describes mitigation and monitoring measures per the federal *Migratory Birds Convention Act* (MBCA; Government of Canada [GOC], 2017) and *Regulations* (GOC, 2022), the federal *Species at Risk Act* (SARA; GOC, 2000c), Alberta's *Wildlife Act* (AWA; GOA, 2000c) and *Regulations* (GOA, 2024a), and Best Management Practices based on Alberta's Wildlife Sweep Protocols (GOA, 2020a) and Sensitive Species Inventory Guidelines (SSIG; GOA, 2013).

The MBCA protects nests, eggs, and individuals of most Canadian migratory birds (GOC, 2017) from disturbance, destruction and possession. Importantly, even accidental "take" (i.e., disturbance or destruction) is considered a prohibition of this Act. Nests are protected when active. For most birds covered under the MBCA which are likely to be found in or near the Project area, nests are considered active from nest building until the nest is fledged (i.e., young have grown and permanently left the nest).

SARA provides protection to federally-listed species at risk (i.e., Threatened, and Endangered species on Schedule 1), including wildlife, plants, fish, fungi, and invertebrates (GOC, 2025a). This WMP focuses on wildlife protections; see Volume 2, Section 10 (Appendix H) for further discussion on plant mitigations, and Volume 2, Section 8 (Appendix F) for fish mitigations. SARA provides legal protections for listed species and their habitat, but these legal requirements are predominantly restricted to individuals and habitats within federal jurisdiction, except where an Emergency Order is in effect (e.g., Greater Sage Grouse, *Centrocercus urophasianus*, in southeastern Alberta; see GOC, 2025b). There are no Emergency Orders in place within or near the Project area.

The AWA protects select mammals, amphibians, reptiles, sensitive plants, and most birds excluded from the MBCA. Like the MBCA and SARA, the nests, dens and similar sensitive habitat features of species covered under the AWA are protected from disturbance and destruction – both intentional and accidental. The AWA also prohibits possession of or harm to prescribed species, except as permitted under the hunting and trapping regulations. Like the MBCA, this Act protects active nests, which includes protection outside of the nesting season for some species that reuse nests, such as the Ferruginous Hawk (*Buteo regalis*). Raptors are not protected under the MBCA but are protected under the AWA.

The SSIG provides survey protocols and information regarding sensitive species detection in Alberta. Mitigations provided in this WMP are, in part, based on the results of these surveys (see Project EIA, Volume 2, Section 11). Sensitive species survey results are considered valid for two years (GOA, 2025), and therefore it is recommended that these are repeated before construction begins to ensure compliance under the Alberta *Wildlife Act*, *Migratory Bird Convention Act* and the *Species at Risk Act*. While sensitive species surveys are not required for projects on private land, they are recommended to minimize potential Project effects on sensitive species, and avoid possible delays which could follow a sensitive species discovery.

A Provincial Wildlife Research and Collection Permit for the South Saskatchewan Region, including all relevant class protocols, is required for most wildlife surveys and any invasive methods discussed in this WMP (e.g., amphibian salvage, snake translocation). The names of all qualified biologists who will be doing or supervising the work must be listed on this permit. The permit must be obtained by the qualified biologists / environmental consultant from Alberta Environment and Protected Areas (Alberta EPA) prior to the start of any environmental surveys or wildlife mitigation work falling under this permit.

For a more detailed discussion of relevant regulations and best practices, see Volume 2, Section 11.1.3 of the Project Environmental Impact Assessment (EIA).

2 AMPHIBIAN HABITAT MANAGEMENT PLAN

The Project area is within Sensitive Amphibian Range. The Northern Leopard Frog (*Lithobates pipiens*) is listed provincially as Threatened under the AWA (GOA, 2000c) and federally as Special Concern under SARA (GOC, 2025a). Northern Leopard Frogs have been reported within 1 km of the Project area (Table 1) and 16 adults were observed in July 2021, during baseline surveys for this Project: 11 were observed in a seasonal marsh within the Project area, and 5 were observed at a dugout in a semi-permanent marsh outside of the Project area. This species has not been detected in any subsequent surveys, sweeps, or site visits, indicating that those observed in 2021 were likely dispersing individuals that did not successfully overwinter and establish on site. Other sensitive amphibian species with ranges overlapping the Project area (i.e., Great Plains Toad [*Anaxyrus cognatus*], Plains Spadefoot [*Spea bombifrons*]) are strongly associated with high levels of precipitation and may be present, but not detectable in years with low-to-average precipitation (Table 1). To date, these species have not been recorded on site (see Vol 2, Section 11.4.2 of the EIA).

Table 1: Amphibian species of conservation concern with distribution ranges overlapping the Project area

Common name	Scientific name	Provincial status[1]	AWA listing[2]	COSEWIC status[3]	SARA listing[3]	Recorded on or within 1 km of Project[4]
Northern Leopard Frog	*Lithobates pipiens*	At Risk	Threatened	Special Concern	Special Concern	✓
Plains Spadefoot	*Spea bombifrons*	May Be at Risk	-	Not at Risk	-	
Great Plains Toad	*Anaxyrus cognatus*	Sensitive	Special Concern	Special Concern	Special Concern	

1 GOA. 2020b. Wild Species Status Search
2 GOA. 2024a. Alberta *Wildlife Act:* Wildlife Regulation and GOA, 2024b. Species at risk assessed in Alberta.
3 GOC 2024. Species at Risk Public Registry - Species Search
4 GOA. 2023. Fish and Wildlife Internet Mapping Tool (FWIMT)

2.1 Amphibian Habitat

Northern Leopard Frogs breed in pools, ponds, marshes, lakes, occasionally slow-moving streams/creeks, and moist upland meadows or native prairie (Committee on the Status of Endangered Wildlife in Canada [COSEWIC], 2009; Table 2). The Great Plains Toad and Plains Spadefoot are irruptive breeders and may spend years underground waiting for ideal breeding conditions (GOA, 2013; Table 2). Generally, the Plains Spadefoot emerges after 50 mm of rainfall during a short precipitation event (1–5-day duration). The Great Plains Toad requires larger amounts of precipitation and generally emerges after a short period precipitation event with approximately 100 mm of rain.

Table 2: Description of breeding habitat for sensitive amphibian species with ranges overlapping the Project area

Species	Breeding habitat
Northern Leopard Frog	Breed in springs, wetlands and shallow waterbodies with abundant emergent vegetation and a neutral pH. Generally found where sufficient ground cover from vegetation is available. Can tolerate salinity levels around 600-4000 ppm (Michalasky and Hamm, 2018).
Plains Spadefoot	Primarily in native short-grass prairie, near permanent or temporary bodies of water. Usually in areas with soil that is suitable for burrowing. Strongly associated with years of high precipitation. Related species can tolerate salinity levels around 2,900 to 18,000 ppm (Thirion, 2014).
Great Plains Toad	Frequents sandy areas near irrigation canals, ephemeral ponds, dugouts, and flood plains. Identifiable during years of high precipitation. Related species can tolerate salinity levels <4,000 ppm (Alexander et al., 2012).

2.2 Sensitive Amphibian Mitigation Measures

Northern Leopard Frogs show strong affinity for their breeding ponds and, especially young-of-the-year, typically remain in or near the pond (i.e., <100 m) until ready to disperse (COSEWIC, 2009). Movement is associated with warm evenings during or after rain, and seasonal dispersal may be as much as 8-10 km, but 0.5 to 1.6 km is more common, especially for juvenile frogs (COSEWIC, 2009). There are no known sensitive amphibian breeding ponds within the Project area, however, since the entire Project area occurs within sensitive amphibian range, all open water ponds represent potential amphibian breeding habitat. If

any sensitive amphibians are observed within the Project area at any point prior to Project Commissioning, the work in the area should be paused until a qualified wildlife biologist familiar with the Project can be consulted. Specific mitigation measures may need to be adjusted to the circumstance, but in general, the following is recommended:

- Prior to *Water Act* and/or EPEA approval:
    - A minimum 20 m setback from all waterbodies containing open water should be adhered to, within which no Project activities are to take place unless a recent pre-disturbance wildlife sweep conducted in appropriate conditions for amphibian detection by a qualified biologist indicates no sensitive amphibian species in or around these waterbodies;
    - No Project activities should occur within 100 m of any confirmed or suspected sensitive amphibian breeding ponds; and
    - If any Project activities must occur between 50 m and 100 m from the edge of a suspected or confirmed sensitive amphibian breeding pond, the pond must be frozen and/or the site must be monitored by a qualified wildlife biologist during the work to ensure no sensitive amphibians are present within this setback.
- Once EPEA and *Water Act* approval is obtained:
    - Prior to the removal (i.e., draining and excavation) of any waterbodies containing water, a qualified wildlife biologist should complete a wildlife sweep, in appropriate conditions for amphibian detection, with a focus on identifying sensitive amphibians;
    - If sensitive amphibians are found in a waterbody, or an amphibian breeding pond is identified at any point, the EID will first need to apply for a special permit from the Alberta EPA Director of Fish and Wildlife to salvage and translocate sensitive amphibians from the identified ponds to suitable offsite habitat (following Randall et al., 2018). Prior to applying for this permit, if sensitive amphibian species are observed, the Project proponent will demonstrate due diligence by protecting sensitive amphibians by respecting the 100 m setback when ponds are active and by monitoring onsite wetlands to better understand the distribution and abundance of sensitive amphibians at this site; and
    - During Project construction, if sensitive amphibians are observed anywhere within the Project area, work in the vicinity of the observation must be paused until a qualified biologist can assess the situation, and, if confirmed, relocate those individuals to suitable habitat nearby, but outside of the Project area.

If amphibian translocations are deemed necessary or likely, discussions will be initiated with Alberta EPA upon Project approval to select suitable offsite habitats and determine the optimal timing and methods for translocation. At that time, a salvage and translocation plan will be written with input from Alberta EPA. This amphibian and translocation plan will detail monitoring and reporting requirements.

3 SENSITIVE MAMMAL MANAGEMENT PLAN

The Project area is within the range of several sensitive mammal species (i.e., mammal Species of SOCC; Table 3). Many mammal dens (e.g., natal and hibernation dens, while active) are protected under the AWA (GOA, 2000c). Two sensitive mammal species have been observed within the Project area during surveys or site visits: Long-tailed Weasel (*Mustela frenata*) and Pronghorn (*Antilocapra americana*). The dens of Long-tailed Weasel are protected when active; Pronghorn do not den and are not associated with any

protected sensitive features. Signs of American Badger (*Taxidea taxus*) excavations was also observed on site, but no individuals or natal burrows were identified.

All bat hibernacula and maternal roost sites in Alberta are protected under the AWA when active (hibernacula: October 1 – May 31; maternal roosts: May 15 – September 30). Most bats that remain in Alberta over the winter hibernate in caves in western Alberta, though some will also hibernate in buildings, or in deep rock crevices in prairie coulees. Three of the bat species with ranges overlapping the Project area are residents and therefore hibernate in the province (Table 3). However, since the Project area doesn't contain suitable hibernacula habitat, it is unlikely that bats would hibernate in the Project area. Bats in Alberta are known to roosts in trees, buildings and rock crevices (GOA, n.d.), however no evidence of maternal roosts have been identified in or near the Project area, nor any observations of bat presence. Table 3 lists the sensitive mammal species with ranges that overlap the Project area. Although inactive burrows and old dens were seen in the Project area, no active protected dens or other sensitive mammal features were identified during any Project surveys, sweeps, or site visits.

Table 3: Mammal species of conservation concern with distribution ranges overlapping the Project area, and FWMIT records within 1 km of the Project area

Common name	Scientific name	Provincial status[1]	AWA status[2]	COSEWIC status	SARA status[3]	Resident or Migrant	Recorded on or within 1 km of Project area[4]
Mammals: Bats							
Hoary Bat	*Lasiurus cinereus*	Sensitive	-[5]	Endangered	-	Migrant	
Little Brown Myotis	*Myotis lucifugus*	May Be at Risk	Endangered	Endangered	Endangered	Resident	
Long-eared Myotis	*Myotis evotis*	Sensitive	-	-	-	Resident	
Silver-haired Bat	*Lasionycteris noctivagans*	Sensitive	Endangered	Endangered	Endangered	Migrant	
Western Small-footed Myotis	*Myotis ciliolabrum*	Sensitive	Special Concern	-	-	Resident	
Mammals: Terrestrial							
American Badger	*Taxidea taxus*	Sensitive	Data Deficient	Special Concern	Special Concern	Resident	
Bobcat	*Lynx rufus*	Sensitive	-	-	-	Resident	
Grizzly Bear	*Ursus arctos*	At Risk	Threatened	Special Concern	Special Concern	Resident	
Prairie Long-tailed Weasel	*Mustela frenata longicauda*	May Be at Risk	-	Not at Risk	-	Resident	
Pronghorn	*Antilocapra americana*	Sensitive	-	-	-	Resident	✓

1 GOA. 2020b. Wild Species Status Search
2 GOA. 2024a. Alberta *Wildlife Act:* Wildlife Regulation and GOA 2024b. Species at risk assessed in Alberta.
3 GOC 2024. Species at Risk Public Registry - Species Search
4 GOA. 2023. Fish and Wildlife Internet Mapping Tool (FWIMT)
5 Recommended for Endangered status by the scientific sub-committee of the Endangered Species Conservation Committee (GOA 2024b)

In the event that a sensitive mammal is seen on site during construction or other Project activities, or a suspected sensitive feature is observed, work in the vicinity is to pause until a qualified biologist can be reached and provide further guidance. This may include:

- Pausing activity to allow the SOCC to make its way out of the work area on its own;
- Setting up a remote wildlife camera to confirm if a suspected sensitive feature is active and the species using it;
- Setting up a 100-m setback around a sensitive feature until it can be confirmed no longer active by a qualified biologist; and
- If a 100-m setback is not feasible, consult with a qualified biologist to develop a monitoring plan to ensure work can continue nearby without causing disturbance to the animals using the sensitive feature.

4 MIGRATORY BIRD MANAGEMENT PLAN

Migratory bird nest sweeps are required when Project activities coincide with the nesting season. The Project is situated in Environment and Climate Change Canada's (ECCC) Nesting Zone B3, with a recognised nesting season from April 8 to August 16 for wetland nesters and April 13 to August 24 for birds nesting in open habitat (GOC, 2018). Nesting activity is typically greatest between mid-May and early July, but this can vary depending on weather, food availability, and ground conditions.

Many species expected to nest in the Project area have an incubation period of 11-15 days and nestling period of 10-13 days (GOC, 2018). As a result, most nests will be occupied for less than 30 days. A few bird species in southeast Alberta may have more than one brood, such as the Savannah Sparrow (*Passerculus sandwichensis*). The migratory bird SOCC that are likely to be found in or near the Project area are summarized in Table 4. Table 4 was developed by compiling species with known ranges overlapping the Project area (Eder & Kennedy, 2011; Fisher & Acron, 1998; Dunn & Alderfer, 2006). This should not be considered an exhaustive list; other species may be found in the Project area. Note, Table 4 only includes SOCC protected under the MBCA. See Table 5 for raptor SOCC.

Table 4: Migratory bird species of conservation concern with distribution ranges overlapping the Project area, and FWMIT records within 1 km of the Project area

Common name	Scientific name	Provincial status[1]	AWA status[2]	COSEWIC status[3]	SARA status[3]	Recorded on or within 1 km of Project[4]
American Bittern	*Botaurus lentiginosus*	Sensitive	-	-	-	✓
American White Pelican	*Pelecanus erythrorhynchos*	Sensitive	-	Not at Risk	-	✓
Baird's Sparrow	*Centronyx bairdii*	Sensitive	-	Special Concern	Special Concern	✓
Bank Swallow	*Riparia birdie*	Sensitive	-	Threatened	Threatened	✓
Barn Swallow	*Hirundo rustica*	May Be at Risk	-	Special Concern	Threatened	✓
Black Tern	*Chlidonias niger*	Sensitive	-	Not at Risk	-	
Black-crowned Night-heron	*Nycticorax nectivore*	Sensitive	-	-	-	✓
Black-necked Stilt	*Himantopus mexicanus*	Sensitive	-	-	-	✓

Common name	Scientific name	Provincial status[1]	AWA status[2]	COSEWIC status[3]	SARA status[3]	Recorded on or within 1 km of Project[4]
Brewer's Sparrow	*Spizella breweri*	Sensitive	-	-	-	
Chestnut-collared Longspur	*Calcarius ornatus*	May Be at Risk	-[5]	Endangered	Endangered	✓
Clark's Grebe	*Aechmophorus clarkii*	May Be at Risk	-	-	-	
Common Nighthawk	*Chordeiles minor*	Sensitive		Special Concern	Special Concern	✓
Common Yellowthroat	*Geothlypis trichas*	Sensitive	-	-	-	✓
Eared Grebe	*Podiceps nigricollis*	Sensitive	-	-	-	✓
Eastern Kingbird	*Tyrannus tyrannus*	Sensitive	-	-	-	✓
Ferruginous Hawk	*Buteo regalis*	At Risk	Endangered	Special Concern	Threatened	✓
Forster's Tern	*Sterna forsteri*	Sensitive	-	Data Deficient	-	
Grasshopper Sparrow	*Ammodramus savannarum*	Sensitive	-	-	-	✓
Great Blue Heron	*Ardea herodias*	Sensitive	-	-	-	✓
Horned Grebe	*Podiceps auritus*	Sensitive	-	Special Concern	Special Concern	
Lark Bunting	*Calamospiza melanocorys*	Sensitive	-	Threatened	Threatened	
Loggerhead Shrike	*Lanius ludovicianus*	Sensitive	Special Concern	Threatened	Threatened	✓
Long-billed Curlew	*Numenius americanus*	May Be at Risk	Special Concern	Threatened	Special Concern	✓
Pied-billed Grebe	*Podilymbus podiceps*	Sensitive	-	-	-	✓
Piping Plover	*Charadrius melodus*	At Risk	Endangered	Endangered	Endangered	
Sharp-tailed Grouse	*Tympanuchus phasianellus*	Sensitive	-	-	-	✓
Sora	*Porzana carolina*	Sensitive	-	-	-	✓
Sprague's Pipit	*Anthus spragueii*	Sensitive	Special Concern	Threatened	Threatened	✓
Thick-billed Longspur	*Rhynchophanes mccownii*	May Be at Risk	-[5]	Threatened	Threatened	
Trumpeter Swan	*Cygnus buccinator*	Sensitive	Special Concern	Not at Risk	-	✓
Upland Sandpiper	*Bartramia longicauda*	Sensitive	-	-	-	
Western Grebe	*Aechmophorus occidentalis*	At Risk	Threatened	Special Concern	Special Concern	✓
White-faced Ibis	*Plegadis chihi*	Sensitive	-	-	-	

Common name	Scientific name	Provincial status[1]	AWA status[2]	COSEWIC status[3]	SARA status[3]	Recorded on or within 1 km of Project[4]
Yellow Rail	*Coturnicops noveboracensis*	Undetermined	-	Special Concern	Special Concern	

1 GOA. 2020b. Wild Species Status Search
2 GOA. 2024a. Alberta *Wildlife Act:* Wildlife Regulation and GOA 2024b. Species at risk assessed in Alberta.
3 GOC 2024. Species at Risk Public Registry - Species Search
4 GOA. 2023. Fish and Wildlife Internet Mapping Tool (FWIMT)
5 Recommended for Endangered status by the scientific sub-committee of the Endangered Species Conservation Committee (GOA2024b)

4.1 Nest Sweep Methods

During the nesting season (i.e., roughly April 13 – August 24), biologists will conduct pre-disturbance nest sweeps prior to Project activity, by walking the planned work area, accesses, and 100 m search buffer to identify active bird nests in and near the Project area. Project related activities that will trigger the need for a pre-disturbance nest sweep includes, for example, initial mobilization of vehicles and equipment to site, any sort of clearing (e.g., vegetation, soil), construction activities, and reservoir flooding. However, if constant disturbance has taken place in an area since no more than 7 days from a previous nest sweep, another may not be required. Construction activities should be coordinated with the EL to ensure any nest sweeps that may be needed are scheduled.

If access to the search buffer is not permitted by neighbouring land owners, biologists will walk as much of the 100 m buffer as permitted, and search the remaining buffer using binoculars and/or spotting scopes. If a large area needs to be swept, the biologists will survey transects located 30 m apart. Nest sweeps will be completed no more than 7 days prior to work commencement in the area (and recommended no more than 3 days prior, during peak nesting). If no active nests are located during a sweep, Project activities can proceed within the next 7 days. If activity continues uninterrupted in the swept area, additional nest sweeps are not required.

At least two of the following criteria are required to confirm the presence of an active nest during nest sweeps:

- Species are identified by sight and/or sound within the expected nesting season;
- Observation of an adult bird carrying nesting material to a nest/nesting site;
- Observation of alarm calling by adult bird(s), which remain within the vicinity after the initial disturbance. Birds may reposition near the nest but will not abandon the immediate area;
- Observation of a nest containing eggs or unfledged young;
- Observation of an adult bird carrying food to the nest and/or fecal sac away from suitable nesting area; and
- Hearing begging calls of unfledged chicks.

Observation of a singing bird within its territory does not by itself qualify as confirmation of an active nest. However, it can support other observations. Once a nest is identified, the biologists will take georeferenced photos and record the following information (where possible without causing additional disturbance to the nest or nesting birds):

- Date nest found;
- Site ID;
- Species ID;
- Species provincial and federal status (e.g., endangered, threatened, secure);

- Nest status (occupied vs. unoccupied);
- Nest location (UTM coordinates);
- Habitat description;
- Eggs observed;
- Estimated date of nest establishment;
- Stage of nesting (e.g., eggs, age of nestlings) – this will help estimate a nest vacancy date;
- Estimated date of nest vacancy (e.g., was the nest occupied for a short or long period);
- Setback buffer information;
- Influence of construction activities (e.g., partial or total suspension of construction activities);
- Recommended monitoring frequency (depends on the proximity of construction activities); and
- Bird behavior (e.g., adults flying in/out of the nest, bringing food or nesting materials into the nest, or displaying defensive behavior, such as singing, drumming, chasing, screeching, or diving).

If the occupied nest is not observed first-hand, secondary observations will assist the biologists to estimate the nesting stage. Food delivery, fecal sac transport, and nestling vocalizations are examples of cues that provide evidence of nestling developmental stages.

4.2 Mitigation Measures

4.2.1 Active Nest Setbacks

Any active nests found within or adjacent to the Project area will be assigned a standard species-specific setback (see EIA Appendix I2, Table I2-4), which will be in effect until the young fledge and the nest is determined unoccupied (for multi-year nests) or inactive (for single-use nests) by a qualified biologist. The qualified consulting biologist(s) will adjust setbacks from the standard setbacks as required, based on bird behaviour and conditions of the nest and surrounding area. Setbacks may also be adjusted when a nest is found outside of the planned work area; qualified biologists will discuss the location with the EL and apply a species-specific setback, modified by the terrain and circumstances, as appropriate.

Setbacks will be centered around the known nest site or in an approximate location based on the biologist's judgement. Standard species-specific setbacks are based on Best Management Practices (Stantec, 2013) and regulatory recommendations (GOC, 2011; GOA, 2024c). Setbacks within the Project area will be flagged/staked and may overlap if there are multiple nests in the same area. Exact nest locations will NOT be flagged, as this can attract predators and lead to nest predation. Project work will be prohibited within nest setbacks until those nests are deemed no longer active by a qualified biologist.

4.2.2 Nest Setback Modifications

Where warranted by the site conditions, species in question, and behaviour of the nesting birds, as well as the level of disturbance expected from planned Project activities, reduced or modified setbacks may sometimes be appropriate. These will be assessed by a qualified wildlife biologist on a case-by-case basis and only when that biologist has high confidence that the reduced or modified setback will not result in disturbance, harassment, abandonment, increased predation, other any other prohibition to the nest. These reduced or modified setbacks may require other mitigations (e.g., qualified biologist on site), or be applicable only to some activities (e.g., travel through permitted, but all other work in the standard setback prohibited). Any such restrictions will be documented by the biologist and communicated to construction personnel.

Activities permitted in a modified setback should typically be limited, short-term, low impact activities, such as mobilizing equipment, materials transport, and through travel, if considered low-risk by a qualified

biologist. These low-impact or travel-through activities will be conducted with a qualified biologist present to monitor bird behavioural responses to Project activity, and to dictate pauses or adjustments to Project work as needed to prevent disturbance to the nest. Other requirements may include, for example:

- Maximum speed limit of 10 km/hr;
- Vehicles travel through all at once (as in a convoy) or allow for a minimum of 30 minutes between disturbances; and
- Vehicles cannot stop or park along the access road.

Restrictions and all work activities occurring within the standard nest setback will be documented in a written report by the biologist monitoring the Project activities. In most cases, it is preferable to adjust the work location or schedule to avoid all Project work and travel through standard, species-specific nest setbacks.

4.2.3 Vegetation Clearing and Grubbing

To minimize Project delays and the risks associated with working in nesting season, it is recommended to schedule all vegetation clearing, grubbing, and stripping well outside of the nesting season. Pre-disturbance wildlife sweeps should be scheduled within 10 days of any vegetation clearing, to ensure there are no active nests, dens, or other sensitive features in the area. The likelihood that active features will be present, which could affect Project activities, is greatly reduced outside of nesting season.

4.2.4 Reservoir Filling

Once construction is complete, additional nest sweeps will be required for any filling during the nesting season, to ensure no nests are damaged or destroyed from flooding. Some shore birds, especially Killdeer (*Charadrius vociferus*), can build nests on open ground near waterbodies, even in disturbed areas (e.g., parking lots).

5 SENSITIVE RAPTOR MANAGEMENT PLAN

The Project area is within the Sensitive Raptor Range, (GOA, 2021), with four species that may be observed in the area, including Bald Eagle (*Haliaeetus leucocephalus)*, Ferruginous Hawk, Golden Eagle (*Aquila chrysaetos)*, and Prairie Falcon (*Falco mexicanus*; Table 5). Additional raptor SOCC were included in Table 5 based on known species ranges that overlap with the Project Area (Fisher & Acron, 1998; Dunn & Alderfer, 2006). Golden Eagles and Ferruginous Hawks have been observed on site during previous site visits, however only Ferruginous Hawks have been documented nesting. The site contains two known Ferruginous Hawk nests: one historic (i.e., inactive), and one active nest (Table 6). Active Ferruginous Hawk nests are protected under the AWA (GOA, 2000c) from destruction and disturbance on both private and public lands.

Table 5: Sensitive raptor species with distribution ranges overlapping the Project area, and FWMIT records within 1 km of the Project area

Common name	Scientific name	Provincial status[1]	AWA status[2]	COSEWIC status[3]	SARA status[3]	Recorded on or within 1 km of Project[4]
American Kestrel	*Falco sparverius*	Sensitive	-	-	-	
Bald Eagle	*Haliaeetus leucocephalus*	Sensitive	-	Not at Risk	-	
Burrowing Owl	*Athene cunicularia*	At Risk	Endangered	Endangered	Endangered	✓

Common name	Scientific name	Provincial status[1]	AWA status[2]	COSEWIC status[3]	SARA status[3]	Recorded on or within 1 km of Project[4]
American Kestrel	*Falco sparverius*	Sensitive	-	-	-	
Ferruginous Hawk	*Buteo regalis*	At Risk	Endangered	Special Concern	Threatened	✓
Golden Eagle	*Aquila chrysaetos*	Sensitive	-	Not at Risk	-	
Prairie Falcon	*Falco mexicanus*	Sensitive	Special Concern	Not at Risk	-	
Short-eared Owl	*Asio flammeus*	May Be at Risk	-	Threatened	Special Concern	

1 GOA. 2020b. Wild Species Status Search
2 GOA. 2024a. Alberta *Wildlife Act:* Wildlife Regulation and GOA 2024b. Species at risk assessed in Alberta.
3 GOC 2024. Species at Risk Public Registry - Species Search
4 GOA. 2023. Fish and Wildlife Internet Mapping Tool (FWIMT)

Because raptors often reuse nests, sensitive raptor nests retain an active designation during the winter following nesting activity, through a full second year, if unoccupied, and until May 31 of the third year. If the nest is documented to be unoccupied in both the second and third year, only as of June 1 of that third year is the nest then considered inactive and no longer retains protection (GOA, 2013). However, if the nest is reused by a sensitive raptor, the timeline for the expiry of active designation resets (GOA, 2013). As shown in Table 6, one Ferruginous Hawk nest (FEHAN01) was abandoned in the spring of 2022, but was observed active throughout the summers of 2021, 2023, and 2024. This nest will therefore retain "active" status until at least May 31 of 2026, even if no further activity is observed at the nest. The second nest (FEHAN02), on the other hand, was also abandoned in the spring of 2022, however, there have been no further activity or raptor use documented at that site. The nest is therefore considered inactive, and no protections apply, unless future nesting is observed at the site.

Table 6: Occupancy and activity status of Ferruginous Hawk nests found within the Project area

Nest	2021	2022	2023	2024	Current Status[1]
FEHAN01	Occupied	Last observed occupied: May 31 Nest abandoned	Occupied	Occupied	Active
FEHAN02	No nesting observed / documented	Last observed occupied: May 31 Nest abandoned	Unoccupied	Unoccupied	Inactive

1 Based on GOA (2013), Sensitive Species Inventory Guidelines (SSIG) section 7.2.2.

5.1 Sensitive Raptor Mitigation Plan – Project Activities within 1,000 m of an Active Sensitive Raptor Nest

Alberta EPA recommends that, while the Ferruginous Hawk nest is occupied, a 1,000 m setback is established and all industrial activities prohibited within that setback (Table 7 and Table I2-4 in Project EIA; GOA, 2021). When unoccupied, (based on date, but also as confirmed by a qualified biologist), active nests are protected with a recommended 100 m setback.

Table 7: Sensitive raptor timing restriction overview for the Snake Lake Project

Stage	Timeframe	Sensitive Wildlife Restrictions
1	15 Feb – 14 Mar	100 m setback for sensitive raptor nests.
2	15 Mar – 15 Apr	1,000 m setback for occupied sensitive raptor nests or 100 m for unoccupied nests. Raptor nest surveys required every 10 days or no more than 10 days prior to the start of Project activity.
3	15 Apr – 15 Jul[1]	1,000 m setback for occupied sensitive raptor nests or 100 m for unoccupied nests. Raptor nest surveys required every 7 days, or no more than 7 days prior to the start of Project activity. Concurrent with migratory bird nest sweeps.
4	16 Jul – 14 Feb	100 m setback on sensitive raptor nests (unoccupied).

1 Or until nest is confirmed unoccupied by a qualified biologist.

Until a wildlife destruction permit is obtained for the active Ferruginous Hawk nest, and if any other sensitive raptor nests are identified in or near the Project area, the 1,000 m and 100 m setbacks will apply. In some circumstances, low-impact Project work may be permitted within these buffers, but only under the recommendations and mitigations of a qualified biologist. This may require an on-site biologist to monitor the behaviour of the nesting birds and to pause or adjust work as needed to avoid disturbing the birds. The below measures (Section 6.1.1) will apply for any work within the Project area prior to permitted approval to remove the active Ferruginous Hawk nest.

5.1.1 Sensitive Raptor Mitigation Plan Measures

Stage 1: 15 February – 14 March

1. Site activities are prioritized for areas within the 1,000 m setback of all known sensitive raptor nesting sites.
2. Site activities should not occur within 100 m of the known nesting site (the year-round setback), unless a qualified biologist is present to monitor that no damage is done to the tree or nest due to construction. Vegetation removal should not take place within 100 m of the nest.
3. Standard requirements for pre-construction wildlife sweeps will apply to Project activities occurring more than 100 m from sensitive raptor nest sites.
4. If site activities must occur within 100 m of the known nesting sites, a wildlife sweep will be required within 10-days prior to Project activities, even if previous sweeps have occurred earlier, to ensure that no early-nesters have initiated nesting.

Stage 2: 15 March – 15 April

1. Site activities will be prioritized, whenever possible, to areas outside of the 1,000 m setback of known sensitive raptor nests.
2. Pre-construction, sensitive raptor surveys will be conducted by a qualified biologist within 10 days prior to crews mobilizing to work sites located 100 – 1,000 m from the known sensitive raptor nesting site.

3. Pre-construction sensitive raptor nesting surveys will occur no more than 10 days apart, beginning on March 15th until April 15th (e.g.: March 15, March 25, April 4, April 14) as long as crews are working within the 1,000 m restricted setback area. To ensure a raptor has not initiated nesting in the 10-day survey interval, onsite construction crews will scan the area for sign of raptors every few days from outside the 100 m buffer. If a raptor is observed a qualified biologist will be contacted to visit the site and assess species and occupancy status.
4. If Project activities are required between 100 and 1,000 m of the known nest site and the nest is determined to be unoccupied, Project activities may proceed in this area for a period of 10 days prior to a renewed sensitive raptor survey. No on-site biologist will be required under these conditions, but the Project crew must remain vigilant of sensitive raptors in the area, and make contact, as in point 3, if a potential raptor is observed. Activities between 50 and 100 m of the nest may also occur under the monitoring of a qualified biologist.
5. If activities are required within 50 – 1,000 m of the known nest site and the nest is determined to be occupied, Project activities may proceed in this area only under the monitoring of a qualified biologist (Table 7). The biologist must remain on site to continuously monitor the environmental and behavioral conditions of the occupied nest so long as the Project activities are within the restricted setback area (within 1,000 m of the nest). If there are behavioural indicators of stress by the hawks (see 6), operations will be halted.
6. Onsite monitoring biologists will have the authority to halt activities and may direct personnel to proceed outside of the setback area. Situations that may halt Project activities include (per Alberta EPA guidance):
   a) Prior to egg laying, the hawks will be defending their territory (flying in and around the site) and then will start courtship and copulation.
      - During territory defense, industrial activity within 1,000 m may proceed if the hawks are showing normal behaviour (staying in and around the site). If the hawks are agitated due to industrial activities (e.g., repeatedly using their alarm call), or if both hawks of a pair fly away from the site for >15 minutes, work must be suspended.
      - Once the hawks begin courtship and copulation, all work within 1,000 m will be suspended until the hawks cease this activity.
   b) Criteria for when eggs or young are present in the nest is outlined in Table 8.

Table 8: Criteria for suspension of Project activities within the buffer of occupied sensitive raptor nests.

Nesting stage	Weather Conditions	Duration (mins) that parents are away from nest	Result
Courtship	All	>15	Stop activity within 1,000 m nest buffer
Eggs in nest	15-20ºC	>15	
	<15ºC or >20ºC	>8	
	Raining or windy	>8	
Young in nest	15-20ºC	>30	
	<15ºC or >20ºC	>8	
	Raining or windy	>8	

7. Project related travel may need to occur along the County of Newell Range Road 164, which is within the 1,000 m setback of the active Ferruginous Hawk nests. Note that the road and public travel on it have been in place for many years. Public travel along the road will not being restricted; however, use by the EID and its agents will be minimized, while the nest site is occupied, as follows:
   a) Vehicle speed shall not exceed 30 km/h when driving through the 1,000 m buffer (from Township Road 200 in the north to the canal crossing near the bend in Range Road 164 in the middle of NE 29-19-16 W4M;
   b) Reduce the volume of vehicles passing at one time, where possible; and
   c) Vehicles will not stop within the setback.

Stage 3: 15 April – 15 July

1. Sensitive raptor mitigations during this time period are the same as in stage 2. Beginning April 15th, sensitive raptor nesting surveys will occur concurrently with migratory bird nest sweeps (GOC, 2017). During stage 3, site visits and surveys will occur at minimum every 7 days.

Stage 4: 16 July – 14 March

1. Once the nest is confirmed no longer occupied, any outstanding Project activities should be prioritized for areas within the 1,000 m setback of the known sensitive raptor nesting site.

2. Project activities should not occur within 100 m of the known nesting site (the year-round setback). Any activities that need to occur within 100 m of the nest site, will be completed after August 15 and only upon consultation with Alberta EPA to determine if the activity can be allowed.

3. No migratory bird nest sweep surveys will be required after 15 August.

4. If activities are required 50 – 1,000 m from the known raptor nest site and the nest is determined to be unoccupied, the activities may proceed in this area for a period of 10 days prior to a renewed sensitive raptor survey or any time after 15 August. No on-site biologist will be required under these conditions, but the onsite crew must remain vigilant of sensitive raptors in the area.

If Project activities are required 50 to 1,000 m from the active Ferruginous Hawk nest and the nest is determined to be occupied, activities may only proceed in this area under the monitoring of a qualified biologist. The biologist must remain on site continuously to monitor the environmental and behavioral conditions of hawks near the occupied nest site. Criteria for work stoppage is the same as provided in Stage 2 (Table 8).

5.2 Permitted Raptor Nest Removal

Disturbing, removing, damaging, or possessing raptor nests is prohibited under the AWA. Where nest avoidance is not possible – for instance, where construction and inundation of the expanded reservoir will destroy the active Ferruginous Hawk nest – the EID must apply to from the Alberta EPA Director of Fish and Wildlife for a damage and destruction permit to allow for removal of the nest from site. Alberta EPA will not accept any such permits for this Project until it is approved under EPEA.

Once the Project is approved and the permit is obtained to remove the tree containing the Ferruginous Hawk nest, the EID will collaborate with Alberta EPA to develop appropriate mitigation and conservation offset measures, such as construction of nesting and perching structure(s) in a suitable offsite location, followed by monitoring and maintenance of these offset sites.

5.3 Snake Management Plan

Although the Project area is not located within Alberta EPA (GOA, 2021; GOA, 2020a; GOA, 2020b) designated Sensitive Snake Habitat or Sensitive Snake Hibernacula Range, the Project area is within the range of four Sensitive snake species and may therefore be observed within the Project area (Table 9). While none of these species were recorded within 1 km of the Project area on the provincial database, Plains Garter Snakes (*Thamnophis radix*) and Wandering Garter Snakes (*Thamnophis elegans*) were observed on site by AARES during sweeps and surveys in 2023.

Table 9: Snake species with distribution ranges overlapping the Project area

Common name	Scientific name	Provincial status[1]	AWA status[2]	COSEWIC status[3]	SARA status[3]	Recorded on or within 1 km of Project[4]
Bullsnake	*Pituophis catenifer*	Sensitive	-	Special Concern	Special Concern	
Plains Garter Snake	*Thamnophis radix*	Sensitive	-	-	-	
Prairie Rattlesnake	*Crotalus viridis*	Sensitive	Special Concern	Special Concern	Special Concern	
Wandering Garter Snake	*Thamnophis elegans*	Sensitive	-	-	-	

1 GOA. 2020b. Wild Species Status Search
2 GOA. 2024a. Alberta *Wildlife Act:* Wildlife Regulation and GOA 2024b. Species at risk assessed in Alberta.
3 GOC 2024. Species at Risk Public Registry - Species Search
4 GOA. 2023. Fish and Wildlife Internet Mapping Tool (FWIMT)

No snake hibernacula were observed within or near the Project area, but if a snake or hibernaculum is observed on site during construction, a qualified wildlife biologist should be consulted to provide recommendations about the particular case and develop a Snake Protection Plan. In general, recommended practices include (GOA, 2020c):

- Avoid contact with the snake;
- Report all snake sightings, including mortalities;
- Pause work until the snake moves out of the area;
- Enforce low speed limits (<30 km/hr on gravel roads and dirt trails);
- If a snake is entrapped (e.g., in a dig site), or poses a risk to Project personnel, a qualified biologist working under a valid permit can remove and relocate it off-site;
- If a suspected hibernaculum is found in or near the Project area, a qualified biologist should evaluate the site in person, and provide Project mitigations; if the status or species use is not confirmed, a remote camera or follow-up surveys may be required; and
- All personnel will be informed of the snake species that may be present on site and their protections. Workers should know the difference between a Prairie Rattlesnake (*Crotalus viridis*) and non-venomous snakes (i.e. Garter Snakes [*Thamnophis* sp.], and Bullsnake [*Pituophis catenifer*]), but should avoid contact with all snake species.

6 OTHER GRASSLAND SPECIES OF CONCERN

6.1 Sharp-tailed Grouse

The entire Project area is within the Sharp-tailed Grouse (*Tympanuchus phasianellus*) range (GOA, 2021) and Sharp-tailed Grouse have been reported within 1 km of the Project area (GOA, 2023). Sharp-tailed Grouse are listed as Sensitive provincially (GOA, 2020b; Table 10) and their lekking sites are protected year-round. During the lekking season (March 15 – June 15), a 500 m setback buffer is established from the perimeter of the lek and all industrial activities are restricted within that setback (GOA, 2024c). Outside of the lekking season (June 16 – March 14), there is a 100 m setback buffer from the perimeter of previously active leks.

Table 10: Sharp-tailed Grouse provincial and federal species of concern designation

Common name	Scientific name	Provincial status[1]	AWA status[2]	COSEWIC status[3]	SARA status[3]	Recorded on or within 1 km of Project[4]
Sharp-tailed Grouse	*Tympanuchus phasianellus*	Sensitive	-	-	-	✓

1 GOA. 2020b. Wild Species Status Search
2 GOA. 2024a. Alberta *Wildlife Act:* Wildlife Regulation and GOA 2024b. Species at risk assessed in Alberta.
3 GOC 2024. Species at Risk Public Registry - Species Search
4 GOA. 2023. Fish and Wildlife Internet Mapping Tool (FWIMT)

No Sharp-tailed Grouse leks have been observed on or within 500 m of the Project area. Although not expected, if a lek is observed or suspected during any Project activities, or any Sharp-tailed Grouse individuals are observed within the Project area, work near that observation should pause and the information should be reported to the Project environmental consultant. A qualified wildlife biologist can provide mitigations specific to the circumstances, but in most cases, a setback of 500 m will apply to active Sharp-tailed Grouse leks.

6.2 Burrowing Owl

The entire Project area is within the Burrowing Owl (*Athene cunicularia*) range (GOA, 2021) and Burrowing Owls have been historically reported within 1 km of the Project area (GOA, 2023). Burrowing Owls are both federally and provincially listed as Endangered (Table 11). The occupied nesting burrows of Burrowing Owls are protected under the AWA (GOA, 2000c) from destruction and disturbance on both private and public lands. As such, Alberta EPA recommends that during the species' nesting and rearing period (April 1 – August 15), a 500 m setback is established and all industrial activities prohibited within that setback (GOA, 2024c). In addition, previously-occupied dens/nests of Burrowing Owls are also protected year-round with a recommended 100 m setback outside of the nesting season from August 16 – March 31.

Table 11: Burrowing Owl provincial and federal species of concern designation

Common name	Scientific name	Provincial status[1]	AWA status[2]	COSEWIC status[3]	SARA status[3]	Recorded on or within 1 km of Project[4]
Burrowing Owl	*Athene cunicularia*	At Risk	Endangered	Endangered	Endangered	✓

1 GOA. 2020b. Wild Species Status Search
2 GOA. 2024a. Alberta *Wildlife Act:* Wildlife Regulation and GOA 2024b. Species at risk assessed in Alberta.
3 GOC 2024. Species at Risk Public Registry - Species Search
4 GOA. 2023. Fish and Wildlife Internet Mapping Tool (FWIMT)

No Burrowing Owls nor Burrowing Owl nesting burrows were observed in or near the Project area during any Project surveys or sweeps. Although not expected, if a nesting burrow is observed or suspected during any Project activities, or any Burrowing Owl individuals are observed within the Project area, work near that observation should pause and the information should be reported to the Project environmental consultant. A qualified wildlife biologist can provide mitigations specific to the circumstances, but in most cases, a setback of 500 m will apply to active nest burrows.

6.3 Short-eared Owl

The Project area contains suitable Short-eared Owl (*Asio flammeus*) habitat (i.e., unforested, open, medium to tall vegetation [native grass prairie or tame pasture] on flat to rolling topography), though no Short-eared Owls have been reported on or within 1 km of the Project area (GOA, 2023). Short-eared Owls are considered a SOCC both federally and provincially (Table 12). On private land, Alberta EPA recommends that during the species' nesting and rearing period (April 15 – August 15), a 100 m setback is established around active nests and all industrial activities are prohibited within that setback (GOA, 2024c). There is no setback outside of the nesting season (August 16 – April 14).

Table 12: Short-eared Owl provincial and federal species of concern designation

Common name	Scientific name	Provincial status[1]	AWA status[2]	COSEWIC status[3]	SARA status[3]	Recorded on or within 1 km of Project[4]
Short-eared Owl	*Asio flammeus*	May Be at Risk	-	Threatened	Special Concern	

1 GOA. 2020b. Wild Species Status Search
2 GOA. 2024a. Alberta *Wildlife Act:* Wildlife Regulation and GOA 2024b. Species at risk assessed in Alberta.
3 GOC 2024. Species at Risk Public Registry - Species Search
4 GOA. 2023. Fish and Wildlife Internet Mapping Tool (FWIMT)

No Short-eared Owls or their nests were observed during any Project sweeps or surveys. While unexpected, if any Short-eared Owls or their nests are observed or suspected on or near the Project area, work near that observation should pause and the information should be reported to the Project environmental consultant. A qualified wildlife biologist can provide mitigations specific to the circumstances, but in most cases, a setback of 100 m will apply to active nests.

6.4 Common Nighthawk

The Project area contains suitable Common Nighthawk *(Chordeilies minor*) habitat (i.e., short, sparse vegetation on flat to rolling topography), and Common Nighthawk have been reported on or within 1 km of the Project area (GOA, 2023). The Common Nighthawk is considered a SOCC both federally and provincially (Table 13). On private land, Alberta EPA recommends that during the species' nesting and rearing period (April 15 – August 15), a 100 m setback be established from active nests and all industrial activities prohibited within that setback (GOA, 2024c). There is no setback outside of the nesting season (August 16 – April 14).

Table 13: Common Nighthawk provincial and federal species of concern designation

Common name	Scientific name	Provincial status[1]	AWA status[2]	COSEWIC status[3]	SARA status[3]	Recorded on or within 1 km of Project[4]
Common Nighthawk	*Chordeiles minor*	Sensitive	-	Special Concern	Special Concern	✓

1 GOA. 2020b. Wild Species Status Search
2 GOA. 2024a. Alberta *Wildlife Act:* Wildlife Regulation and GOA 2024b. Species at risk assessed in Alberta.
3 GOC 2024. Species at Risk Public Registry - Species Search
4 GOA. 2023. Fish and Wildlife Internet Mapping Tool (FWIMT)

No Common Nighthawks or their nests were observed during any Project sweeps or surveys. While unexpected, if any Common Nighthawks or their nests are observed or suspected in or near the Project area, work near that observation should pause and the information should be reported to the Project environmental consultant. A qualified wildlife biologist can provide mitigations specific to the circumstances, but in most cases, a setback of 100 m will apply to active nests.

6.5 Yellow Rail

During times of high precipitation, the Project area contains suitable Yellow Rail (*Coturnicops noveboracensis*) habitat (i.e., floodplains or wet meadows; GOA, 2013), though no Yellow Rail have been reported on or within 1 km of the Project area (GOA, 2023). Yellow Rail are federally listed as Special Concern (Table 14). On private land, Alberta EPA recommends that during the species' nesting and rearing period (April 15 – August 15), a 100 m setback be established from the nest and all industrial activities prohibited within that setback (GOA, 2024c). There is no setback outside of the nesting season (August 16 – April 14).

Table 14: Yellow Rail provincial and federal species of concern designation

Common name	Scientific name	Provincial status[1]	AWA status[2]	COSEWIC status[3]	SARA status[3]	Recorded on or within 1 km of Project[4]
Yellow Rail	*Coturnicops noveboracensis*	Undetermined	-	Special Concern	Special Concern	

1 GOA. 2020b. Wild Species Status Search
2 GOA. 2024a. Alberta *Wildlife Act:* Wildlife Regulation and GOA 2024b. Species at risk assessed in Alberta.
3 GOC 2024. Species at Risk Public Registry - Species Search
4 GOA. 2023. Fish and Wildlife Internet Mapping Tool (FWIMT)

No Yellow Rail or their nests were observed during any Project sweeps or surveys. While unexpected, if any Yellow Rail or their nests are observed or suspected in or near the Project area, work near that observation should pause and the information should be reported to the Project environmental consultant. A qualified wildlife biologist can provide mitigations specific to the circumstances, but in most cases, a setback of 100 m will apply to active nests.

7 GENERAL WILDLIFE SWEEPS

Outside of the timing restrictions for the Zone B3 nesting season (April 13 – August 24), general wildlife sweeps are recommended to be completed within 10 days of the start of Project construction or other Project activities (GOA, 2020a). A biologist will complete pre-construction wildlife sweeps of the planned activity areas and 100 m buffer as recommended by the Wildlife Sweep Protocols (GOA, 2020a). A provincial or federal wildlife permit is not required to conduct a wildlife sweep.

8 ADDITIONAL PROJECT MITIGATIONS

8.1 Staff Training and Awareness

Mitigations rely on workers knowing what to look for and what to do when a SOCC or sensitive habitat features are encountered. Therefore, all on-site Project personnel are required to read this WMP prior to beginning work on site and expected to adhere to it. Materials helping Project personnel to identify SOCC and any species that may be become aggressive or nuisance species should be available on site and with other onboarding and safety materials. Project personnel must be aware of which personnel on site to report any species observations, encounters, incidents, or features (e.g., nests, dens).

8.2 Traffic and Vehicle Collisions

Project personnel are to follow all traffic regulations. Any temporary traffic controls implemented within the Project area or surrounding roads, including stop signs and speed limits, will be enforced. Workers will be encouraged to do the following to minimize the risk of vehicle-wildlife collisions:

- Drive at or below the speed limit;
- Reduce speeds when driving at dawn or dusk, or during reduced visibility (e.g., fog, heavy precipitation, night); and
- Inform all drivers to avoid hitting wildlife while driving, including snakes and amphibians, whenever safe to do so.

Additional restrictions may be implemented for Project work near active sensitive wildlife features. These restrictions may include reduced speed limits, timing of travel, restrictions on idling and parking, and the number of vehicles that can move through an area at a given time. These restrictions will be feature- and species-specific and detailed in a protection plan written by a qualified biologist familiar with the Project and feature(s) in question.

8.3 Dust and Emissions

Project emissions will result from construction, but are expected to have negligible, and only short-term effects (See EIA Volume 2, Section 4). As a result, Project emissions are not expected to have an effect on wildlife. Any emissions exceedances that might take place as a result of Project construction are expected to be temporary in nature, having no long-term effects on wildlife health or behaviour, except, possibly for dust. Dust particulates are commonly caused by construction projects, and standard mitigations to reduce or eliminate dust should take place to avoid negative effects on wildlife:

- Avoid movement of soils during heavy wind conditions;
- Use water trucks to spray water as a key dust suppression technique;
- Use dust fences if standard dust suppression is not proving sufficient;
- Monitor dust to ensure exceedances are not taking place; and
- Reduce vehicle activity, if necessary, to reduce dust emissions.

Additional details and recommendations can be found in the Project EIA, Volume 1, Section 11 (Mitigation, Management and Monitoring) and Volume 2, Section 4 (Air Quality).

8.4 Noise

Noise may deter wildlife from an area, or increase vigilance, and therefore reduce efficiency in feeding and other behaviours. The only appreciable noise caused by the Project will be during the construction phase, which is expected to only have a limited and short-term effect outside of the Project area (See Project EIA Volume 2, Section 5). Deterrence of wildlife from the immediate Project area during construction can be

beneficial, as it will reduce the likelihood of wildlife choosing to den or nest within the Project area, and should generally reduce the likelihood of human-wildlife incidents and harm to wildlife as a result of construction activities.

Efforts should still be made to minimize Project construction noise, so that the effects are limited, as much as possible, to the Project area. Therefore, the following should be encouraged:

- Avoid any unnecessary noise sources such as high revving and honking (unless critical for safety, e.g., preventing a near collision);
- Avoid idling vehicles and equipment whenever possible;
- Ensure all exhaust systems have working mufflers; and
- Ensure all vehicles and equipment are operated as per manufacturer specifications.

8.5 Light

Lighting during the night can affect wildlife behaviour and movements, with a particular effect on migratory birds and other highly mobile wildlife (Cabrera-Cruz et al., 2018). Construction activities after dark typically requires bright lights to allow for operations to take place accurately and safely. Effects of lighting on wildlife can be minimised if the following recommendations are followed:

- Target lighting so that it is downward pointing/facing whenever possible – so that required areas are illuminated, without shining light into the sky;
- Minimize lighting to areas where work or travel is actively taking place;
- Turn off vehicle headlights when vehicles are not in use; and
- Where possible, minimize lighting during the spring and fall migration, particularly between 23:00 until 06:00 from March 15 to May 15 and August 15 until November 15 (GOA, 2020d).

8.6 Garbage and Attractant Management

Improperly managed garbage and other attractants, most often food and food waste (e.g., food wrappers) can attract wildlife to an area, cause changes in wildlife behaviour (i.e., food conditioning and habituation), and ultimately lead to human-wildlife conflict. For the safety of both Project personnel and local wildlife, it is important that Project garbage and attractants are properly managed. The following steps will be followed:

- Project personnel will keep all foods secure from wildlife (e.g., closed in a vehicle, sealed cooler, and/or trailer);
- Food, food waste and other potential attractants will either be disposed of in closed bins removed from site daily (i.e., not left overnight) or be disposed of in wildlife-proof garbage bins;
- Food waste will not be disposed of on the ground or buried; and
- Feeding of wildlife is prohibited.

8.7 Human Interactions and Conflict Mitigation

All personnel on site should review this WMP and be aware of wildlife protections. Approaching, feeding, and harassment of wildlife is a contravention of the AWA and therefore prohibited, and will be penalized. All wildlife interactions, including conflict, will be immediately reported to the Project EL. Unusual wildlife sightings that may indicate food conditioning or other concerning behaviours will also be reported to the EL immediately. Alternatively, they may indicate the presence of a sensitive wildlife feature that requires mitigation. These observations or behaviours may include:

- Wildlife approaching people or work areas despite Project disturbance;
- Wild animals returning to the Project area regularly; and
- Wildlife displaying aggressive or territorial behaviour.

Additionally, any sighting of the following species that may pose a particular risk to humans and/or be prone to food conditioning, should be reported to the EL immediately:

- Bears (*Ursus* sp.);
- Coyotes (*Canis latrans*);
- Red Fox (*Vulpes vulpes*);
- Common Racoon (*Procyon lotor*); and
- Prairie Rattlesnake (*Crotalus viridis*).

Importantly, a sighting of the above species does not alone indicate that there is any problem or elevated risk to Project personnel but should be assessed by a qualified biologist in context with the behaviour, time of day and season, and location(s) observed as well as the concurrent Project activities.

8.8 Fencing and Exclusion

Fencing can be helpful to exclude wildlife from dangerous areas, such as active work sites within the Project area or especially trenches. Any fences installed for this purpose should be appropriate for the location and the wildlife it attempts to exclude, without causing further harm to that or other species of wildlife. Fencing the entire Project area may not be feasible nor desired, as these fences can act as movement barriers to wildlife. Furthermore, some fences can cause harm to wildlife from entrapment or collisions (e.g., grouse, Pronghorn; Paige, 2020). Any fencing installed should be inspected regularly and maintained as required. Fencing should follow guidelines for wildlife-friendly fencing (Paige, 2020).

9 REPORTING

Daily reporting of nest sweeps, general wildlife sweeps, sensitive species monitoring, and any other on-site activity (e.g., follow-up on wildlife sightings) should be provided by consultant biologist(s) to MPE and the EID. It will include pertinent wildlife findings, recommended mitigations, and follow-up monitoring recommendations. Findings, recommended mitigations, and follow-up monitoring will be reviewed with the EID, construction managers, and any applicable contractor. The construction manager(s) will consider this information in development of their daily work plans. Daily reports from the field will be documented by AARES and filed in chronological order for future reference. These reports will summarize fieldwork methodology and results, including issues encountered, construction plans or feedback, mitigation measures employed by the Project, and evaluation of the success of the mitigation employed in terms of identifiable impacts to construction activity.

10 WMP UPDATES

This report should be updated prior to the start of construction with any new mitigations or requirements that results in new wildlife features or sensitivities, project approval requirements, and/or Project updates, as well as any time that significant changes to the project or wildlife mitigations warrants an update.

11 REFERENCES

Alexander, L. G., Lailvaux, S. P., Pechmann J. H. K., & Devries P.J. (2012). *Effects of salinity on early life stages of the Gulf Coast toad, Incilius nebulifer (Anura: Bufonidae). Copeia.* 1:106-114. Retrieved March 2025, from https://www.jstor.org/stable/pdf/41416605.pdf?casa_token=19Z5FouB54kAAAAA:I13nQvWMbsVRNr8snEixP_WaBpbddRPt-yF2DRTOUIoL52fJK9oauYEP0L4ZmNqDPTAsvD6pQ2X-hjHi5lM2lApvqMsMkmbio-u5j4igR3xNL8I8bimX.

Cabrera-Cruz, S.A., Smolinsky J.A., & Buler, J.J. (2018*). Light pollution is greatest within migration passage areas for nocturnally-migrating birds around the world*. Scientific Reports, 8(3261). Retrieved March 2025, from https://www.nature.com/articles/s41598-018-21577-6.pdf. https://doi.org/10.1038/s41598-018-21577-6.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). (2009). *Assessment and Update Status Report on the Northern Leopard Frog Lithobates pipiens*. Retrieved March 2025, from https://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_northern_leopard_frog_0809i_e.pdf.

Dunn, J.L., & Alderfer, J. (2006). *Field Guide to the Birds of North America.* (6th ed.). National Geographic.

Eder, T., & Kennedy G. (2011). *Mammals of Canada.* Lone Pine Publishing.

Fisher, C., Acorn, J. (1998). *Birds of Alberta*. Lone Pine Publishing.

Government of Alberta (GOA). (n.d.). *Bat Facts Sheet*. Multisar. Retrieved March 2025, from https://multisar.ca/wp-content/uploads/2015/10/Bat-Fact-Sheet-FINAL-for-WEB.pdf.

GOA. (2000a). *Environmental Protection and Enhancement Act* (EPEA): Revised statutes of Alberta 2000. Current as of December 12, 2024. Retrieved February 2025, from https://open.alberta.ca/publications/e12#:~:text=Description,approval%20or%20registration%20is%20required.

GOA. (2000b). *Water Act* (RSA 2000, c. W-3). Current as at December 15, 2017. Alberta King's Printer. Retrieved March 2025, from https://open.alberta.ca/publications/w03#summary.

GOA. (2000c). Alberta *Wildlife Act* (AWA; RSA 2000, c. W-10). Current as of December 15, 2022. Retrieved February 2025, from https://www.qp.alberta.ca/documents/Acts/W10.pdf.

GOA. (2006). *Natural Regions and Subregions of Alberta.* Natural Regions Committee. Retrieved March 2025, from https://www.albertaparks.ca/media/2942026/nrsrcomplete_may_06.pdf.

GOA. (2013). *Sensitive Species Inventory Guidelines (SSIG).* Retrieved March 2025, from https://open.alberta.ca/publications/sensitive-species-inventory-guidelines.

GOA. (2020a). Wildlife Sweep Protocols – Sensitive Species Inventory Guidelines. Retrieved March 2025, from https://open.alberta.ca/dataset/d15221f2-f6d8-4671-8b49-d8fff6eab2b6/resource/6968392a-9e05-4bd8-bd76-ea107ba86c1c/download/aep-wildlife-sweep-protocols-sensitive-species-inventory-guidelines-2020.pdf.

GOA. (2020b). *Wild Species Status Search*. Retrieved March 2025, from https://www.alberta.ca/lookup/wild-species-status-search.aspx.

GOA. (2020c). *Snake Protection Plan: Requirements for All Disposition Purposes and Activities.* Retrieved March 2025, from https://open.alberta.ca/dataset/692f0737-2c06-410a-b272-da7f9f2e70f6/resource/9f6eefe7-5cda-4d9a-91bb-904f60188c09/download/aep-snake-protection-plan-requirements-disposition-purposes-activities.pdf.

GOA. (2020d). *Bird Migration Survey Protocol*. Environment and Parks. Retrieved March 2025, from https://open.alberta.ca/publications/bird-migration-survey-protocol#summary.

GOA. (2021). *Wildlife Sensitivity Maps*. Updated January 8, 2021. Retrieved February 2025, from https://www.alberta.ca/wildlife-sensitivity-maps.aspx.

GOA. (2023). *Fish and Wildlife Internet Mapping Tool– Public*. Alberta EPA. Retrieved February 2023, from https://geospatial.alberta.ca/FWIMT_Pub/Viewer/?TermsOfUseRequired=true&Viewer=FWIMT_Pub.

GOA. (2024a). *Alberta Wildlife Regulation*. Alberta King's Printer. Retrieved March 2025, from https://open.alberta.ca/publications/1997_143.

GOA. (2024b). *Species at risk assessed in Alberta*. Environment and Protected Areas. Retrieved March 2025, from https://open.alberta.ca/publications/species-assessed-by-the-conservation-committee-alberta-species-at-risk.

GOA. (2024c). *Master Schedule of Standards and Conditions*. Retrieved March 2025, from https://open.alberta.ca/publications/master-schedule-of-standards-and-conditions.

GOA. (2025). Wildlife Management: Sensitive Species Inventory Guidelines. Retrieved March 2025, from https://www.alberta.ca/sensitive-species-inventory-guidelines#jumplinks-2.

Government of Canada (GOC). (2011). *Petroleum Industry Activity Guidelines for Wildlife Species at Risk in the Prairie and Northern Region*. Canadian Wildlife Service, Environment Canada, Prairie and Northern Region. 64p. Retrieved March 2025, from https://docs2.cer-rec.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/640423/675915/712760/735866/A2F6F7_%2D_Letter_of_Comment.pdf?nodeid=735849&vernum=-2.

GOC. (2017). *Migratory Birds Convention Act*, 1994. Retrieved March 2025, from https://laws-lois.justice.gc.ca/eng/acts/m-7.01/.

GOC. (2018). Nesting Periods. Retrieved March 2025, from https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html.

GOC. (2022a). *Migratory Birds Regulations*. Retrieved March 2025, from https://laws-lois.justice.gc.ca/eng/regulations/SOR-2022-105/index.html.

GOC. (2024). Species at Risk Public Registry - Species Search. Retrieved March 2025, from https://species-registry.az.ec.gc.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10.

GOC. (2025a). *Species at Risk Act*. Retrieved March 2025, from https://laws.justice.gc.ca/eng/acts/s-15.3/.

GOC. (2025b). *Emergency Order for the Protection of the Greater Sage Grouse (SOR/2013-202)*. Minister of Justice. Retrieved March 2025, from https://laws-lois.justice.gc.ca/eng/regulations/SOR-2013-202/page-1.html.

Michalasky, S., and H.P. Hamm. (2018). *Guide to Managing for Optimal Habitat Attributes: Northern Leopard Frog.* Saskatchewan Prairie Conservation Action Plan. Retrieved March 2025, from https://www.pcap-sk.org/rsu_docs/documents/pcap-nlfr-module-final-draft.pdf.

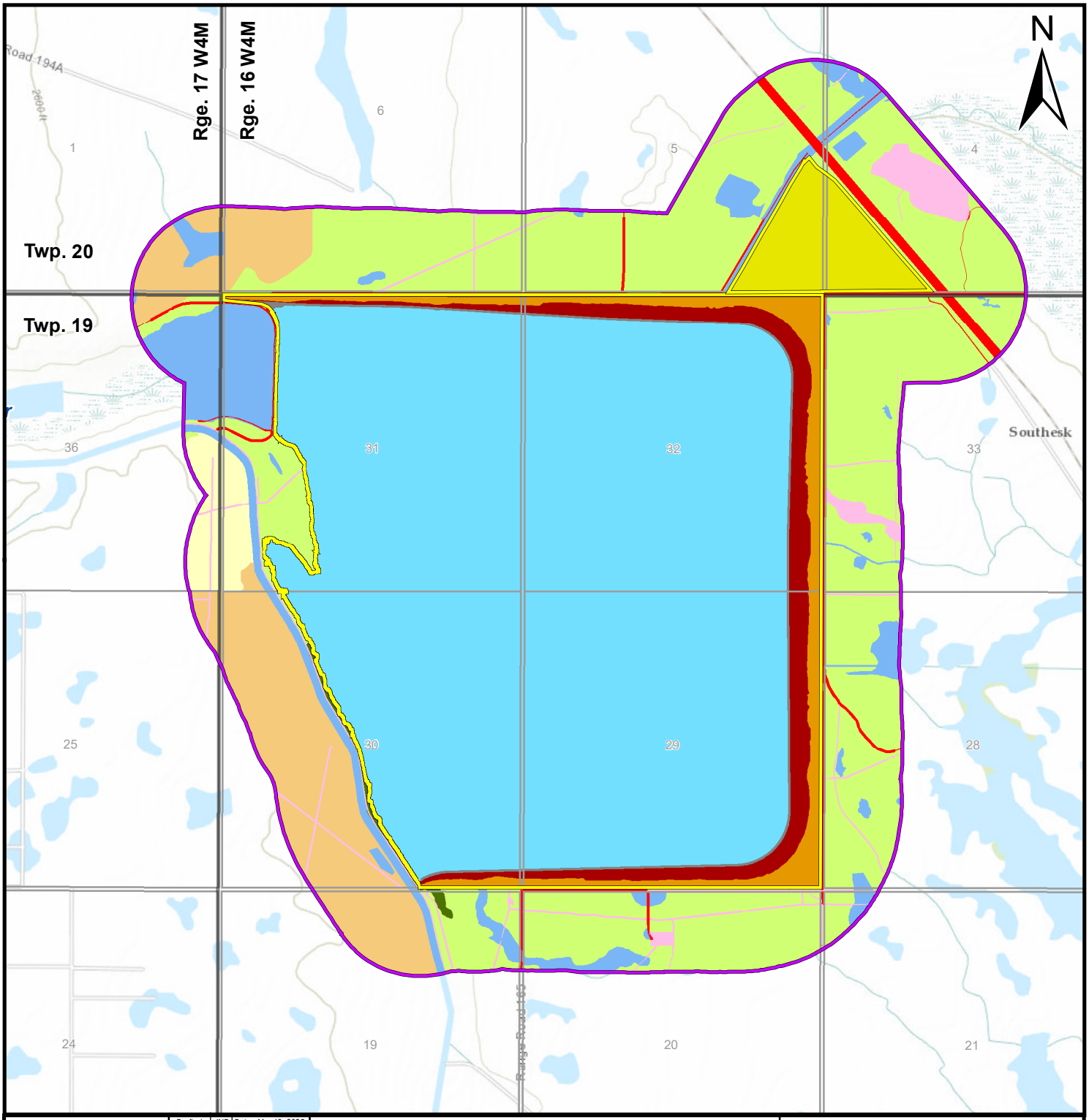
Paige, C. (2020). *Alberta Landholder's Guide to Wildlife Friendly Fencing*. Alberta Conservation Association. Retrieved March 2025, from https://www.ab-conservation.com/downloads/educational_materials/brochures/ACA_Wildlife_Friendly_Fencing.pdf.

Randall, L., N. Lloyd, and A. Moehrenschlager. (2018). *Guidelines for Mitigation Translocations of Amphibians: Applications for Canada's Prairie Provinces*. Version 1.0. Centre for Conservation Research, Calgary Zoological Society. 94 pp. Retrieved March 2025, from https://www.sccp.ca/sites/default/files/species-habitat/documents/amphibian_translocation_guidelines%20Alberta%202018.pdf.

Stantec Consulting Ltd. (Stantec). (2013). *Migratory Bird Convention Act*: *A Best Management Practices for Pipelines*. Developed for the Canadian Energy Pipeline Association. Draft.

Thirion, J.-M. (2014). *Salinity of the reproduction habitats of the Western Spadefoot Toad Pelobates cultripes (Cuvier, 1829), along the Atlantic coast of France*. Herpetozoa. 27(1/2):13-20. Retrieved March 2025, from http://www.objectifs-biodiversites.com/medias/files/thirion-2014-herpetozoa-salinity-of-the-reproduction-habitats-of-the-western-spadefoot-toad-pelobates-cultripes.pdf.

Appendix I5: Project Case and Modelling Figures



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CAD Survey		Revision:	0

Data Sources:
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ATS Grid: AltaLIS 2007.
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AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Type:

- Cropland
- Native Prairie
- Pasture
- Treed
- Waterbodies
- Non-vegetated Disturbance
- Vegetated Disturbance

Project Components:

- Berm Road and Riprap
- Reclaimed Soil Storage Area
- Inundated Area
- Reclaimed Berm
- Reclaimed Berm to Section

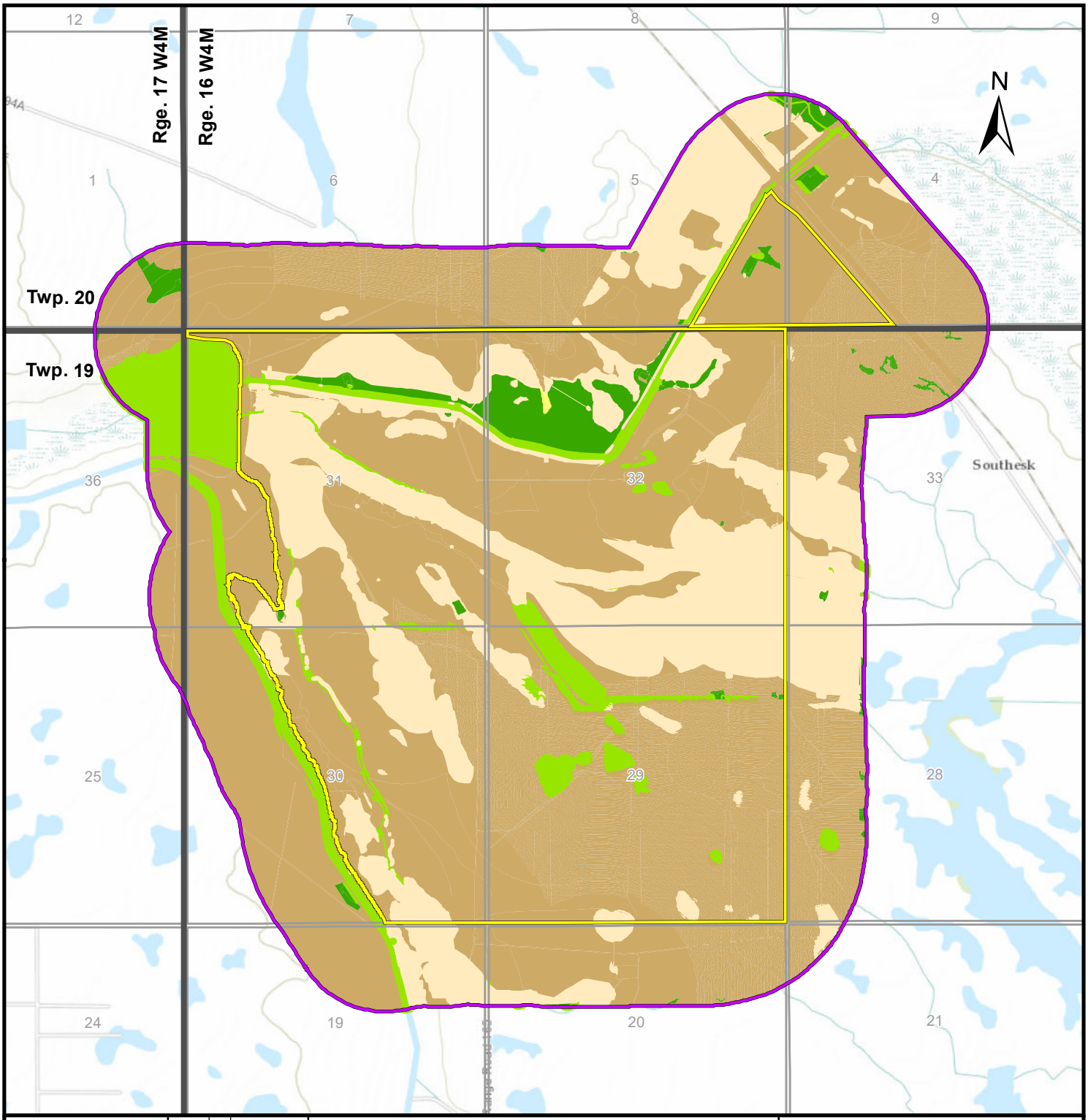
EID

Anticipated Project Case Habitat Types and Reclaimed Areas in the Terrestrial Local Study Area

March 2025

REF.: AARES21-127
(Wildlife)

Figure I5-1



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Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.132; Habitat Suitabiliy Index for the Northern Leopard Frog in Alberta: Model Derivation and Validation

AAR Environmental Services

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

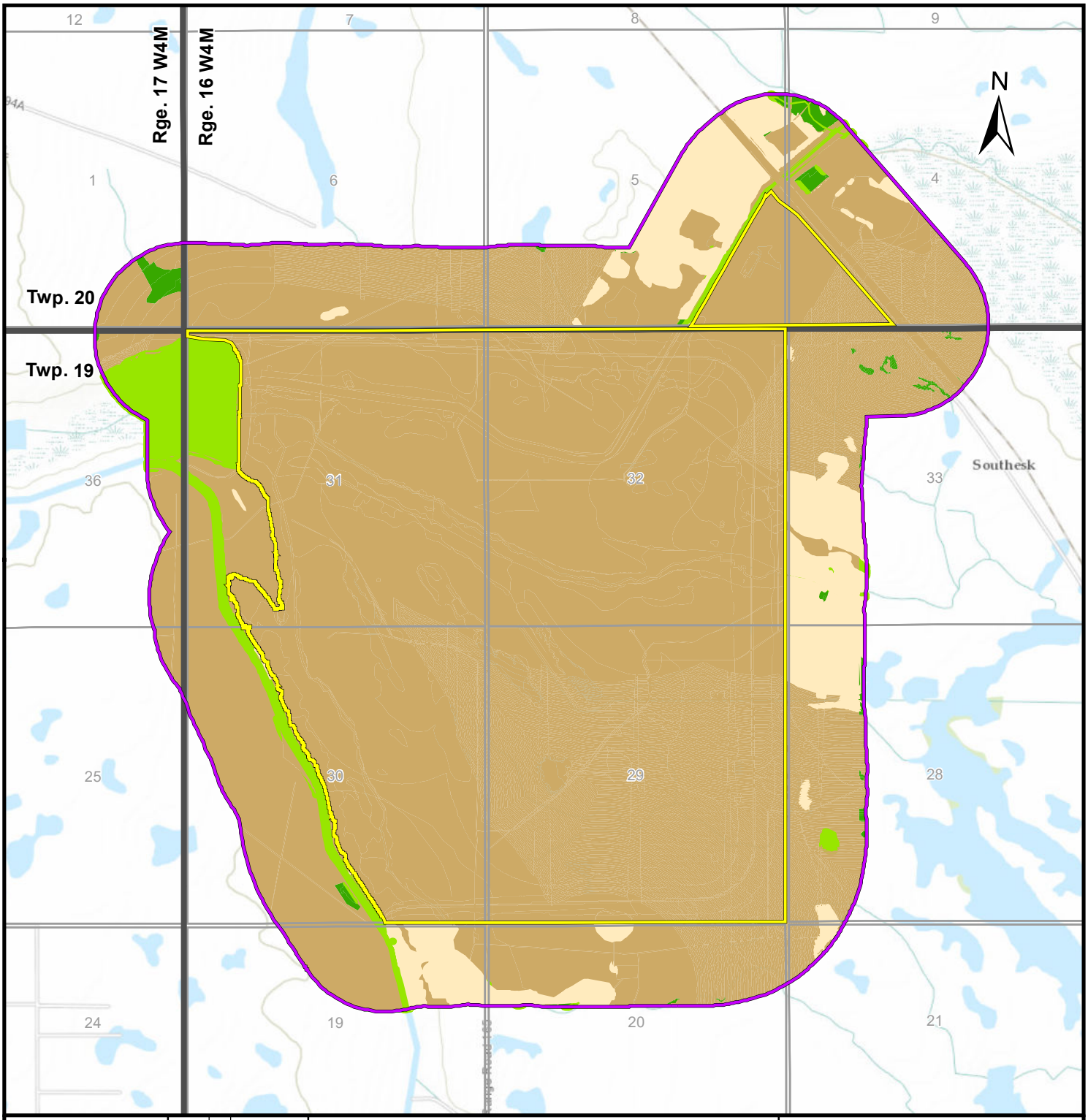
EID

Habitat Suitability for Northern Leopard Frog Within the TLSA Baseline Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-2



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Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.132; Habitat Suitabiliy Index for the Northern Leopard Frog in Alberta: Model Derivation and Validation.

AAR Environmental Services

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Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

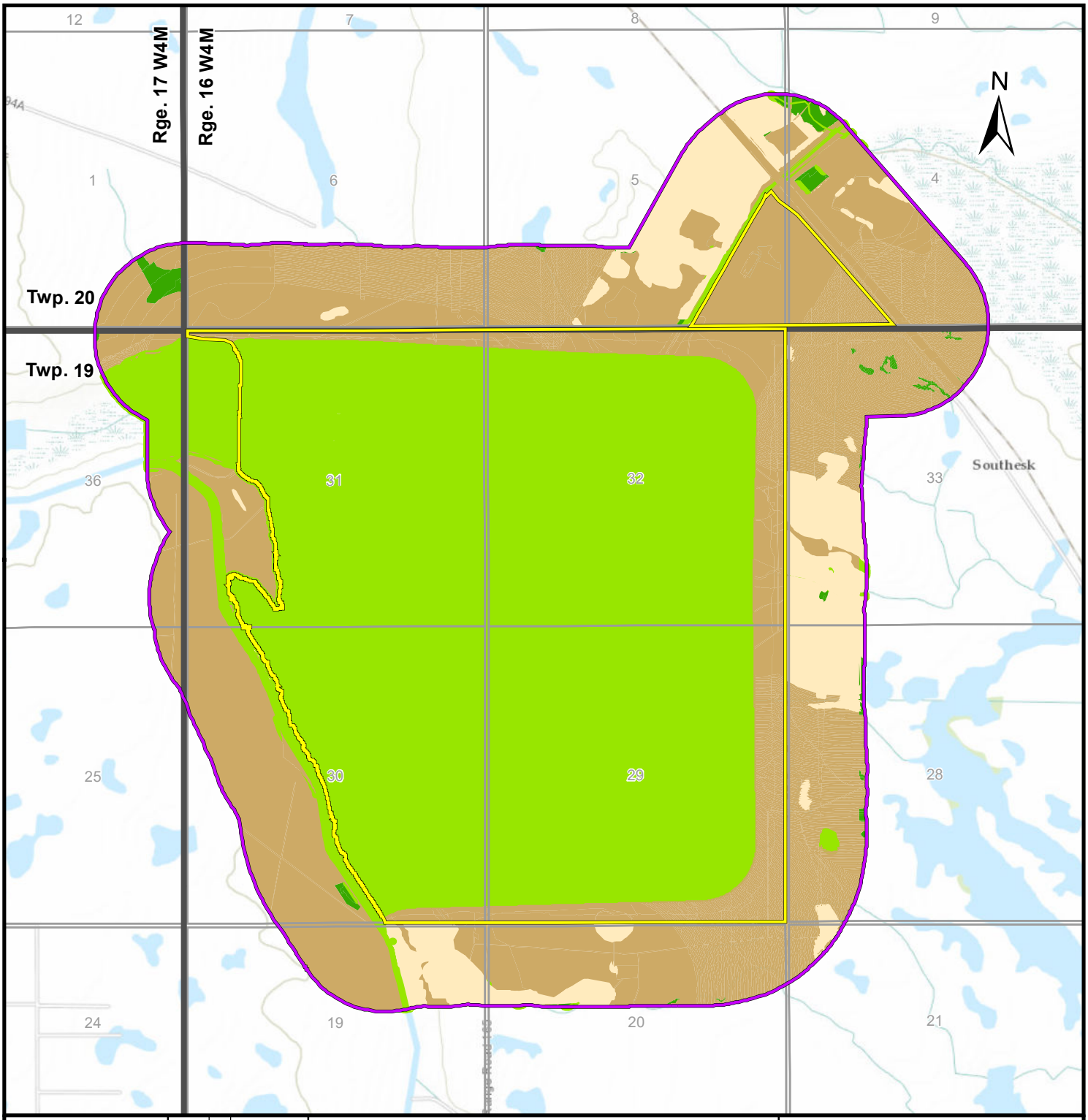
EID

Habitat Suitability for Northern Leopard Frog Within the TLSA Project Case

March 2025

REF.: AARES21-127
(Wildlife HSI)

Figure I5-3



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Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.132; Habitat Suitabiliy Index for the Northern Leopard Frog in Alberta: Model Derivation and Validation

AAR Environmental Services

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Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

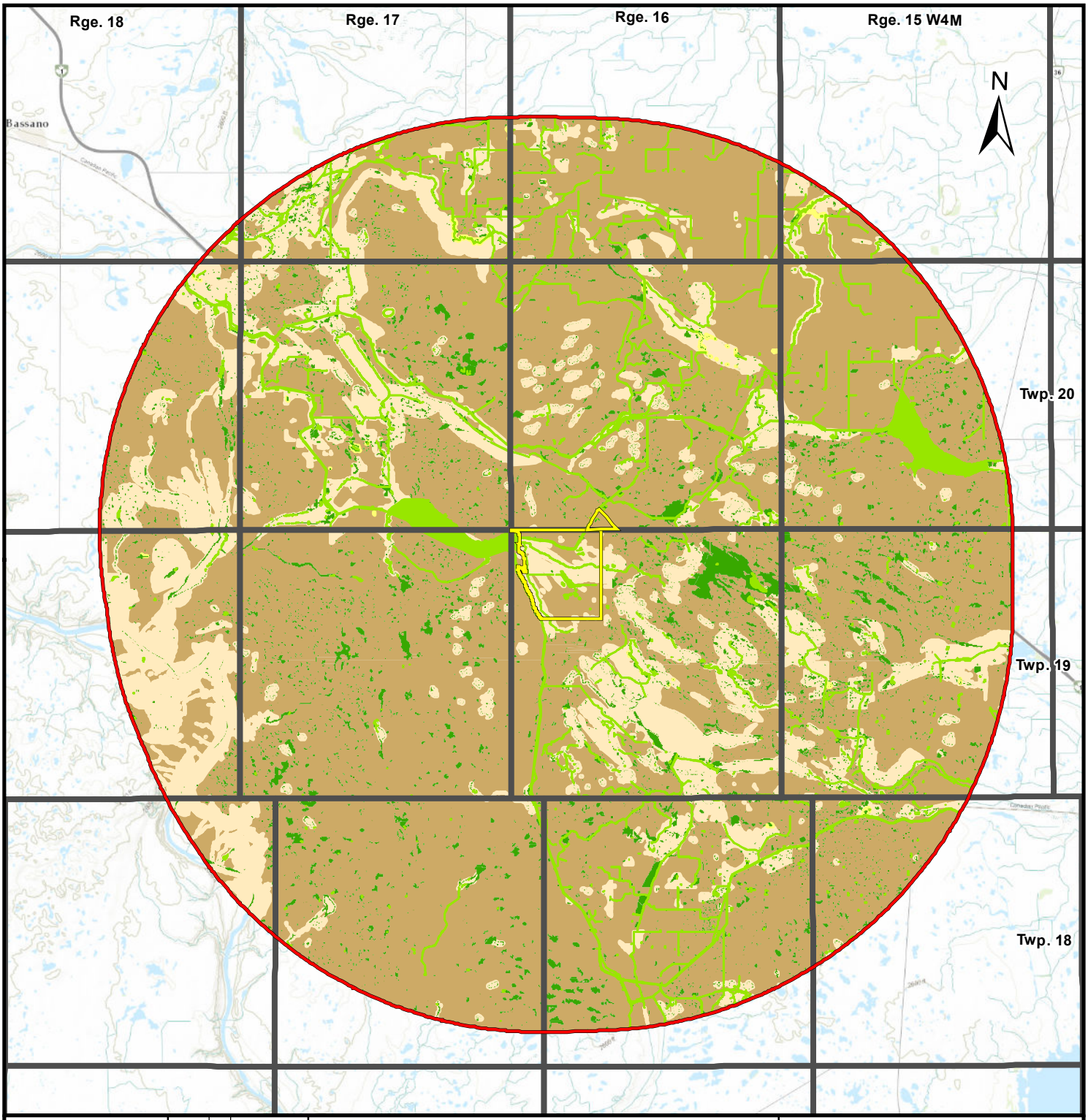
EID

Habitat Suitability for Northern Leopard Frog Within the TLSA Reclaimed Case

March 2025

REF.: AARES21-127
(Wildlife HSI)

Figure I5-4



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PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.132; Habitat Suitabiliy Index for the Northern Leopard Frog in Alberta: Model Derivation and Validation

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

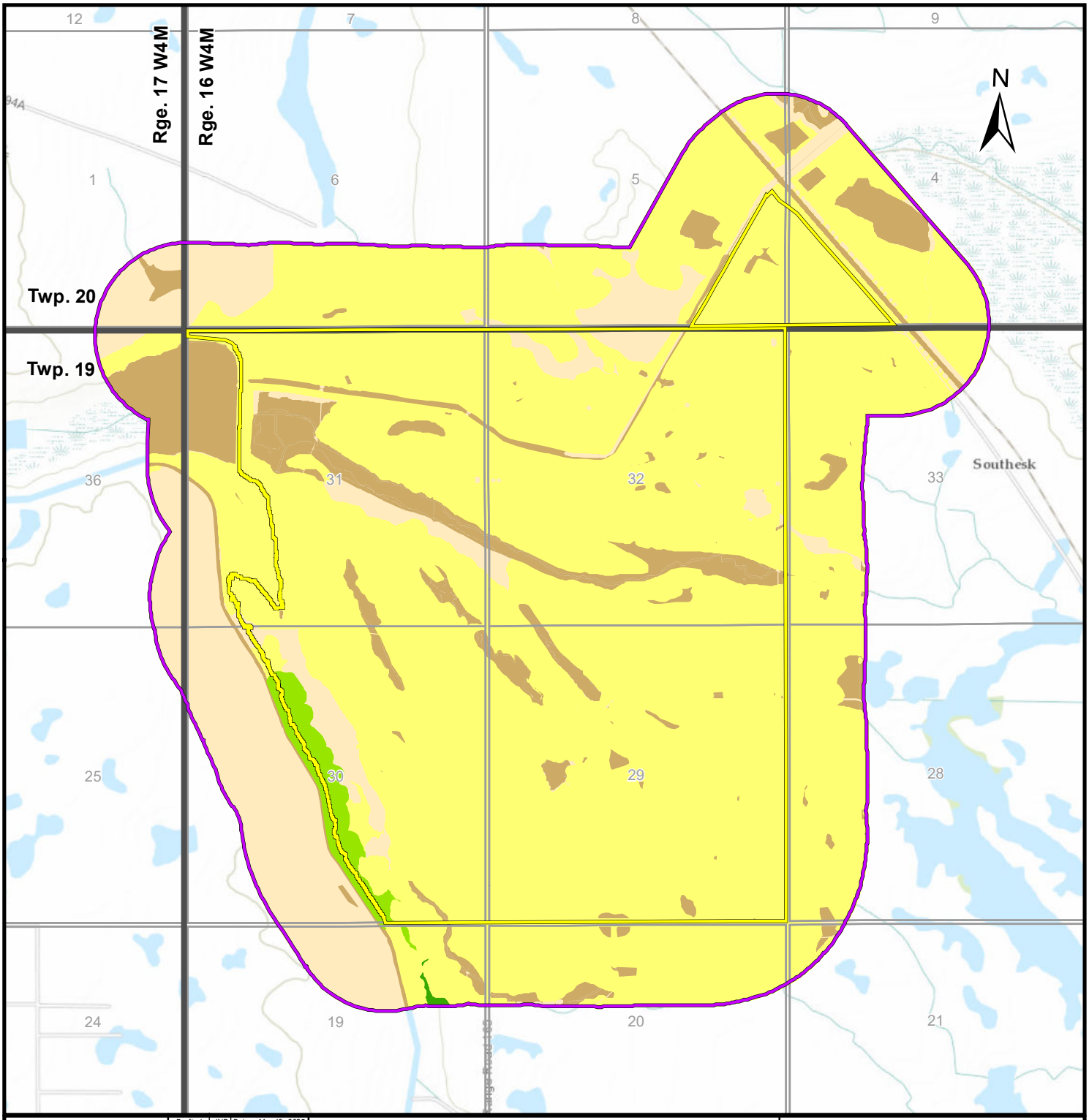
EID

Habitat Suitability for Northern Leopard Frog Within the TRSA Baseline Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-5



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PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.86 MULTISAR: The Milk River Basin Project.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

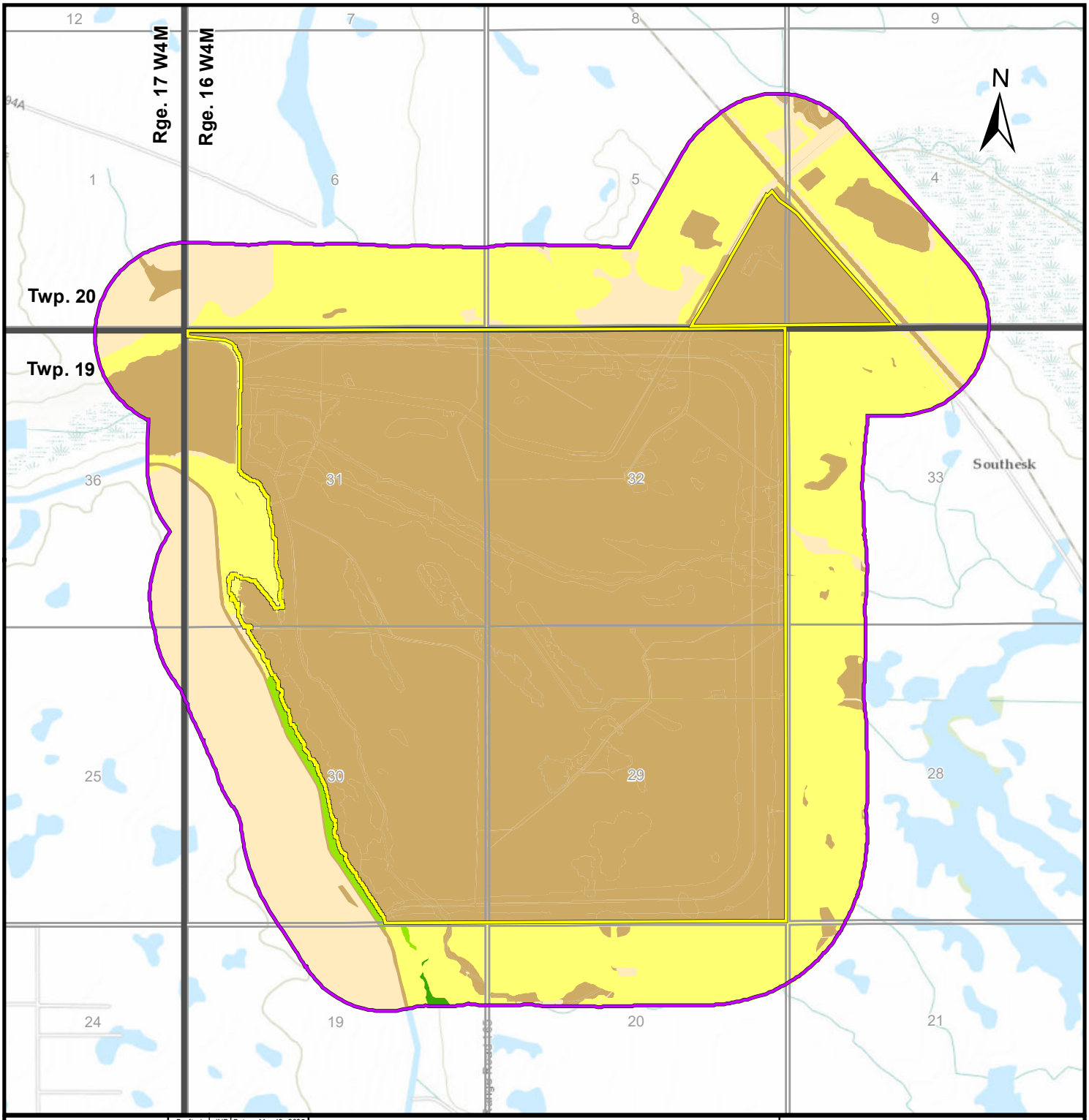
EID

Habitat Suitability for Loggerhead Shrike Within the TLSA Baseline Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-6



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PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.86 MULTISAR: The Milk River Basin Project.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Proposed Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

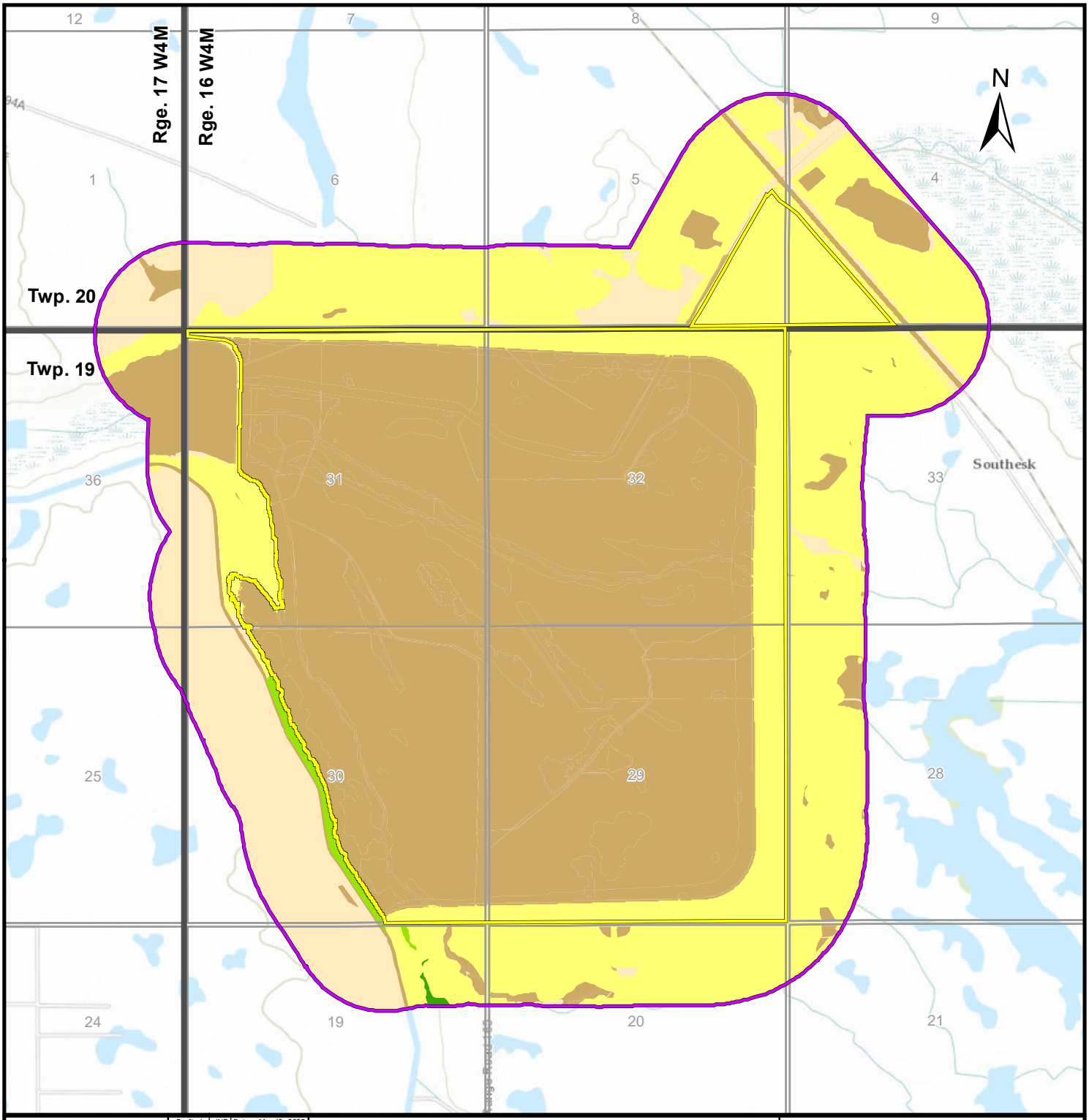
EID

Habitat Suitability for Loggerhead Shrike Within the TLSA Project Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-7



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PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.86 MULTISAR: The Milk River Basin Project.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

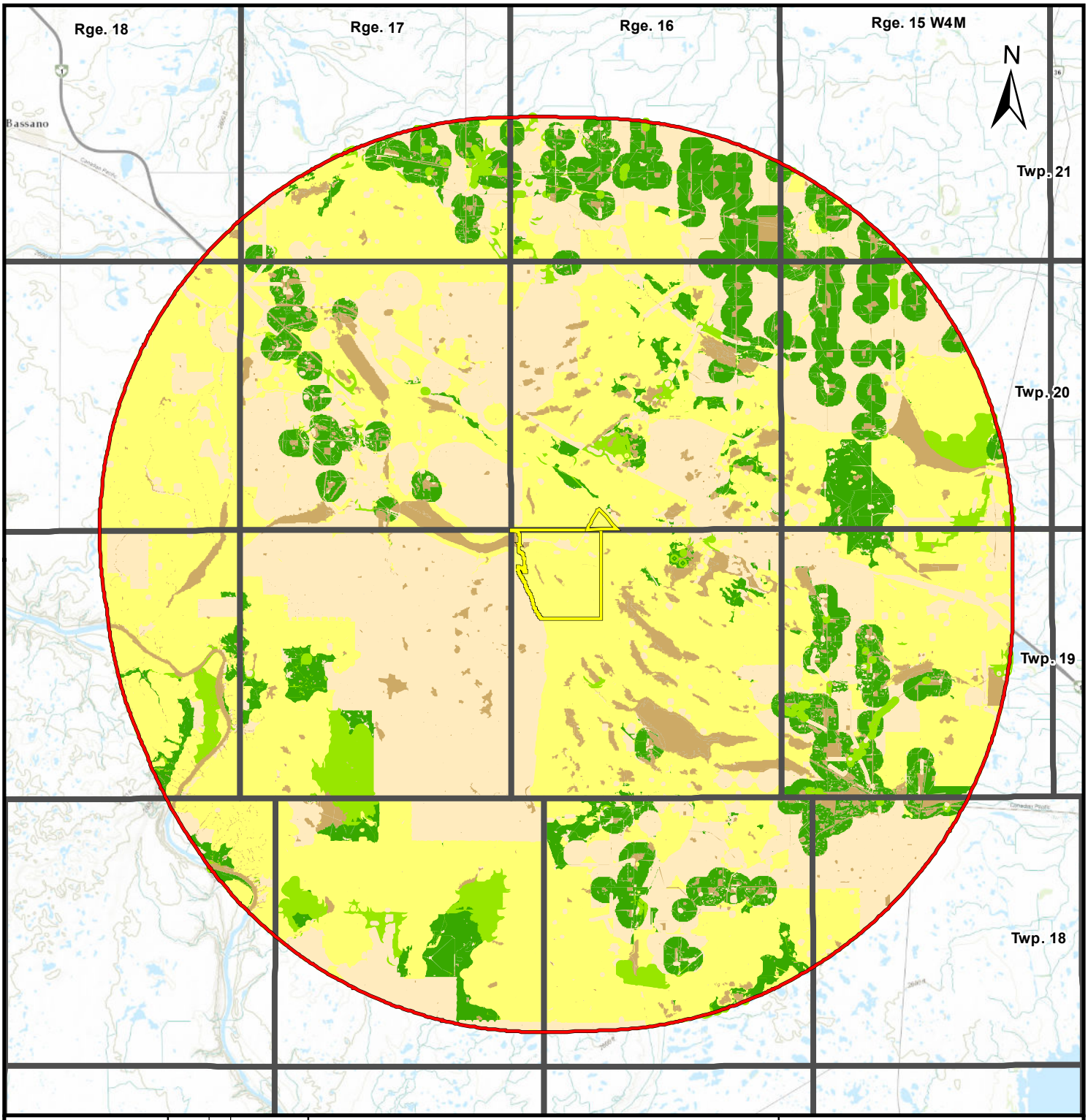
EID

Habitat Suitability for Loggerhead Shrike Within the TLSA Reclaimed Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-8



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* Modified HSI model developed from the Alberta Species at Risk Report No.86 MULTISAR: The Milk River Basin Project.

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Legend

Routing:

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

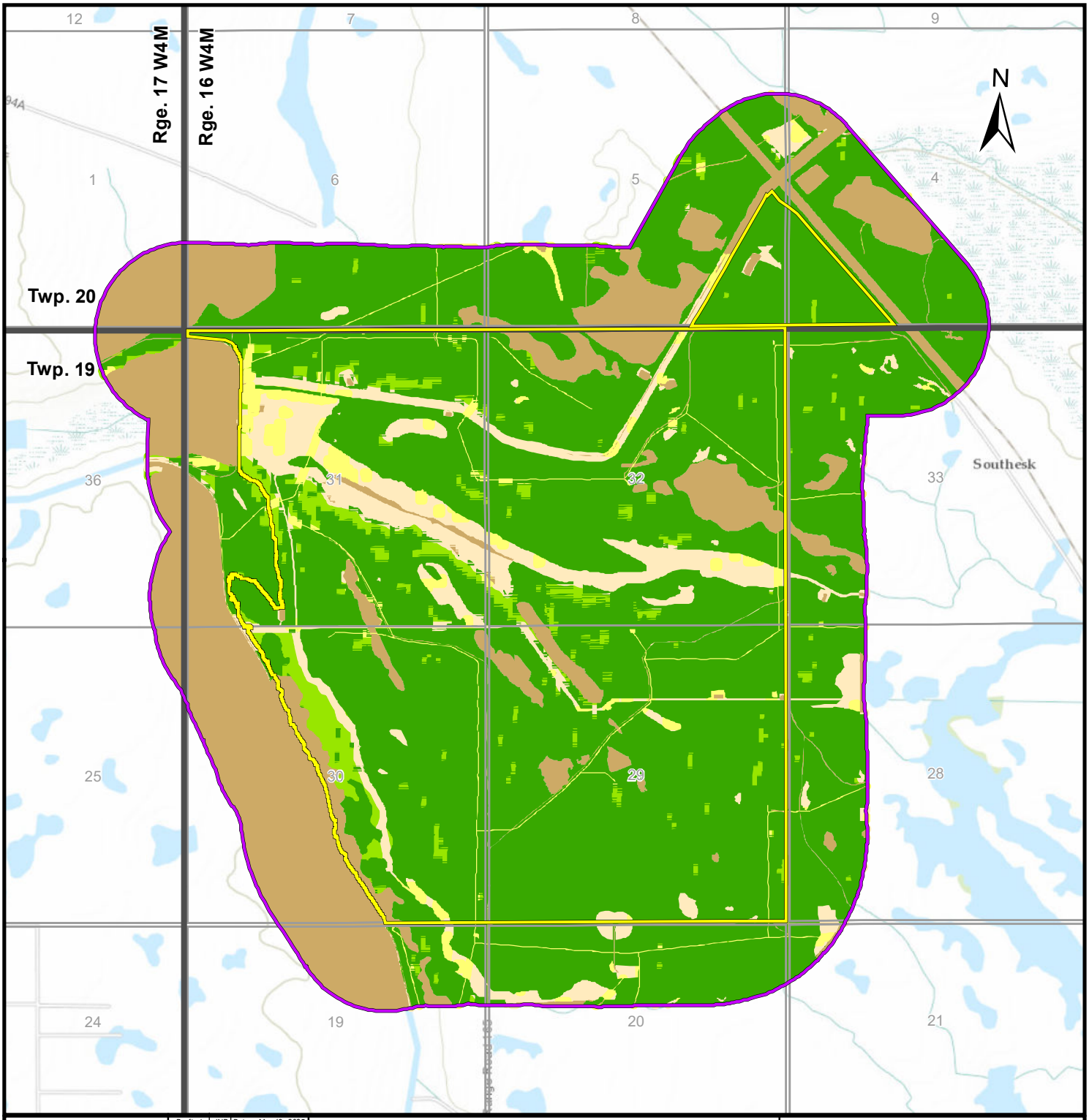
EID

Habitat Suitability for Loggerhead Shrike Within the TRSA Baseline Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-9



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PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.86
MULTISAR: The Milk River Basin Project.

AAR Environmental Services

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

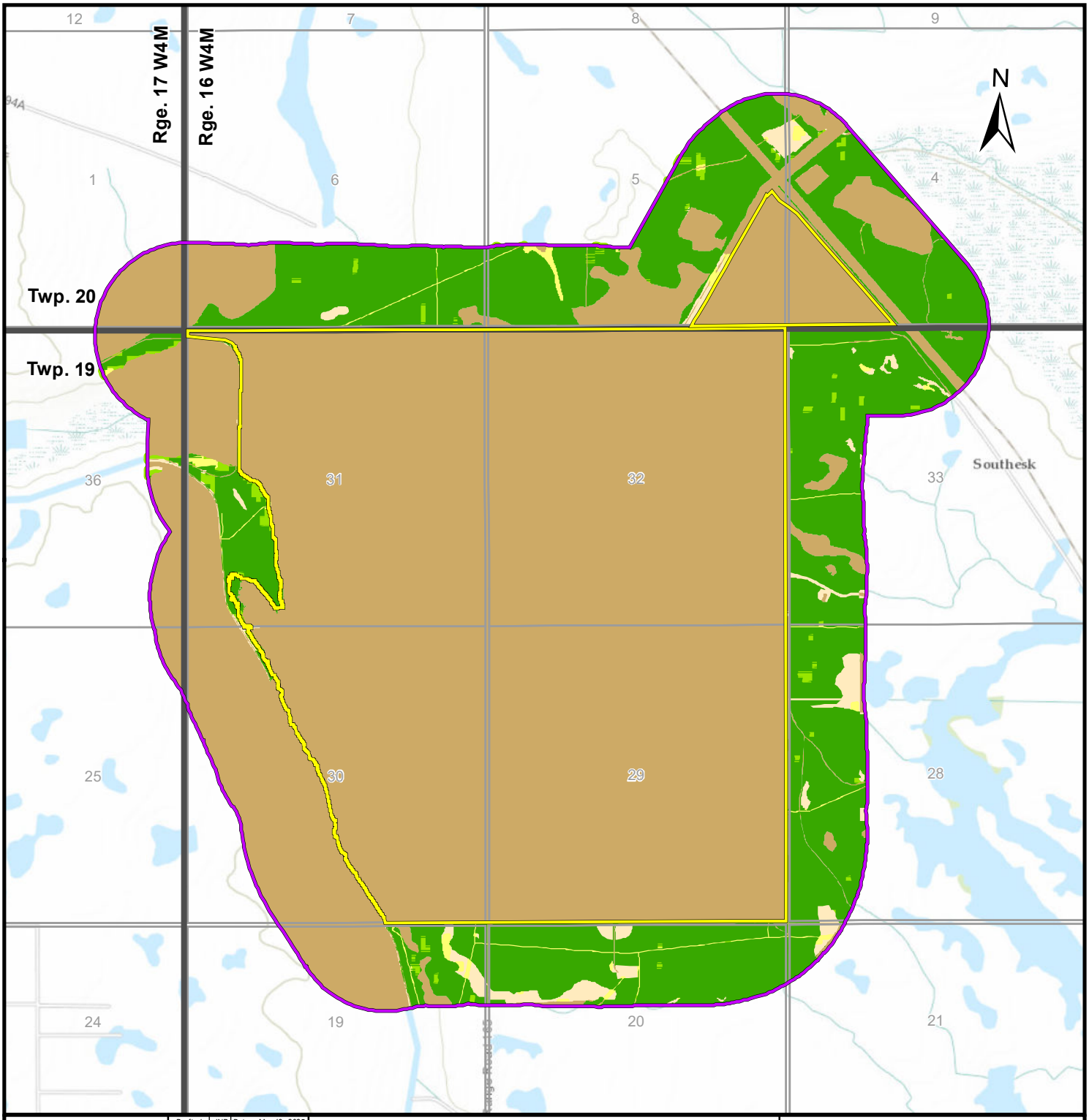
EID

Habitat Suitability for Long-billed Curlew Within the TLSA Baseline Case

March 2025

REF.: AARES21-127
(Wildlife HSI)

Figure I5-10



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Data Sources:
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ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.86 MULTISAR: The Milk River Basin Project.

AAR Environmental Services

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Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

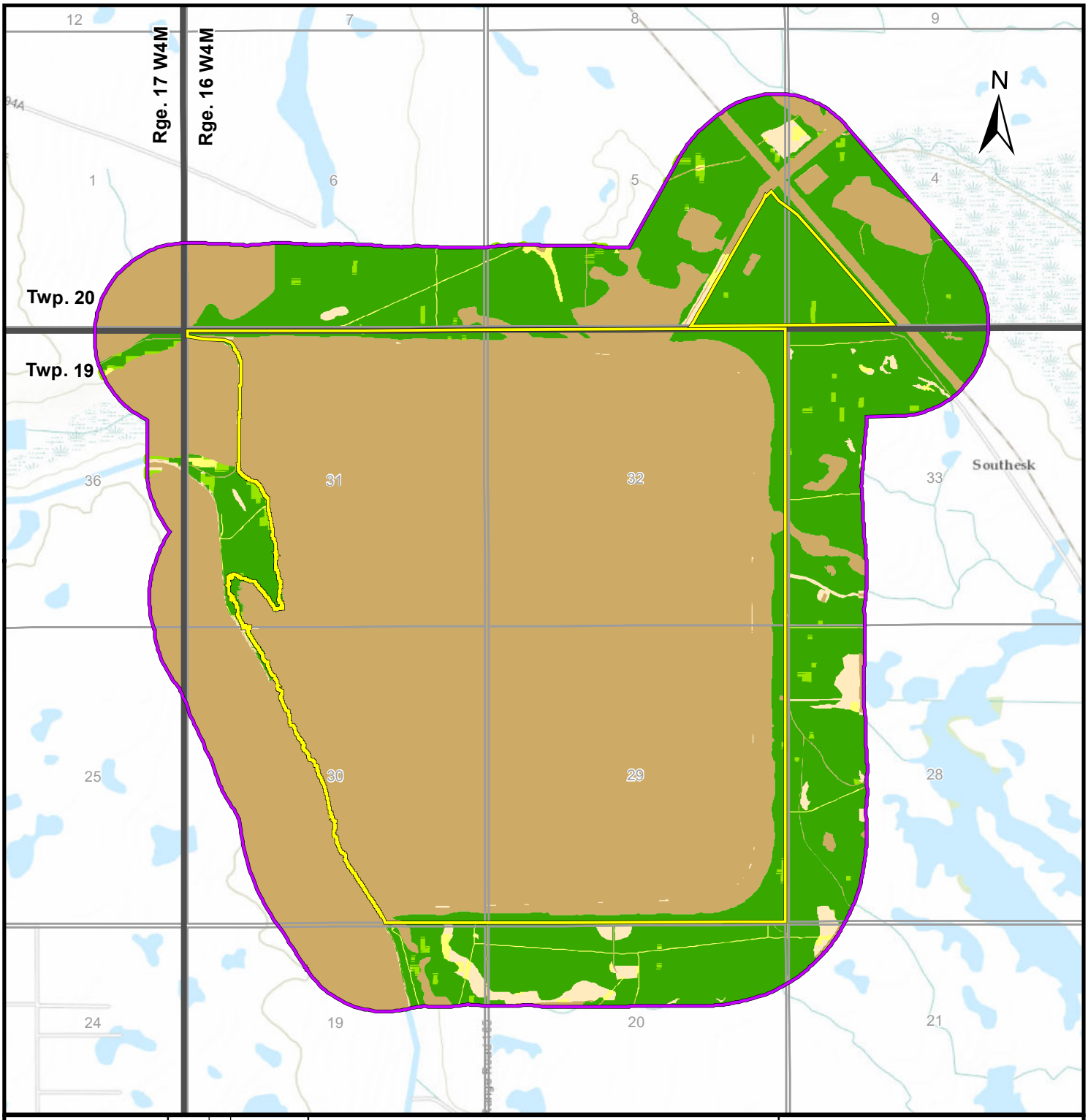
EID

Habitat Suitability for Long-billed Curlew Within the TLSA Project Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-11



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PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.86 MULTISAR: The Milk River Basin Project.

AAR Environmental Services

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

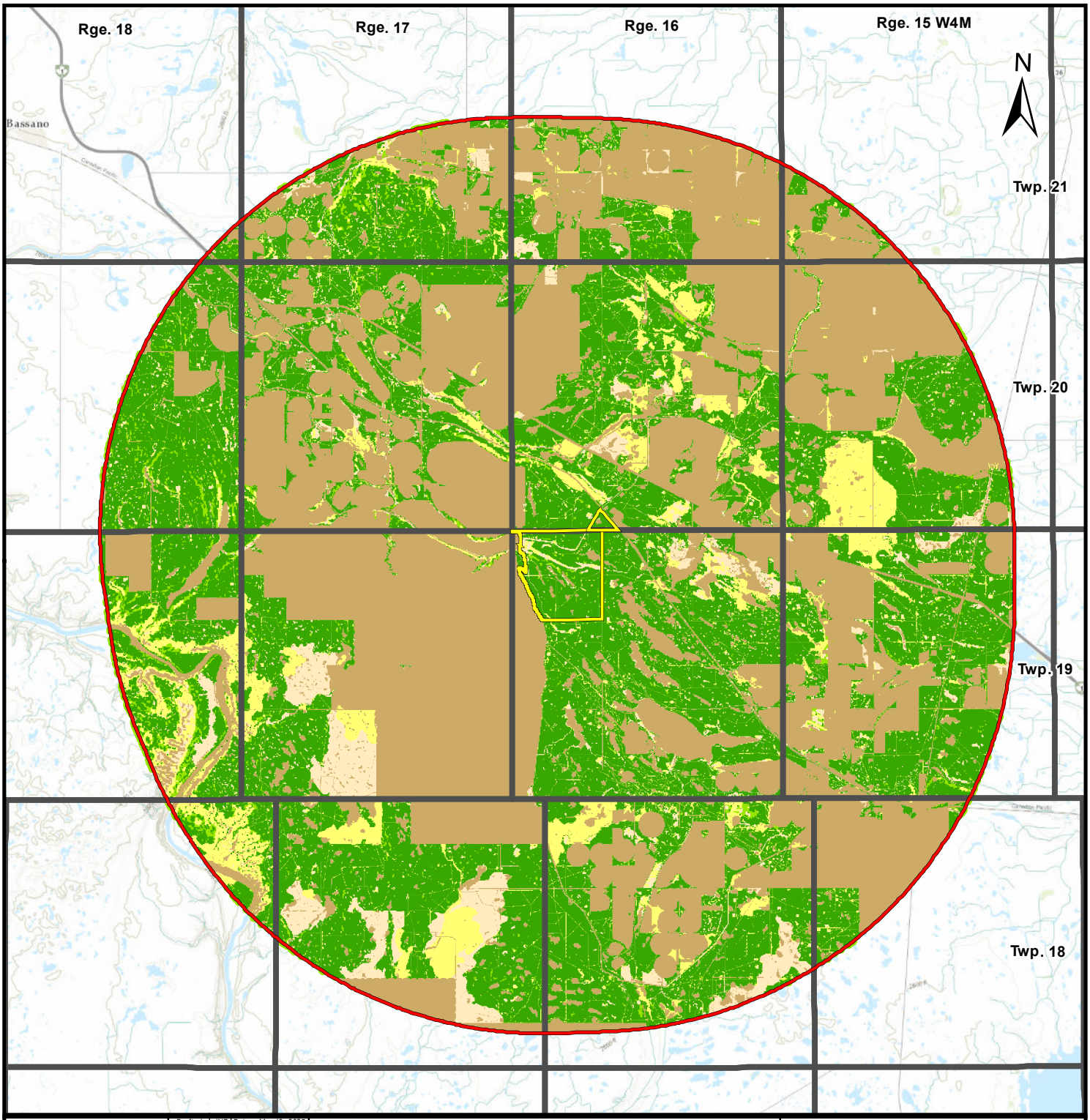
EID

Habitat Suitability for Long-billed Curlew Within the TLSA Reclaimed Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-12



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PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.86 MULTISAR: The Milk River Basin Project.

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Legend

Routing:

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

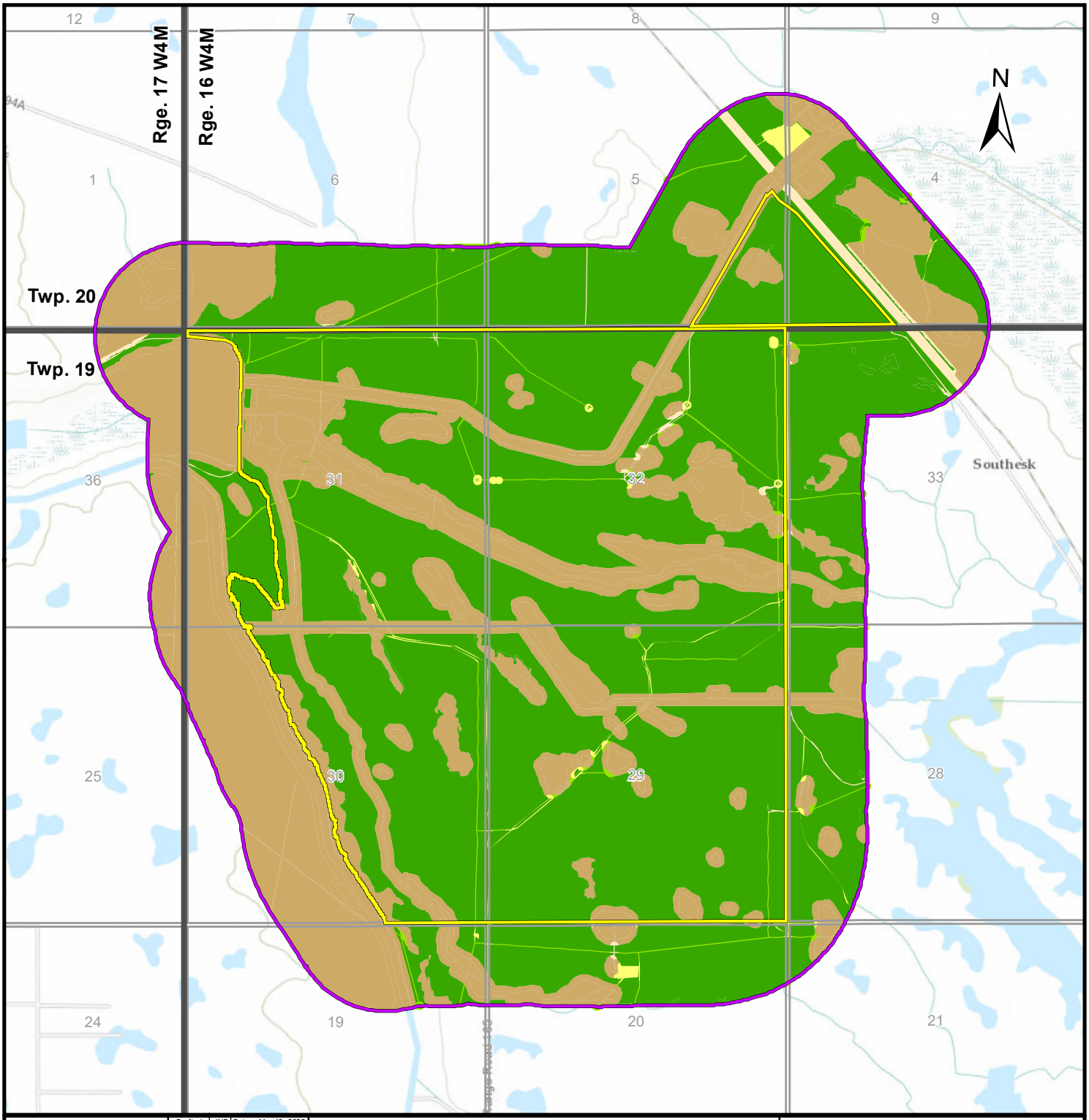
EID

Habitat Suitability for Long-billed Curlew Within the TRSA Baseline Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-13



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Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.86 MULTISAR: The Milk River Basin Project.

AAR Environmental Services

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

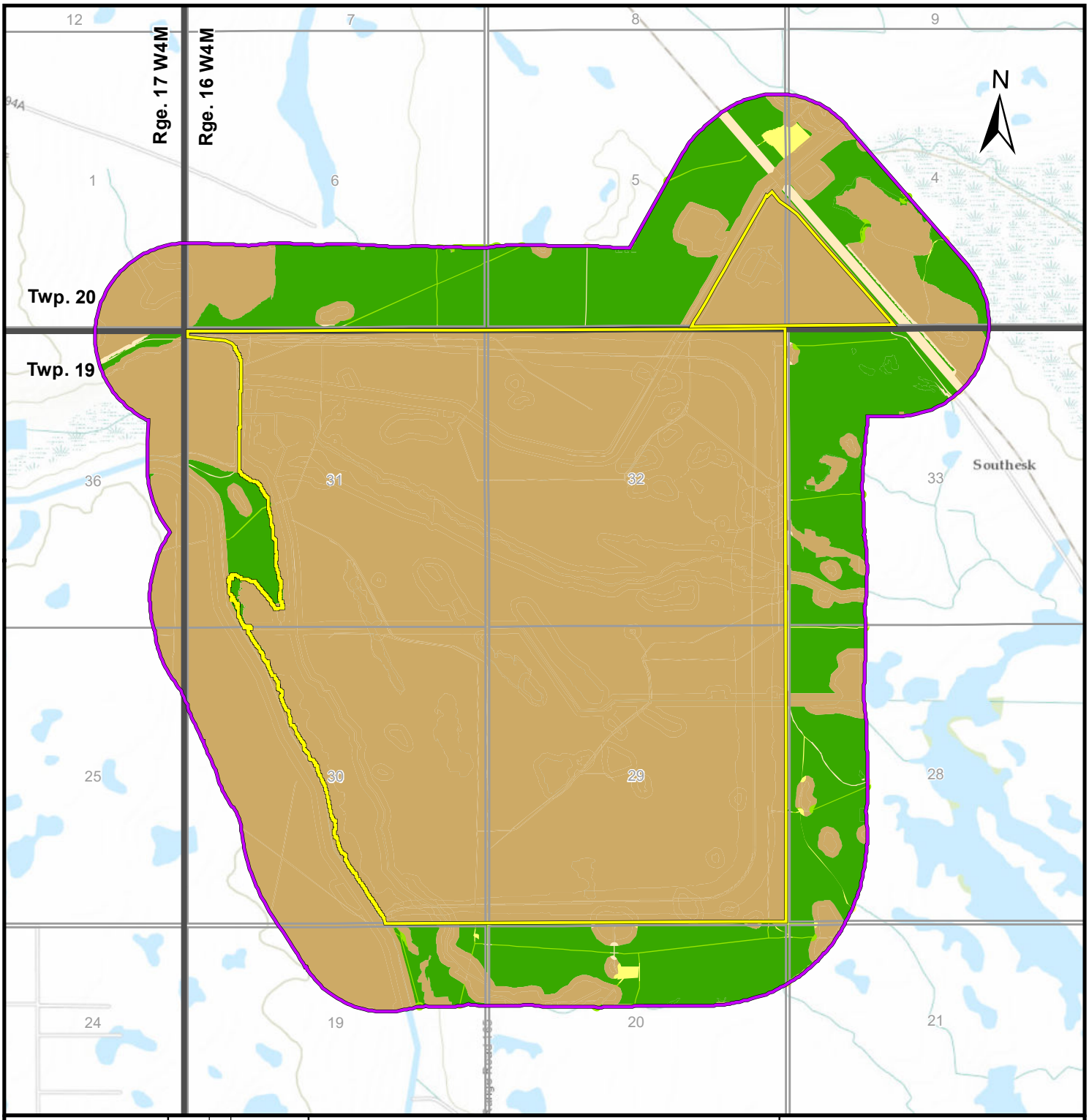
EID

Habitat Suitability for Sprague's Pipit Within the TLSA Baseline Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-14



SCALE: 1:30,000

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Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.86 MULTISAR: The Milk River Basin Project.

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

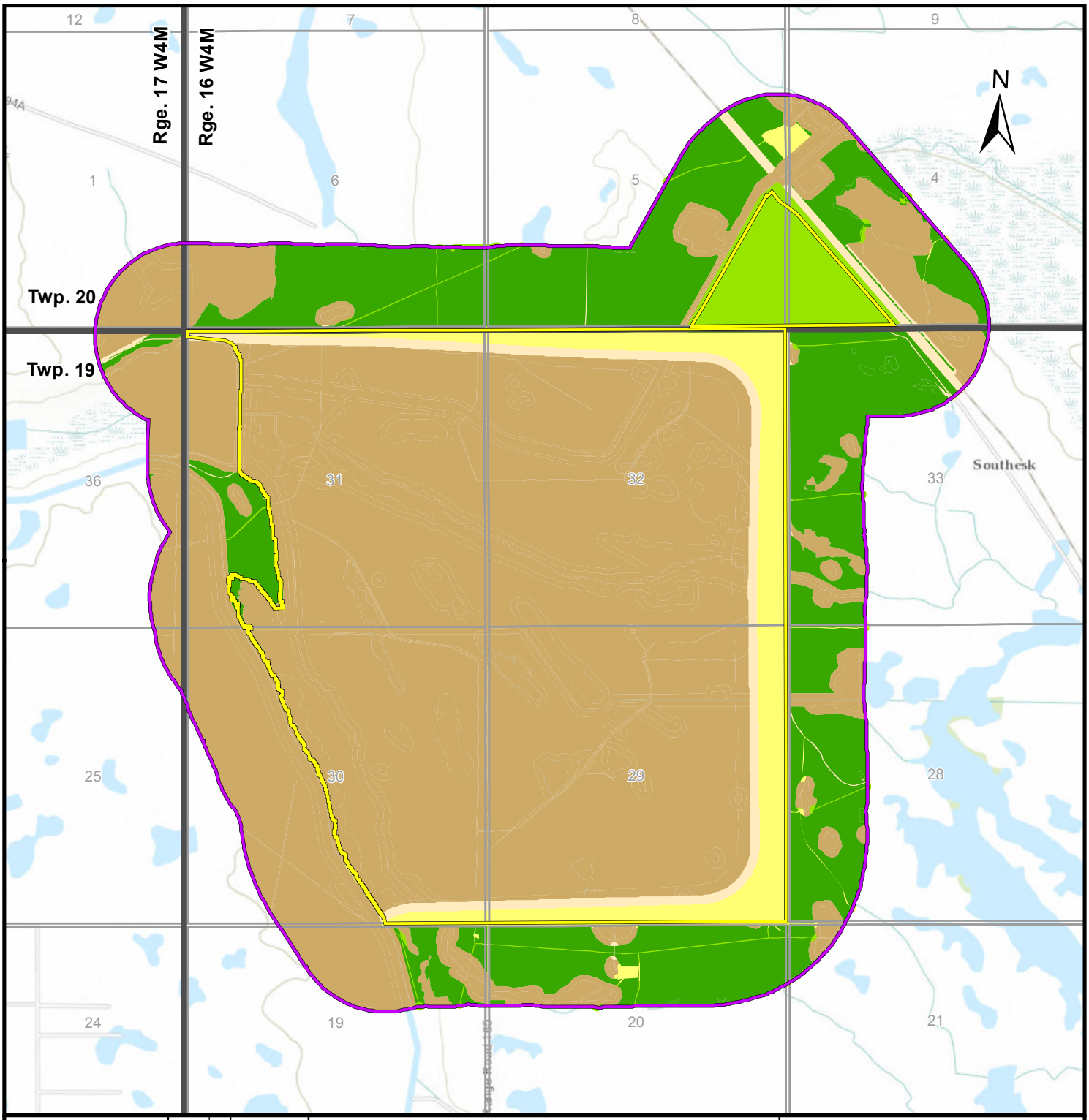
EID

Habitat Suitability for Sprague's Pipit Within the TLSA Project Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-15



SCALE: 1:30,000

200 0 200 400 m

Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

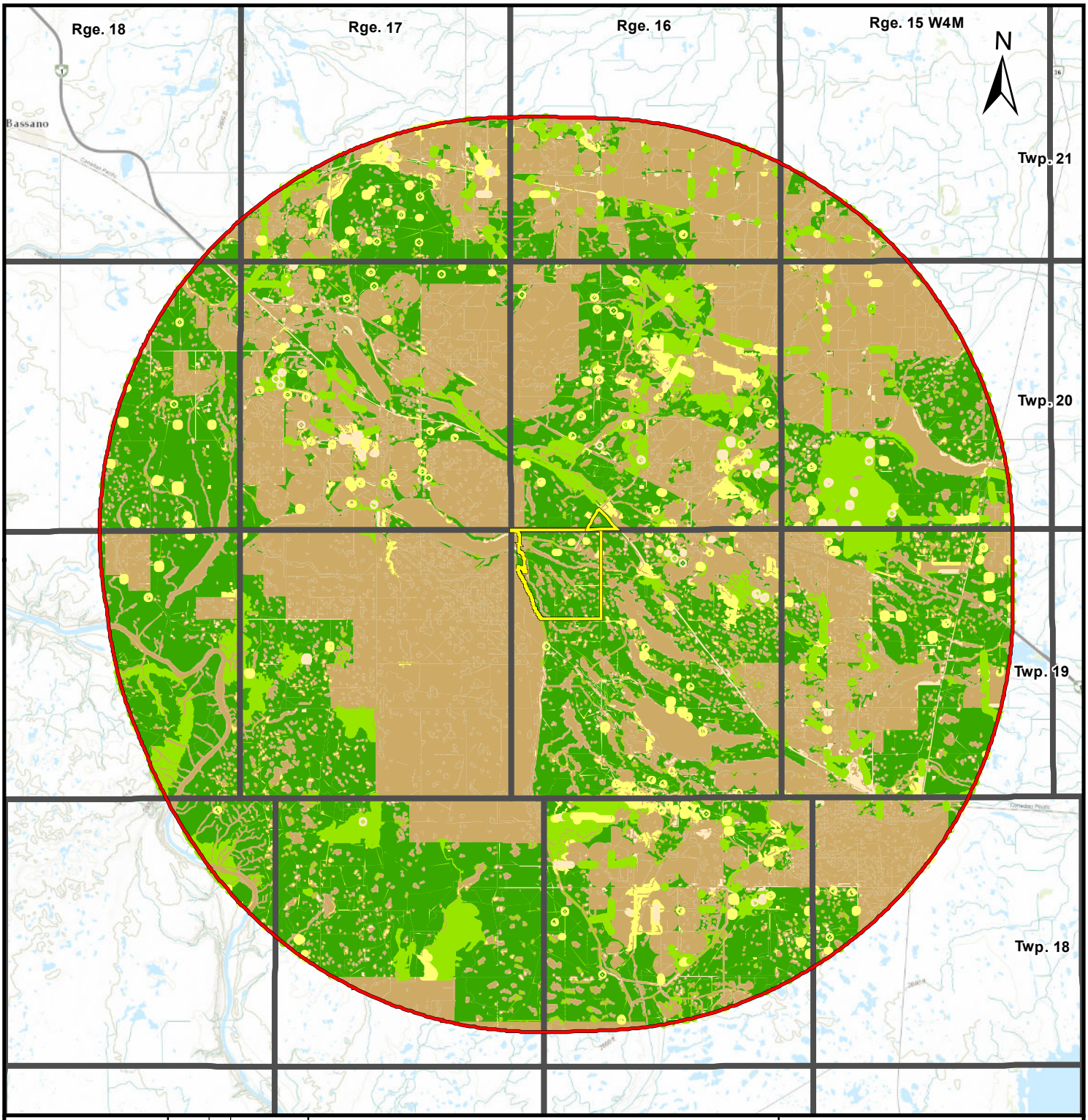
EID

Habitat Suitability for Sprague's Pipit Within the TLSA Reclaimed Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-16



SCALE: 1:200,000

1,500 0 1,500 3,000 m

Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.86 MULTISAR: The Milk River Basin Project.

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Legend

Routing:

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

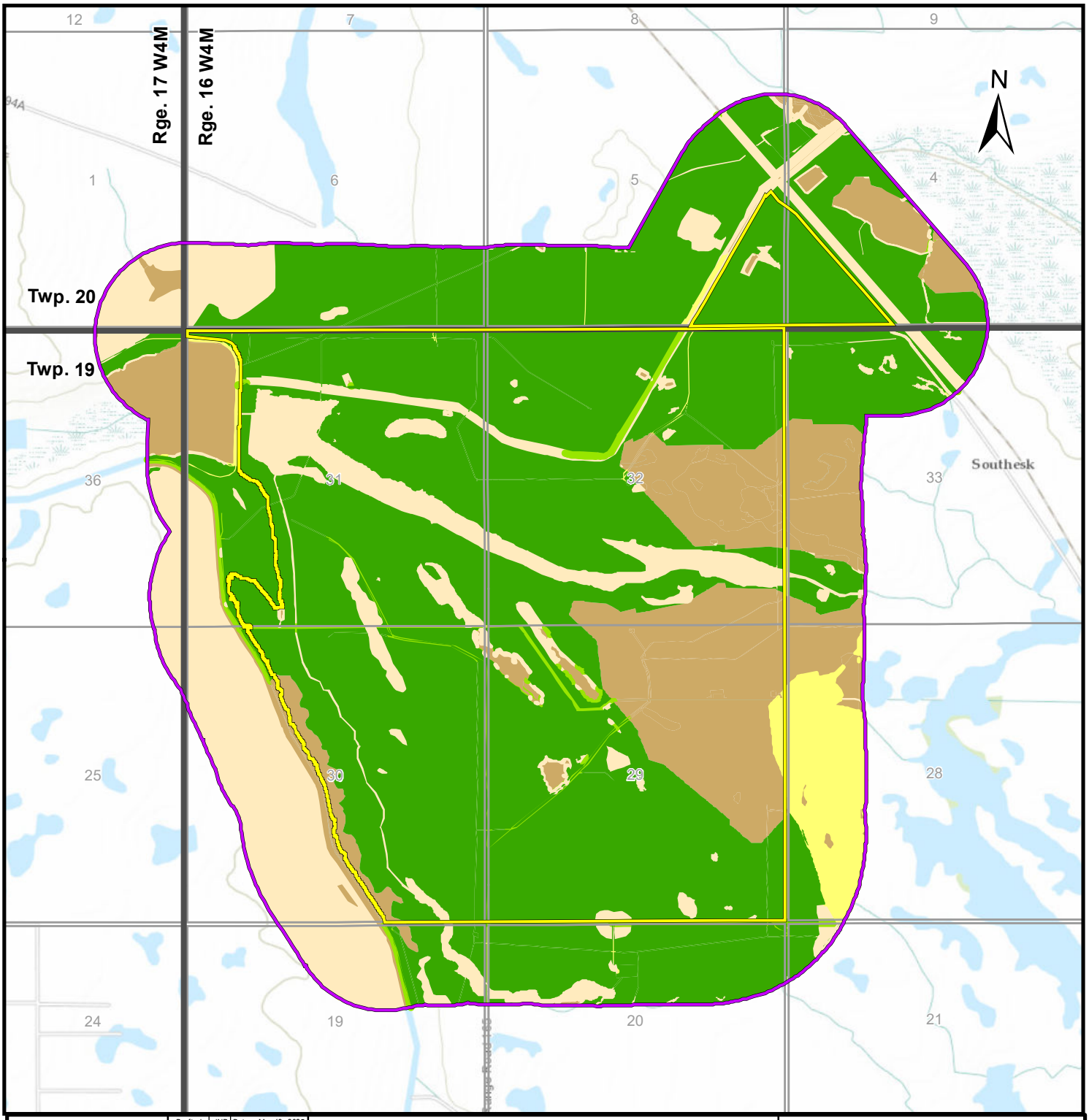
EID

Habitat Suitability for Sprague's Pipit Within the TRSA Baseline Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-17



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m
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Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.86 MULTISAR: The Milk River Basin Project.

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

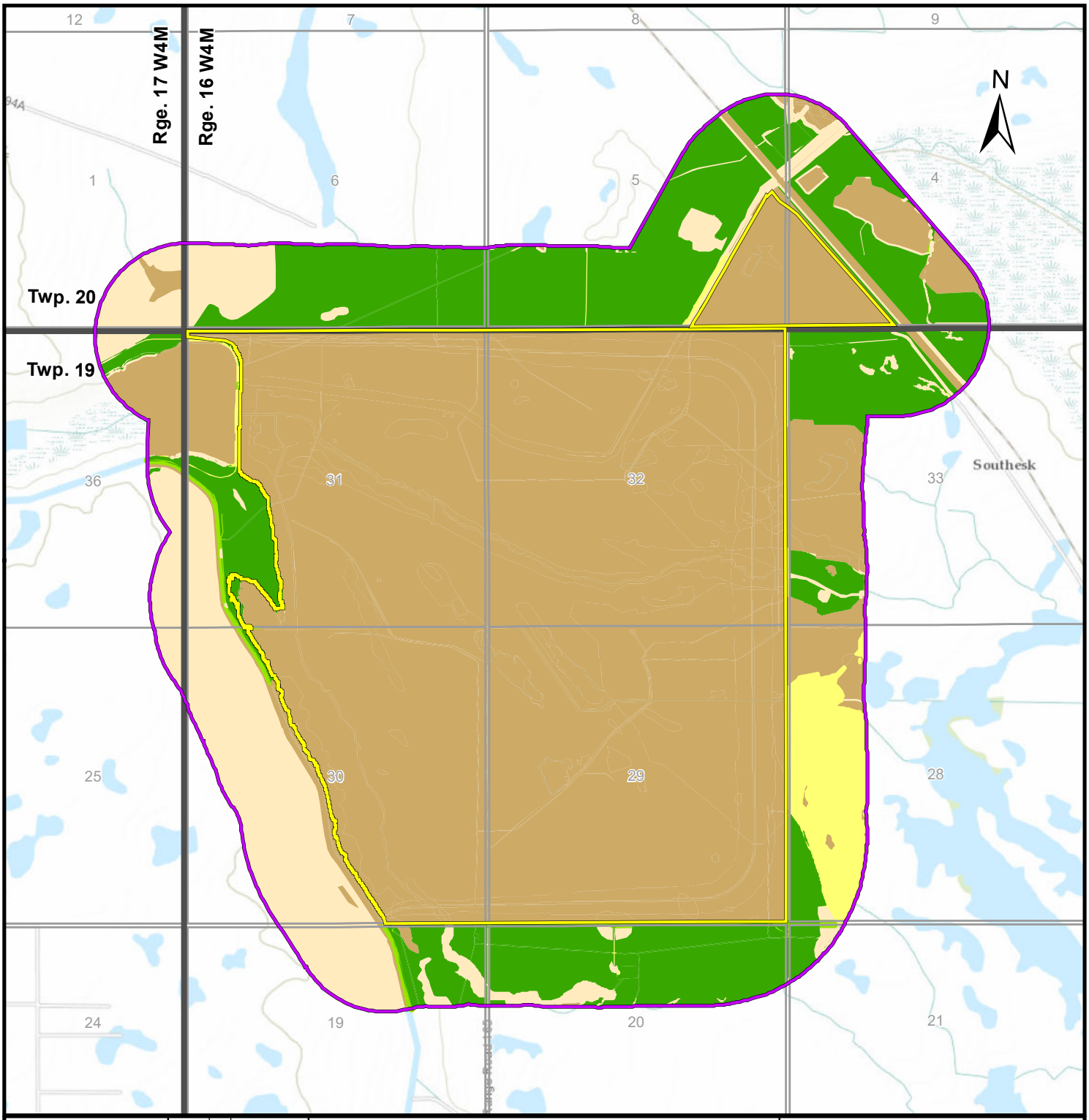
EID

Habitat Suitability for Richardson's Ground Squirrel Within the TLSA Baseline Case

March 2025

REF.: AARES21-127
(Wildlife HSI)

Figure I5-18



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Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

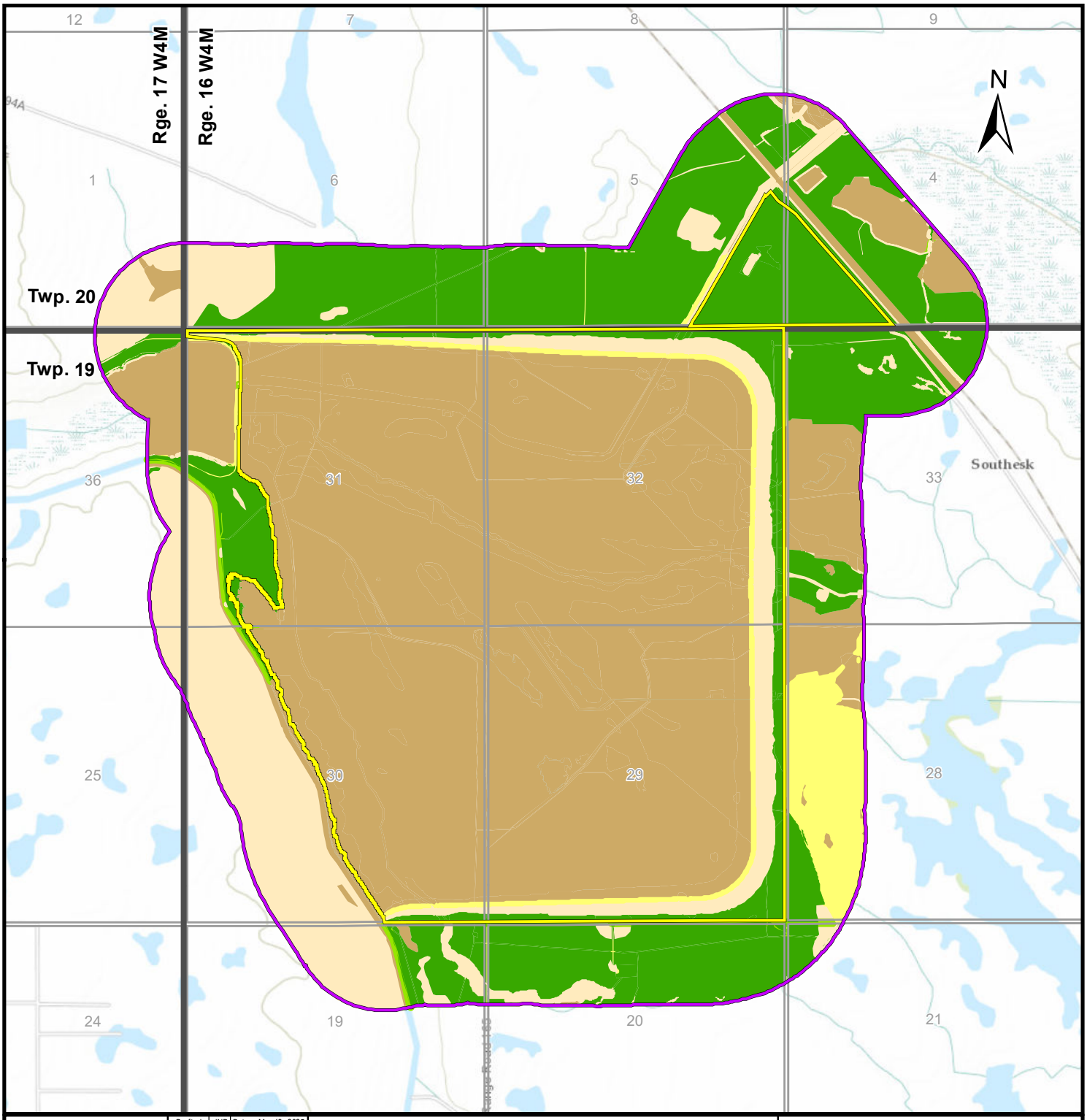
EID

Habitat Suitability for Richardson's Ground Squirrel Within the TLSA Project Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-19



SCALE: 1:30,000

200 0 200 400 m

Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

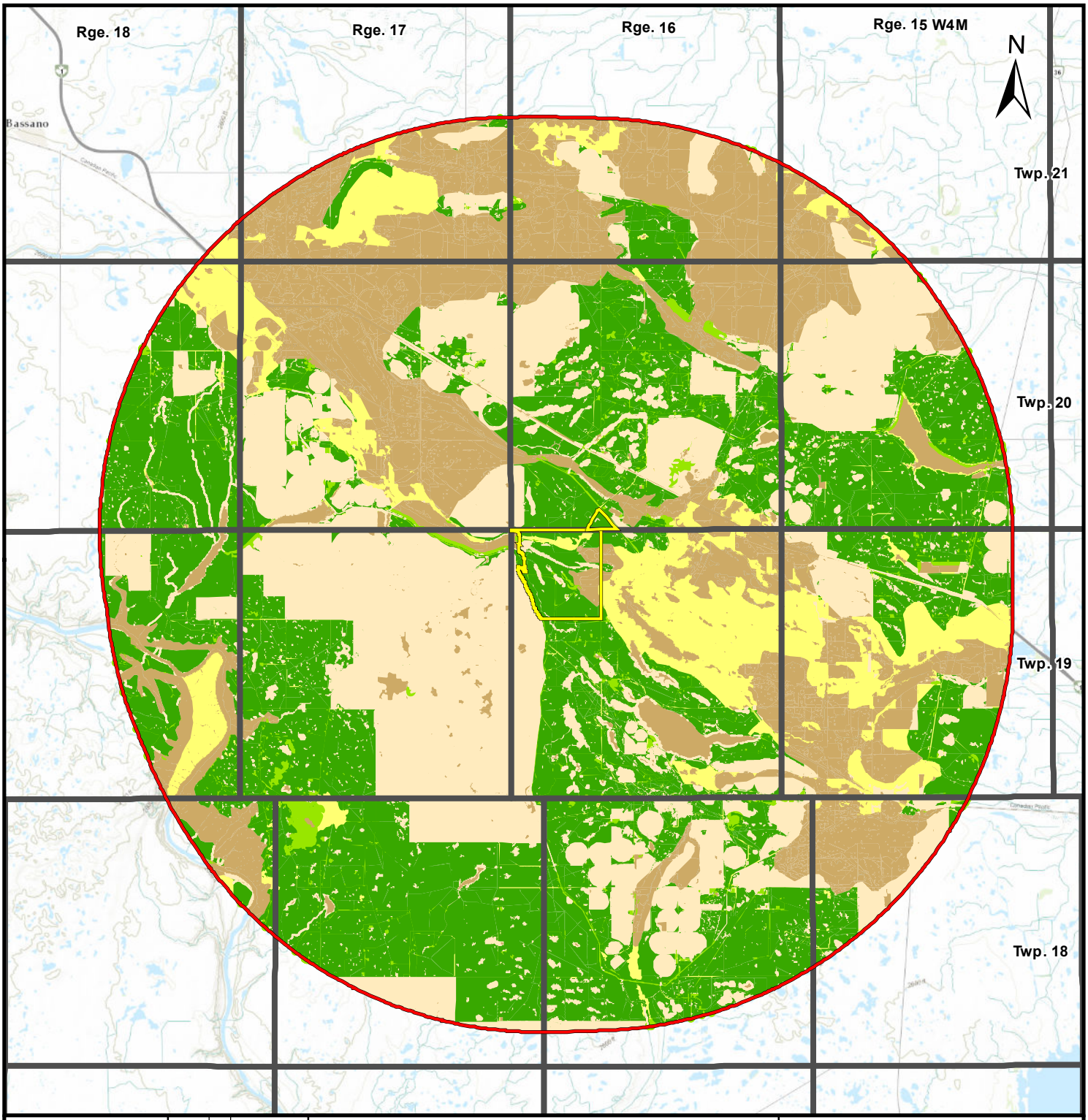
EID

Habitat Suitability for Richardson's Ground Squirrel Within the TLSA Reclaimed Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-20



SCALE: 1:200,000

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Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

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Legend

Routing:

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

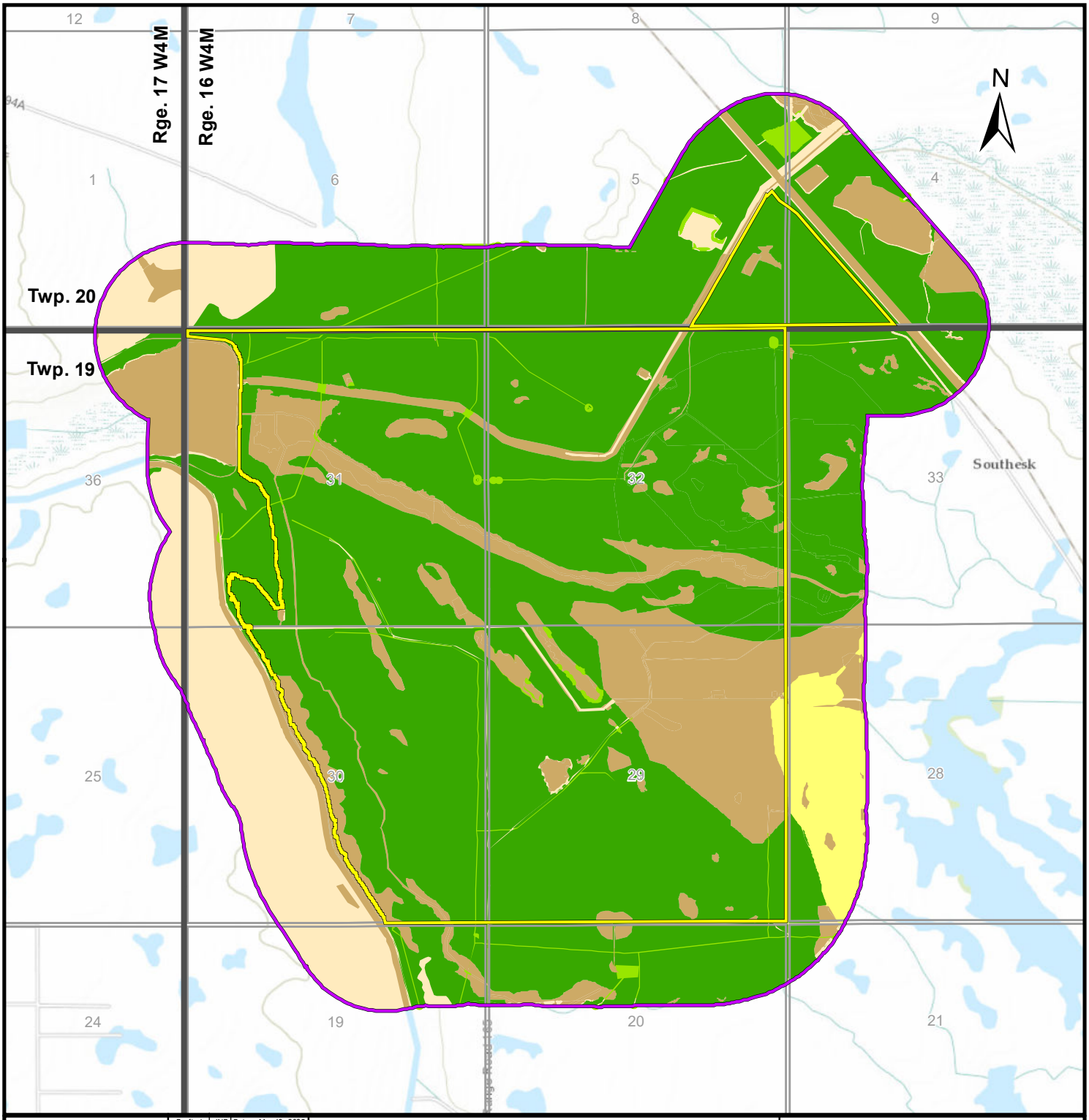
EID

Habitat Suitability for Richardson's Ground Squirrel Within the TRSA Baseline Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-21



SCALE: 1:30,000

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Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

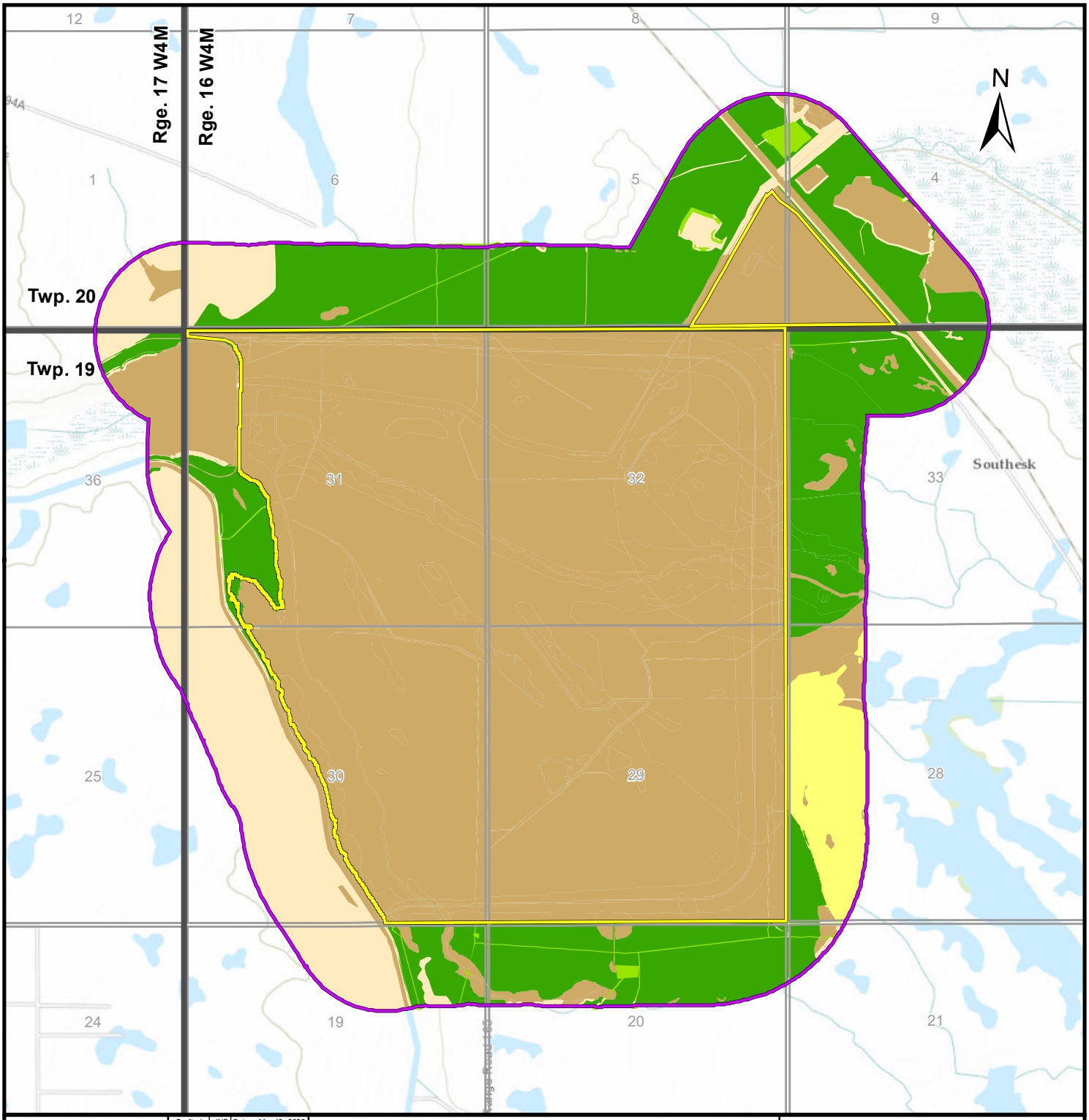
EID

Habitat Suitability for Ferruginous Hawk Within the TLSA Baseline Case

March 2026

REF.: AARES21-127 (Wildlife HSI)

Figure I5-22



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Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* Modified HSI model developed from the Alberta Species at Risk Report No.86 MULTISAR: The Milk River Basin Project.

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

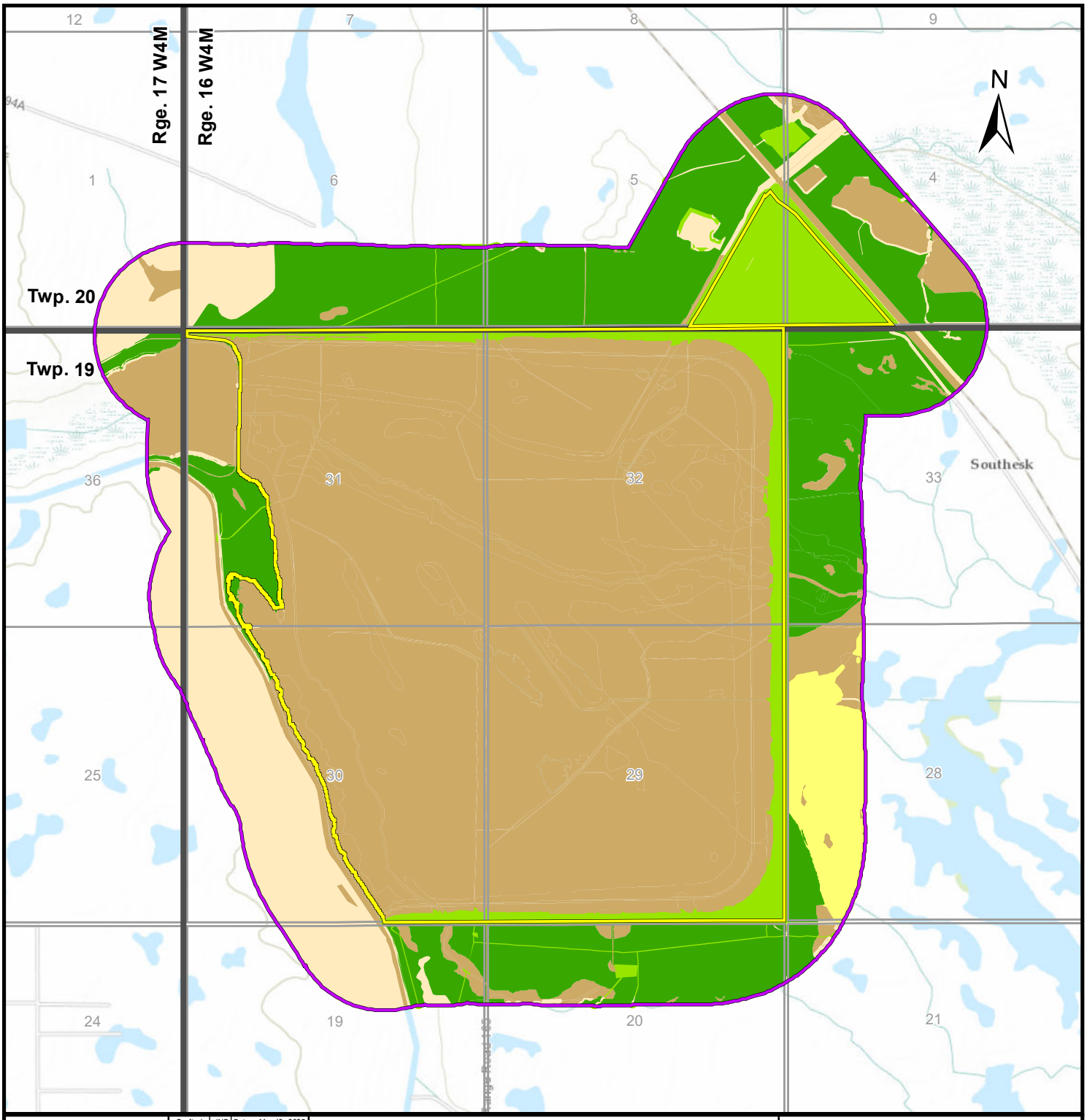
EID

Habitat Suitability for Ferruginous Hawk Within the TLSA Project Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-23



SCALE: 1:30,000

200 0 200 400 m

Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

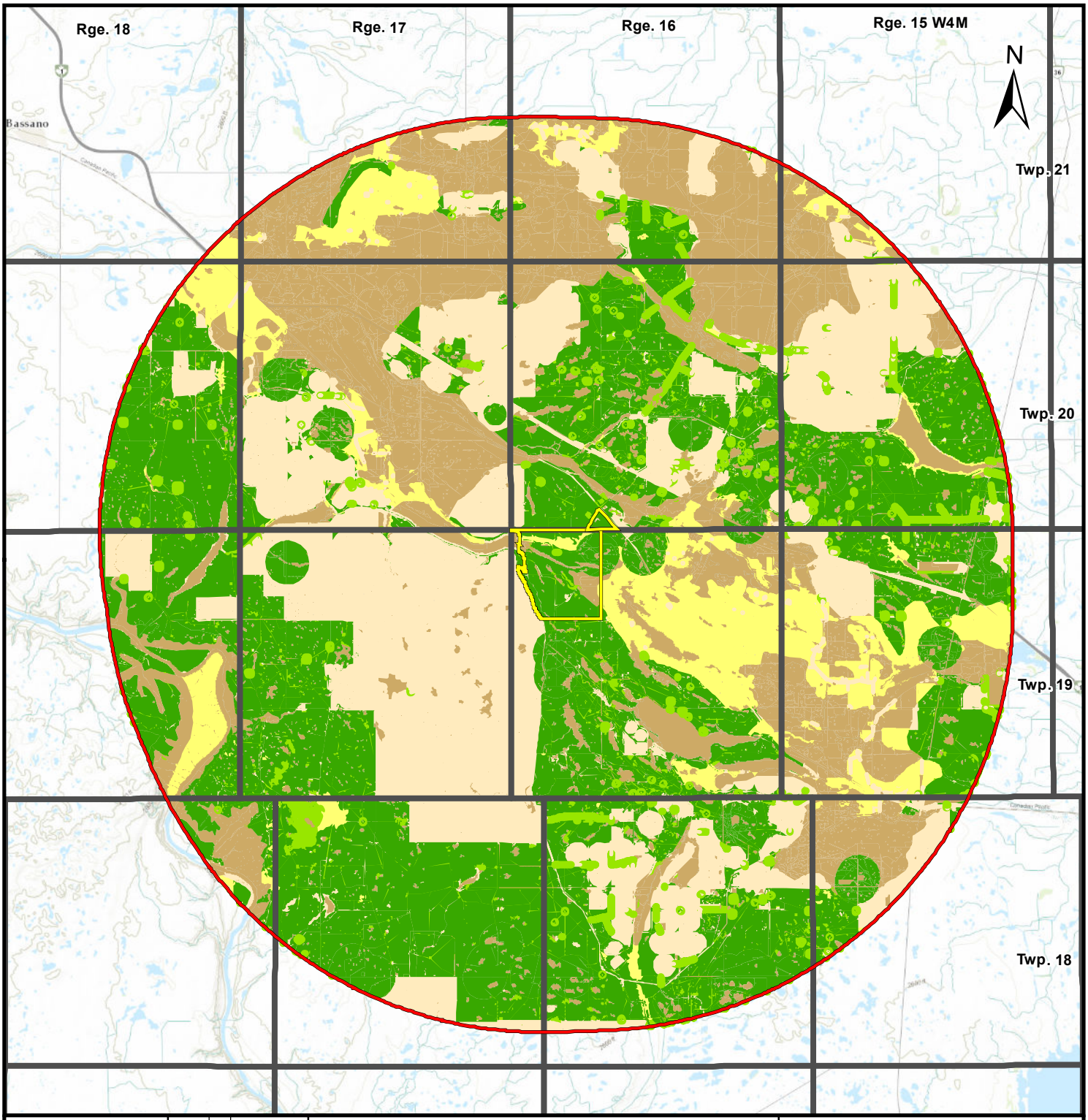
EID

Habitat Suitability for Ferruginous Hawk Within the TLSA Reclaimed Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-24



SCALE: 1:200,000

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Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

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Legend

Routing:

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

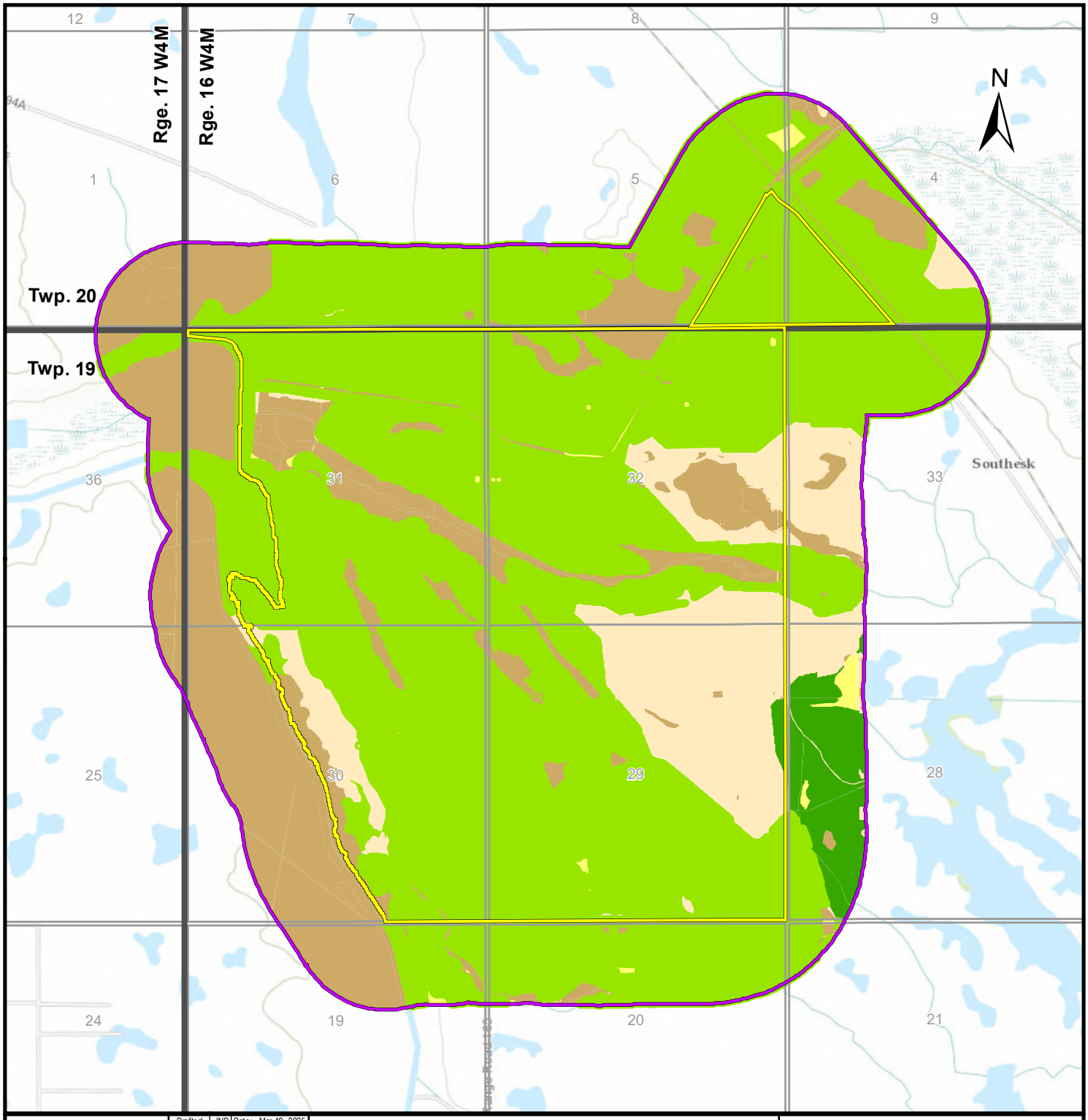
EID

Habitat Suitability for Ferruginous Hawk Within the TRSA Baseline Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-25



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Drafted:	JNB	Date:	Mar 19, 2025
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Route Source:		Date:	Feb 21, 2024
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Data Sources:
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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

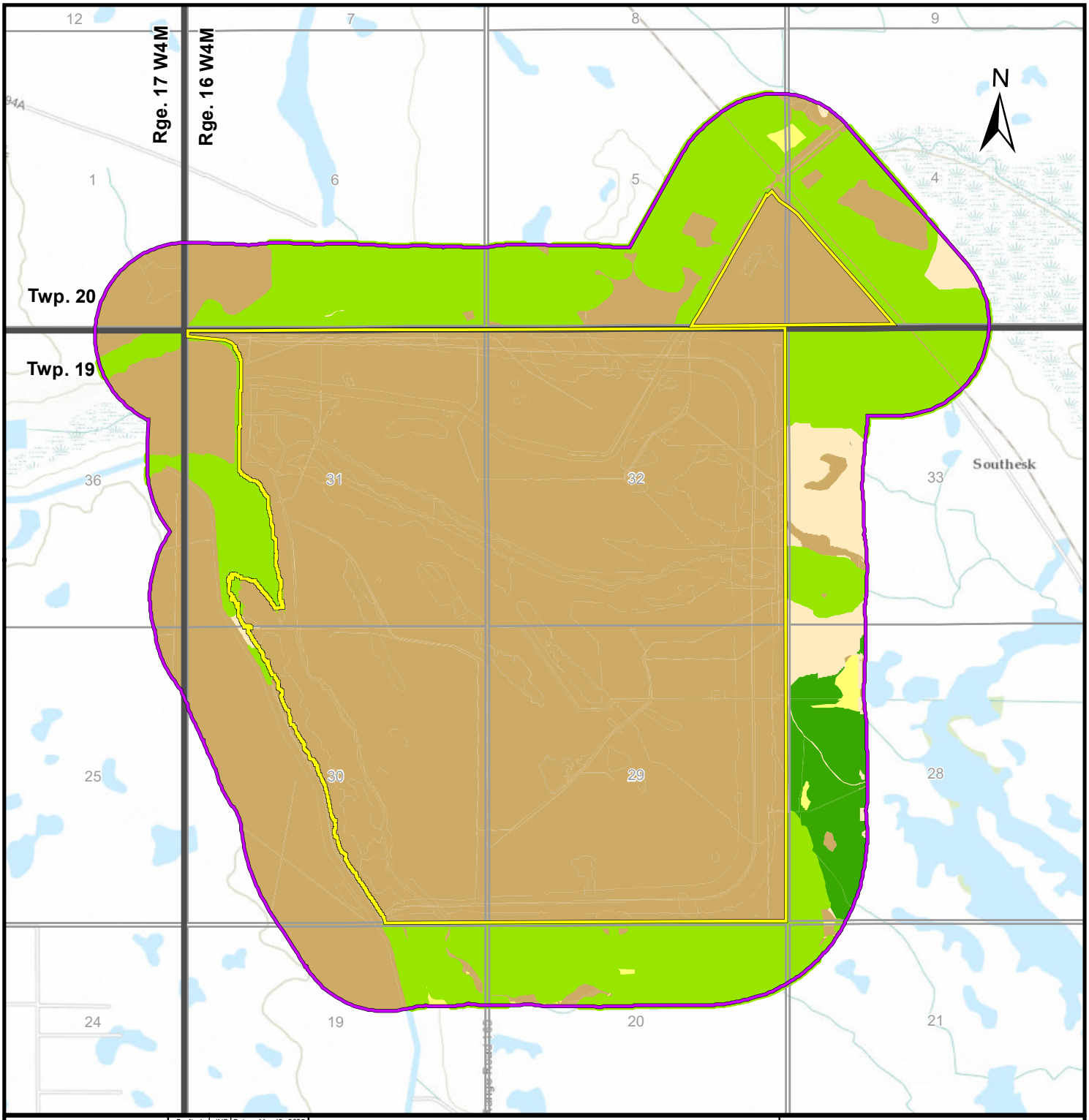
EID

Habitat Suitability for American Badger Within the TLSA Baseline Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-26



SCALE: 1:30,000

200 0 200 400 m

Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
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ATS Grid: AltaLIS 2007.

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

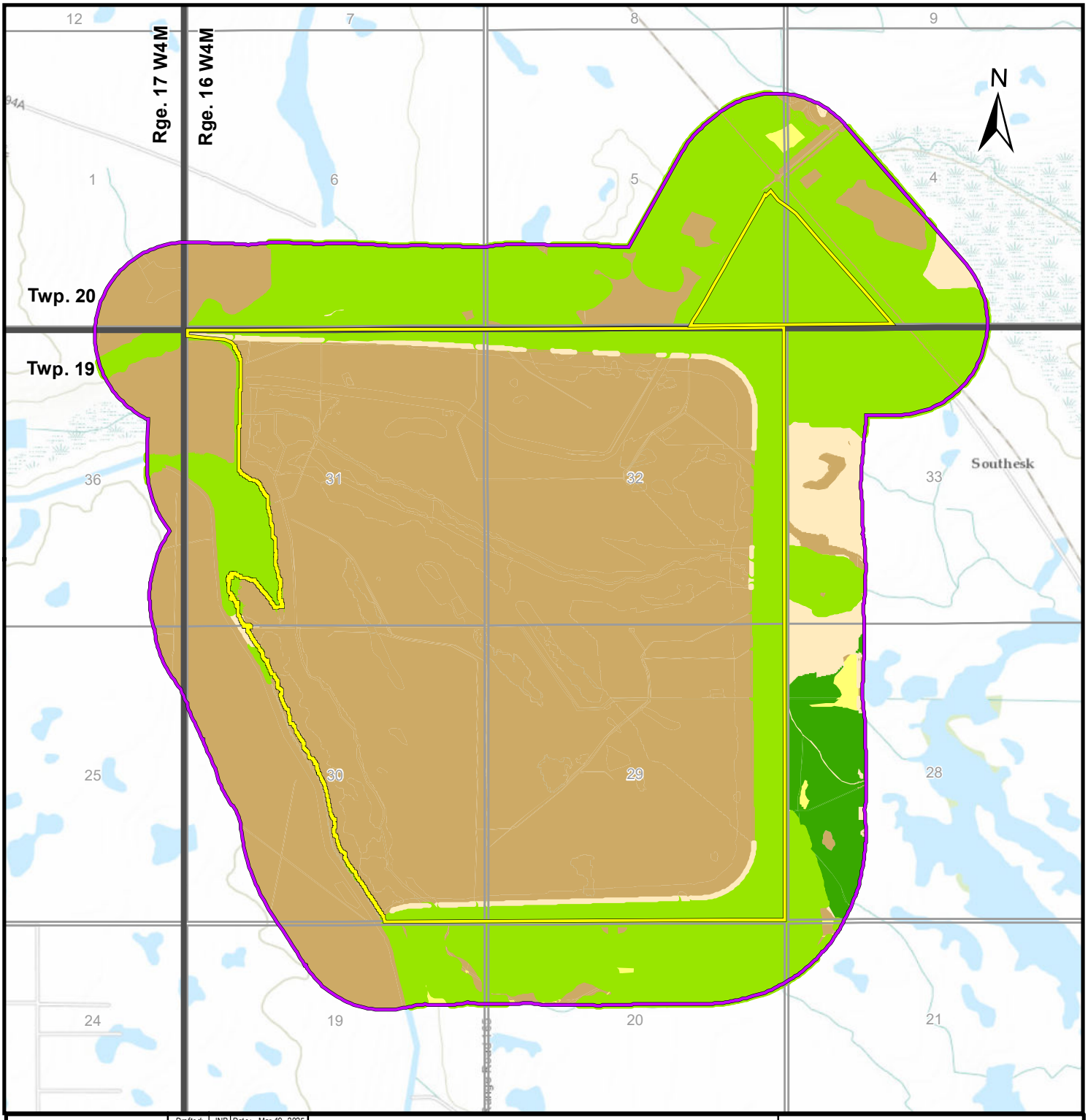
EID

Habitat Suitability for American Badger Within the TLSA Project Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-27



SCALE: 1:30,000

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Drafted:	JNB	Date:	Mar 19, 2025
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Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

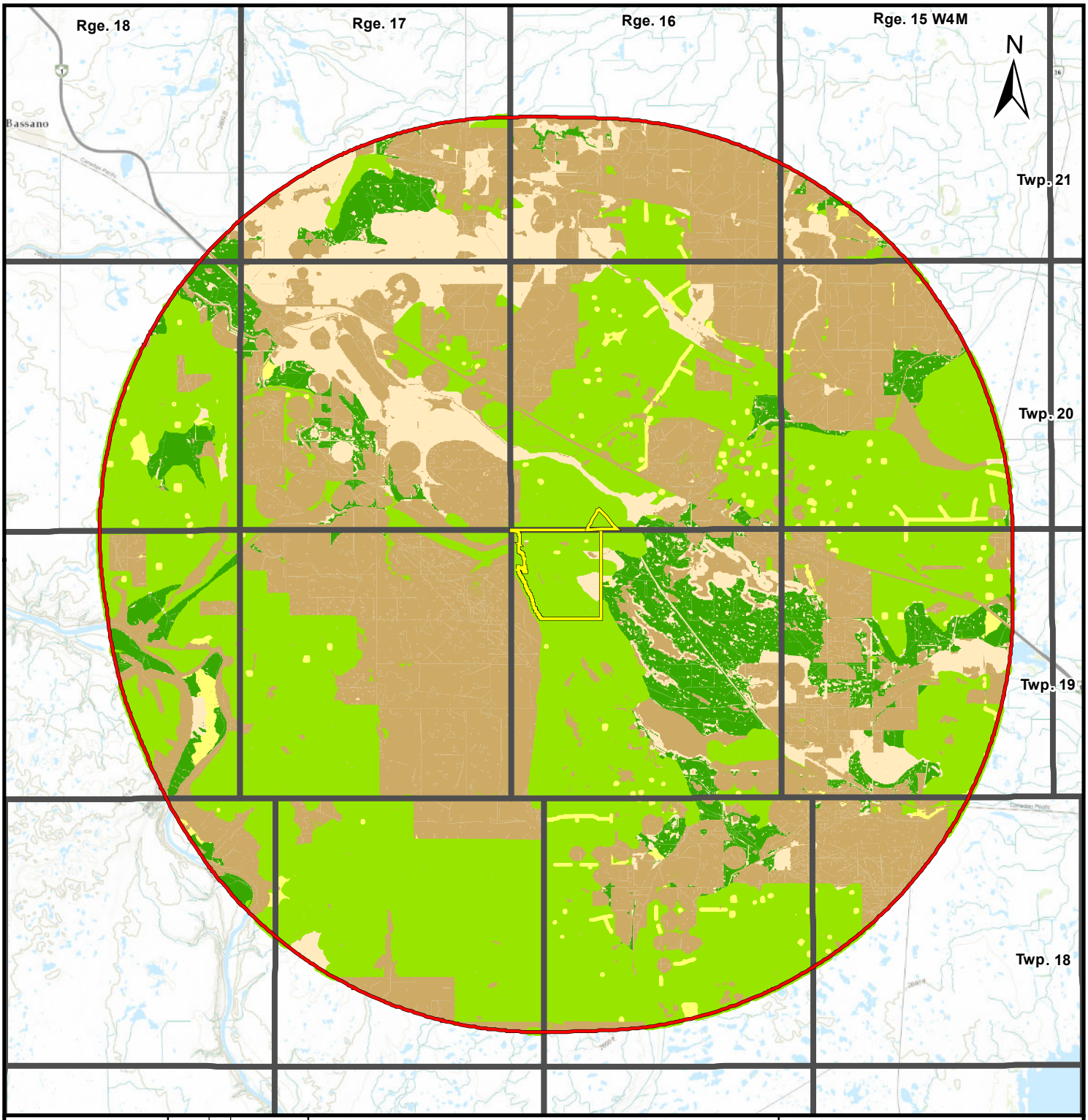
EID

Habitat Suitability for American Badger Within the TLSA Reclaimed Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-28



SCALE: 1:200,000

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Drafted:	JNB	Date:	Mar 19, 2025
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Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

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Legend

Routing:

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

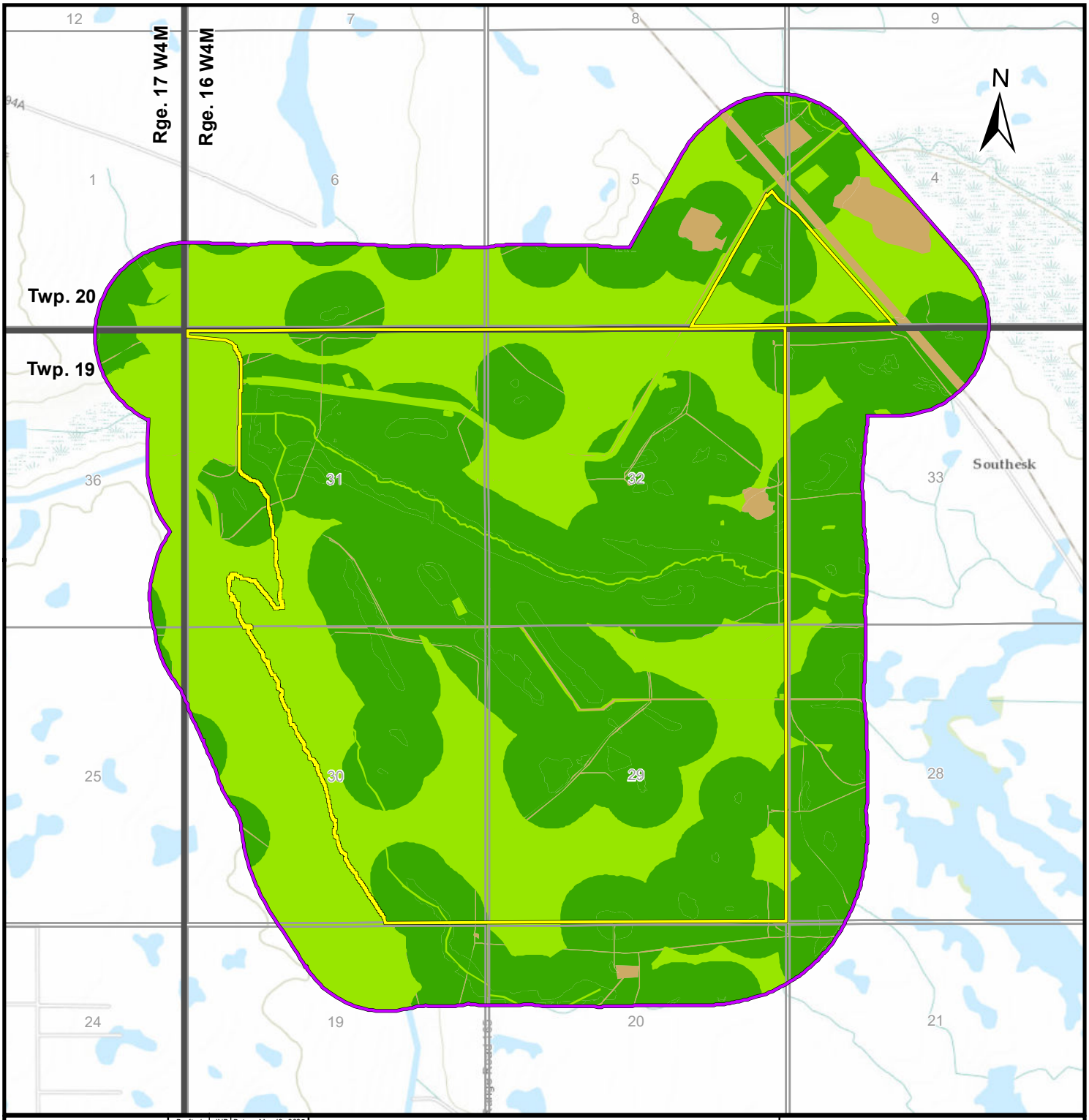
EID

Habitat Suitability for American Badger Within the TRSA Baseline Case

March 2025

REF.: AARES21-127 (Wildlife HSI)

Figure I5-29



SCALE: 1:30,000

200 0 200 400 m

Drafted:	JNB	Date:	Mar 19, 2025
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Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* HSI for general migratory waterbird species was based on the culmination of modified information from Helmers 1992, LaMontagne et al. 2003, Thomas 2008, Ewert et al. 2012, Skagen and Thompson 2013, Davis et al. 2016, Linscott and Senner 2021, Linhart et al. 2023

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

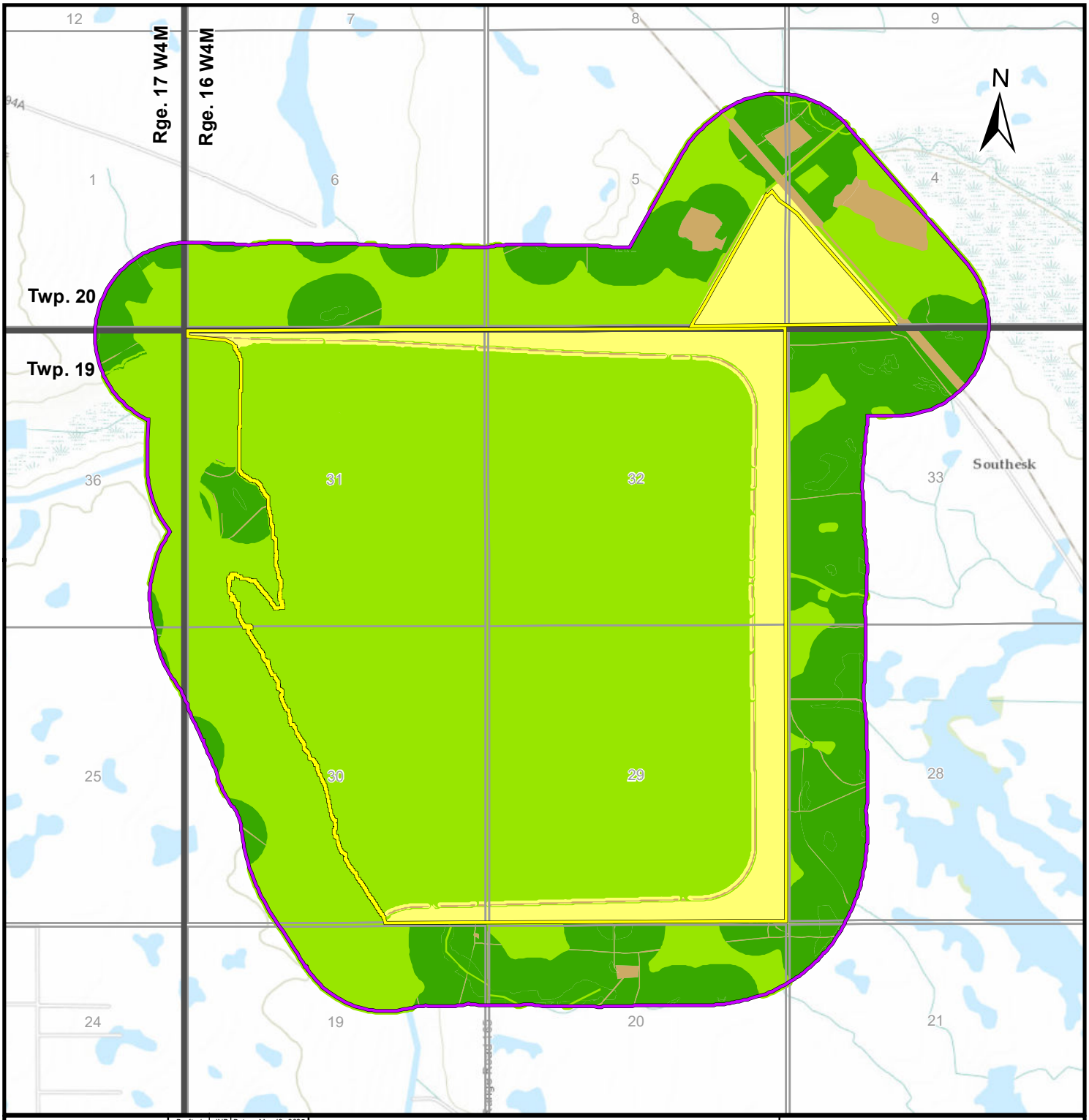
EID

Habitat Suitability for Migratory Bird Stopover Within the TLSA Baseline Case

March 2025

REF.: AARES21-127
(Wildlife HSI)

Figure I5-30



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200 0 200 400 m

Drafted:	JNB	Date:	Mar 19, 2025
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Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

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Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

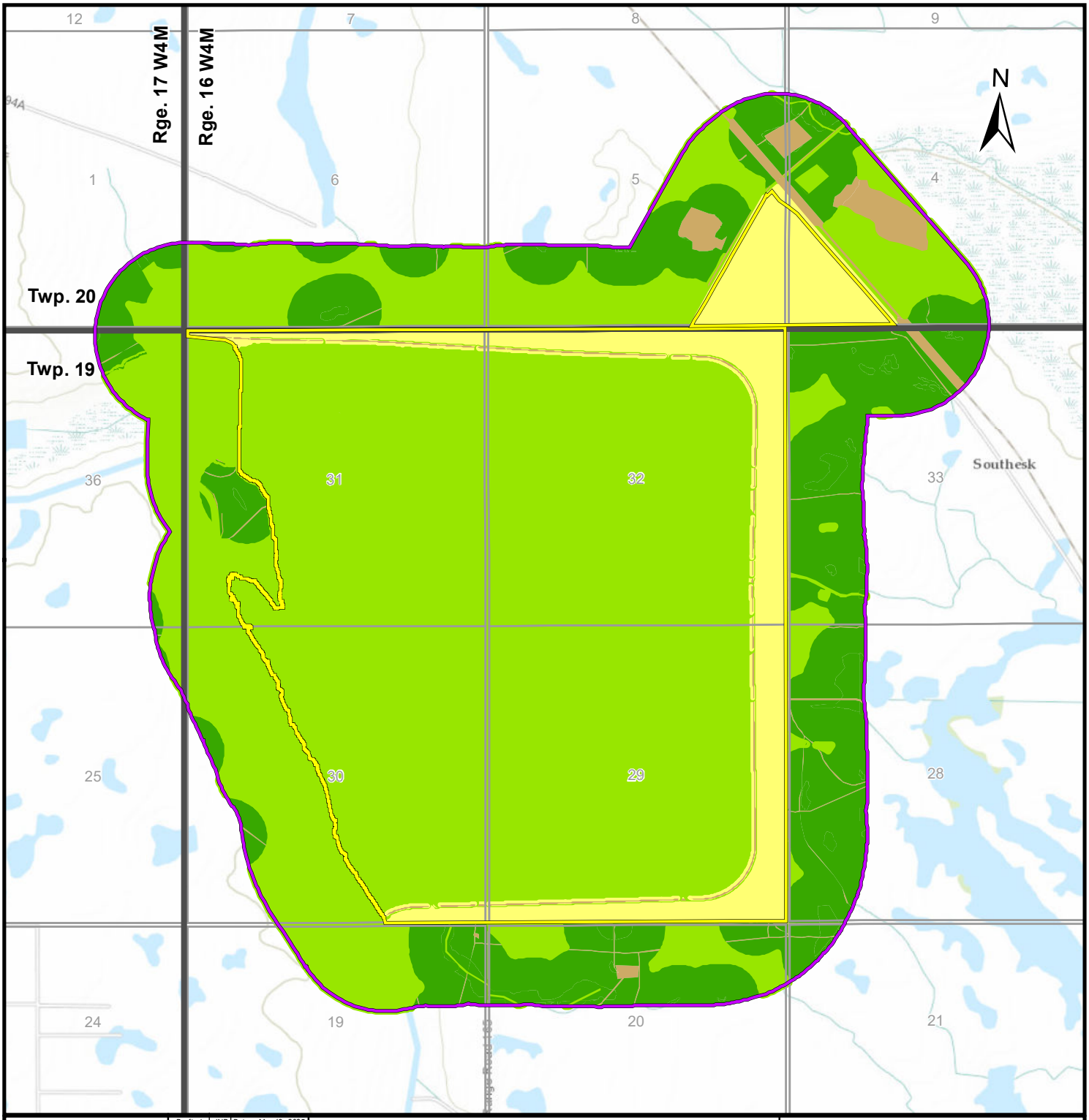
EID

Habitat Suitability for Migratory Bird Stopover Within the TLSA Project Case

March 2025

REF.: AARES21-127
(Wildlife HSI)

Figure I5-31



SCALE: 1:30,000

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Drafted:	JNB	Date:	Mar 19, 2025
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Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

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AAR Environmental Services

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Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Terrestrial Local Study Area (TLSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

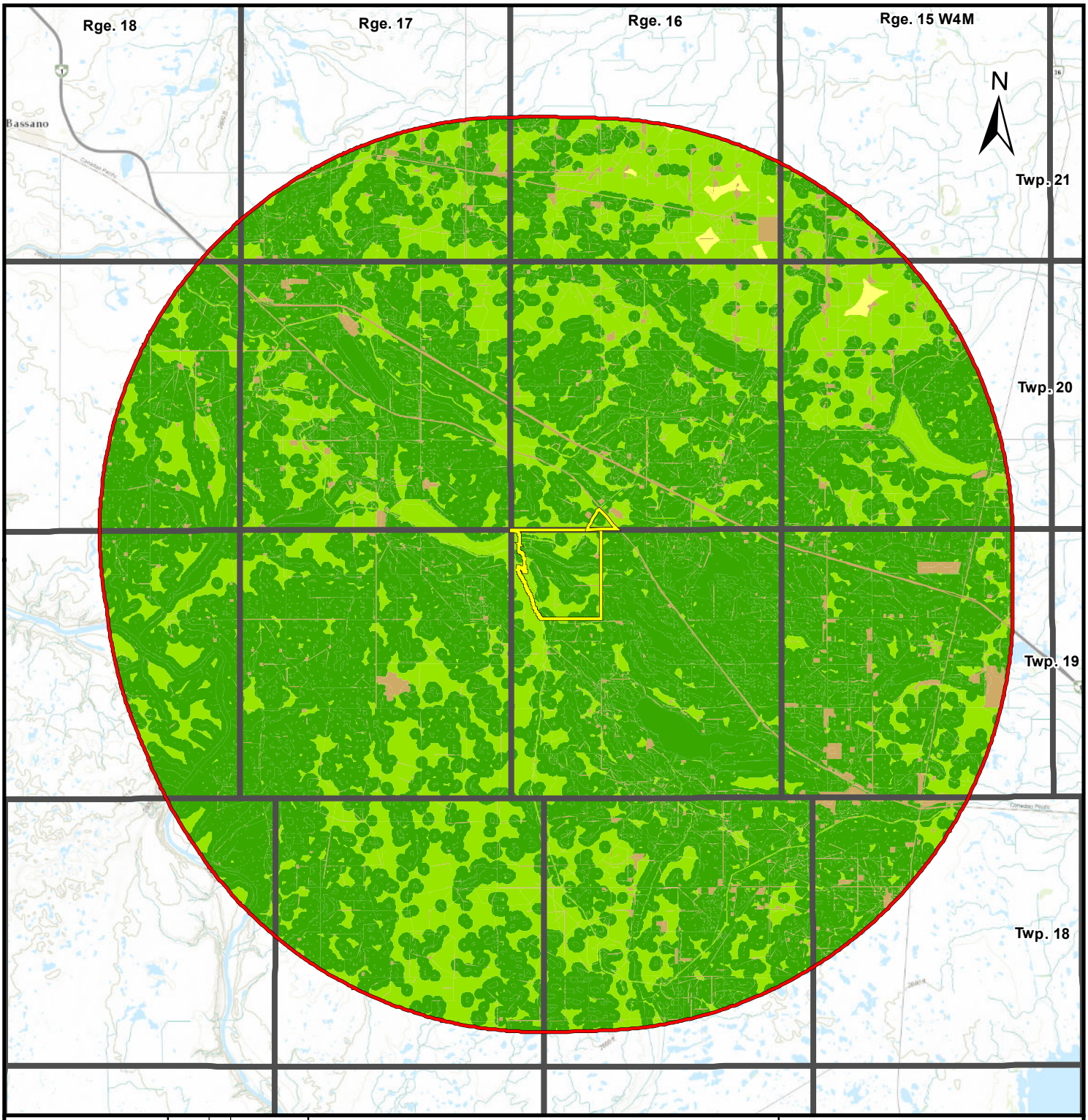
EID

Habitat Suitability for Migratory Bird Stopover Within the TLSA Reclaimed Case

March 2025

REF.: AARES21-127
(Wildlife HSI)

Figure I5-32



SCALE: 1:200,000

1,500 0 1,500 3,000 m

Drafted:	JNB	Date:	Mar 19, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Feb 21, 2024
PDF		Revision:	1

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

* HSI for general migratory waterbird species was based on the culmination of modified information from Helmers 1992, LaMontagne et al. 2003, Thomas 2008, Ewert et al. 2012, Skagen and Thompson 2013, Davis et al. 2016, Linscott and Senner 2021, Linhart et al. 2023

AAR Environmental Services

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Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing:

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area

Habitat Suitability Index*

- Very High
- High
- Moderate
- Low
- Poor

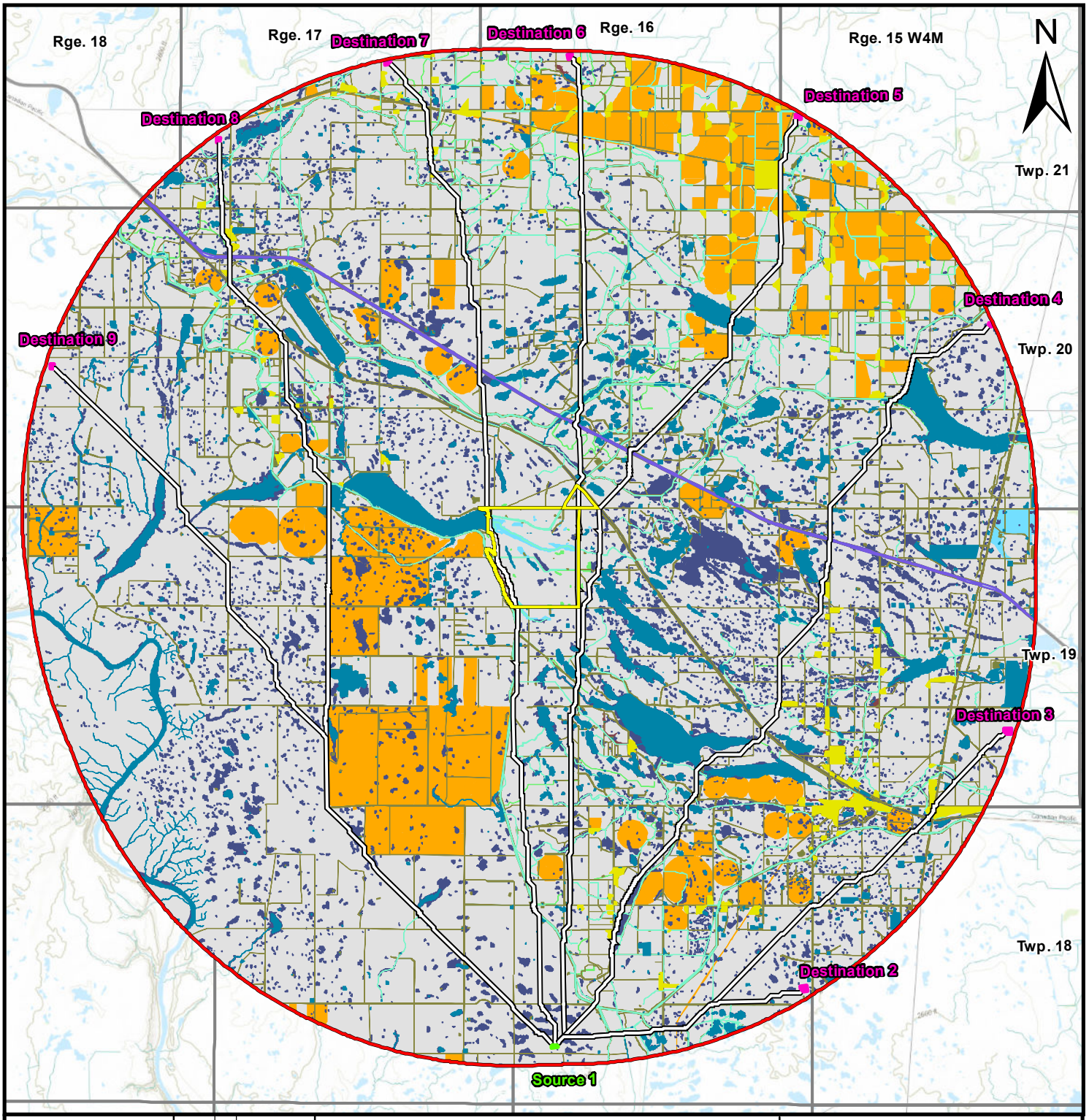
EID

Habitat Suitability for Migratory Bird Stopover Within the TRSA Baseline Case

March 2025

REF.: AARES21-127
(Wildlife HSI)

Figure I5-33



SCALE: 1:180,000

m

1,200 0 1,200 2,400

Drafted:	JNB	Date:	Mar 20, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Nov 4, 2024
Raster		Revision:	0

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Model Results from ESRI Least Cost Path GIS Tool.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area
- Least Cost Path
- Source Location
- Destination Location

Least Cost Path Resistance Value*

- 1 Grassland/Pasture
- 2 Ephemeral WB, Ditch
- 3 Cropland
- 4 Semi-permanent Marsh Road, Gravel Road
- 5 Paved Road, Trees
- 6 Permanent Marsh, Wetlands, Railway
- 7 Dugout, Barbed Wire Fence
- 8 Canal
- 9 Divided Highway
- 10 Residential, Developed
- 11 Reservoir, Open Water, Industrial

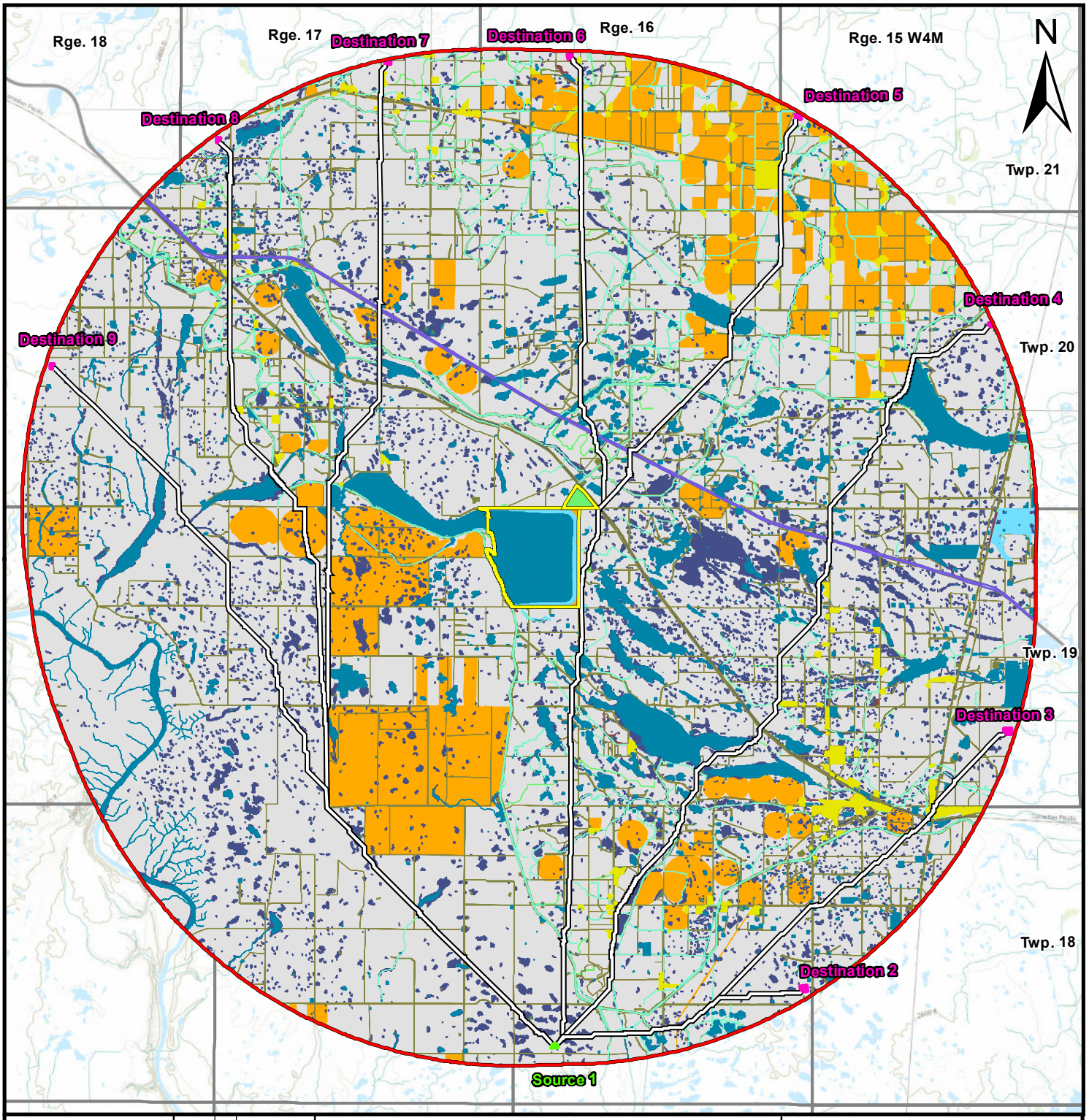
EID

Modelled Pronghorn Movement from Source 1 (South) to Eight Destinations Baseline Case

March 2025

REF.: AARES21-127 (Wildlife LCP)

Figure I5-34



SCALE: 1:180,000

m

1,200 0 1,200 2,400

Drafted:	JNB	Date:	Mar 20, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Nov 4, 2024
Raster		Revision:	0

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Model Results from ESRI Least Cost Path GIS Tool.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area
- Least Cost Path
- Source Location
- Destination Location

Least Cost Path Resistance Value*

- 1 Grassland/Pasture
- 2 Ephemeral WB, Ditch
- 3 Reclaimed Project Cropland
- 4 Semi-permanent Marsh Road, Gravel Road, Berm
- 5 Paved Road, Trees
- 6 Permanent Marsh, Wetlands, Railway
- 7 Dugout, Barbed Wire Fence
- 8 Canal
- 9 Divided Highway
- 10 Residential, Developed
- 11 Snake Lake Project, Reservoir, Open Water, Industrial

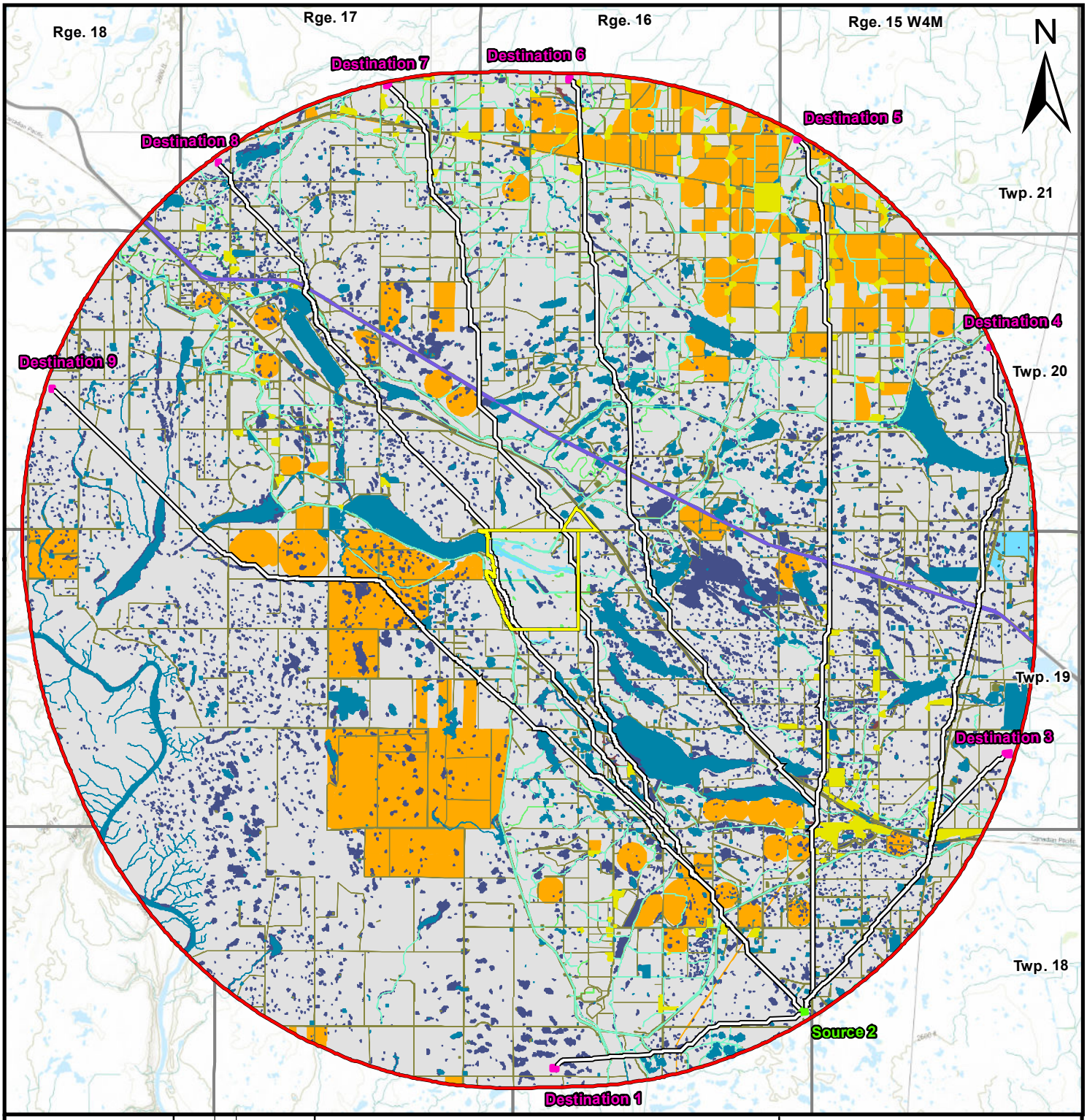
EID

Modelled Pronghorn Movement from Source 1 (South) to Eight Destinations Reclaimed Scenario

March 2025

REF.: AARES21-127 (Wildlife LCP)

Figure I5-35



SCALE: 1:180,000

m

1,200 0 1,200 2,400

Drafted:	JNB	Date:	Mar 20, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Nov 4, 2024
Raster		Revision:	0

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Model Results from ESRI Least Cost Path GIS Tool.

AAR Environmental Services

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Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area
- Least Cost Path
- Source Location
- Destination Location

Least Cost Path Resistance Value*

- 1 Grassland/Pasture
- 2 Ephemeral WB, Ditch
- 3 Cropland
- 4 Semi-permanent Marsh Road, Gravel Road
- 5 Paved Road, Trees
- 6 Permanent Marsh, Wetlands, Railway
- 7 Dugout, Barbed Wire Fence
- 8 Canal
- 9 Divided Highway
- 10 Residential, Developed
- 11 Reservoir, Open Water, Industrial

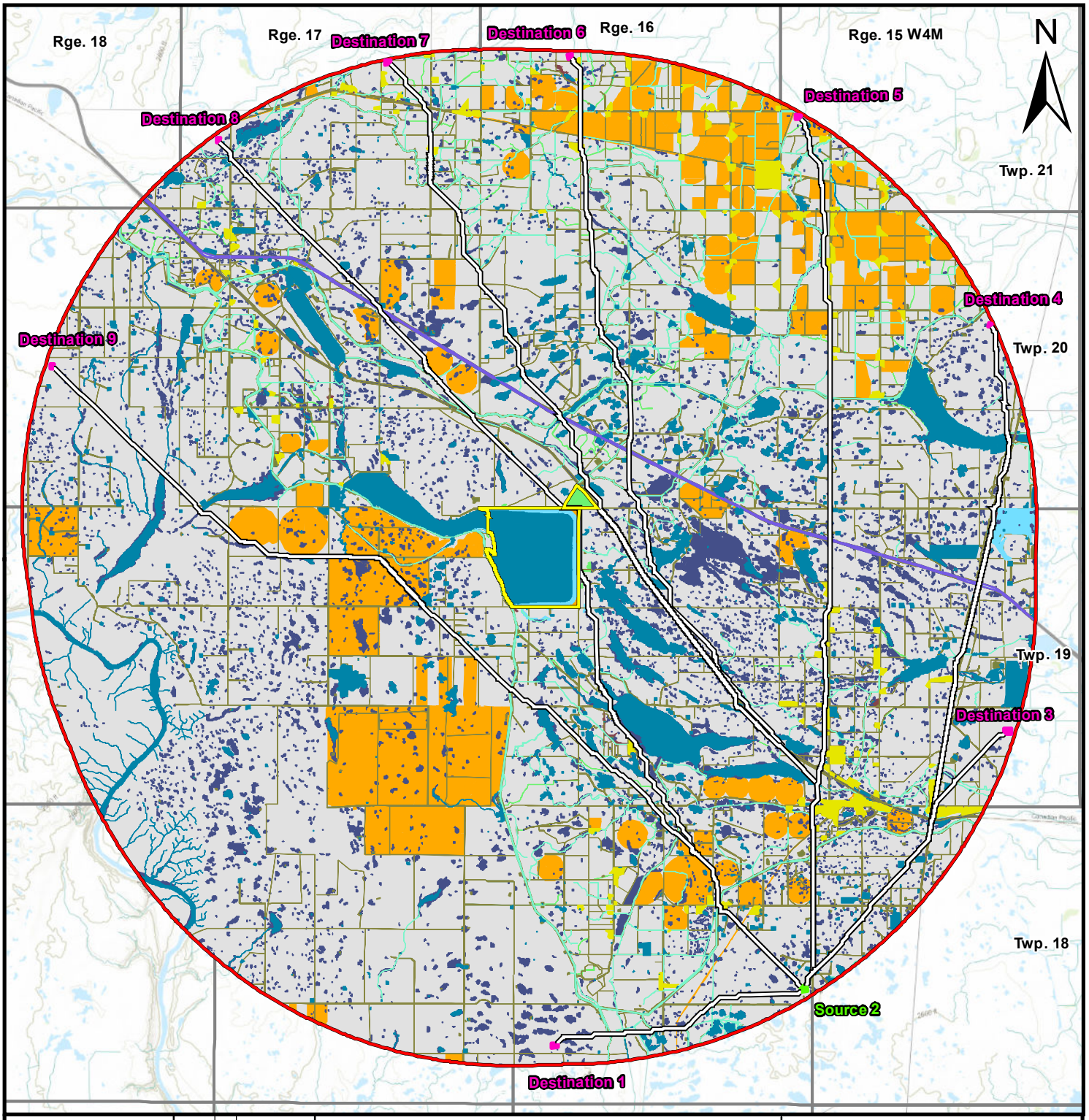
EID

Modelled Pronghorn Movement from Source 2 (Southeast) to Eight Destinations Baseline Scenario

March 2025

REF.: AARES21-127 (Wildlife LCP)

Figure I 5-36



SCALE: 1:180,000

1,200 0 1,200 2,400 m

Drafted:	JNB	Date:	Mar 20, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Nov 4, 2024
Raster		Revision:	0

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Model Results from ESRI Least Cost Path GIS Tool.

AAR Environmental Services

Please contact AARES for all other sources.

Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area
- Least Cost Path
- Source Location
- Destination Location

Least Cost Path Resistance Value*

- 1 Grassland/Pasture
- 2 Ephemeral WB, Ditch
- 3 Reclaimed Project Cropland
- 4 Semi-permanent Marsh Road, Gravel Road, Berm
- 5 Paved Road, Trees
- 6 Permanent Marsh, Wetlands, Railway
- 7 Dugout, Barbed Wire Fence
- 8 Canal
- 9 Divided Highway
- 10 Residential, Developed
- 11 Snake Lake Project, Reservoir, Open Water, Industrial

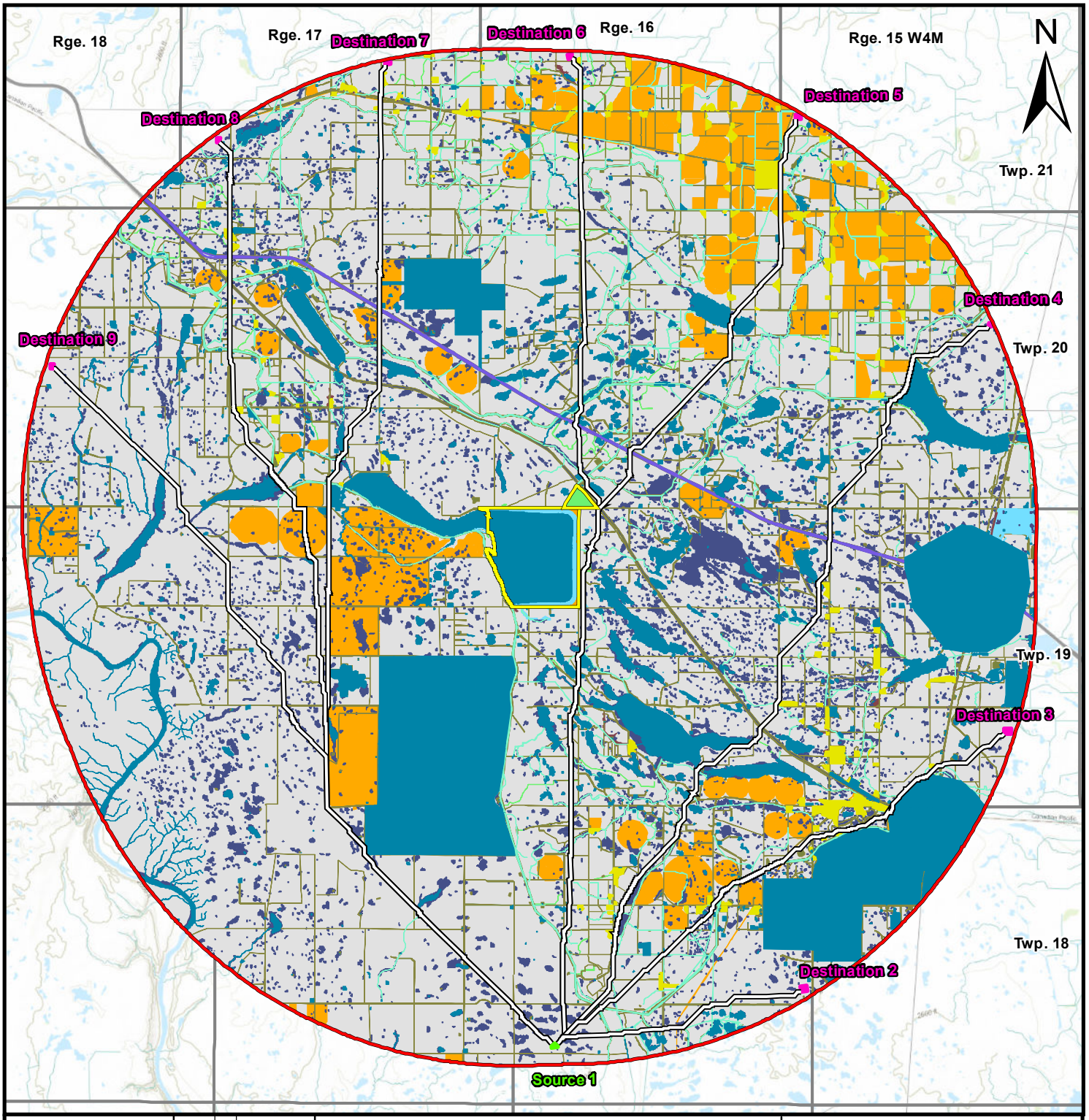
EID

Modelled Pronghorn Movement from Source 2 (Southeast) to Eight Destinations Reclaimed Scenario

March 2025

REF.: AARES21-127 (Wildlife LCP)

Figure I5-37



SCALE: 1:180,000
m
1,200 0 1,200 2,400

Drafted:	JNB	Date:	Mar 20, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Nov 4, 2024
Raster		Revision:	0

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Model Results from ESRI Least Cost Path GIS Tool.

AAR Environmental Services

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Please note that the topographic map is from 2010 (NRCAN) and although we have no reason to doubt the accuracy and completeness of it, users should be aware discrepancies may be present.

Legend

Routing

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area
- Least Cost Path
- Source Location
- Destination Location

Least Cost Path Resistance Value*

- 1 Grassland/Pasture
- 2 Ephemeral WB, Ditch
- 3 Reclaimed Project Cropland
- 4 Semi-permanent Marsh Road, Gravel Road, Berm
- 5 Paved Road, Trees
- 6 Permanent Marsh, Wetlands, Railway
- 7 Dugout, Barbed Wire Fence
- 8 Canal
- 9 Divided Highway
- 10 Residential, Developed
- 11 Snake Lake Project, Reservoir, Open Water, Industrial Solar Projects, Agribusiness Development

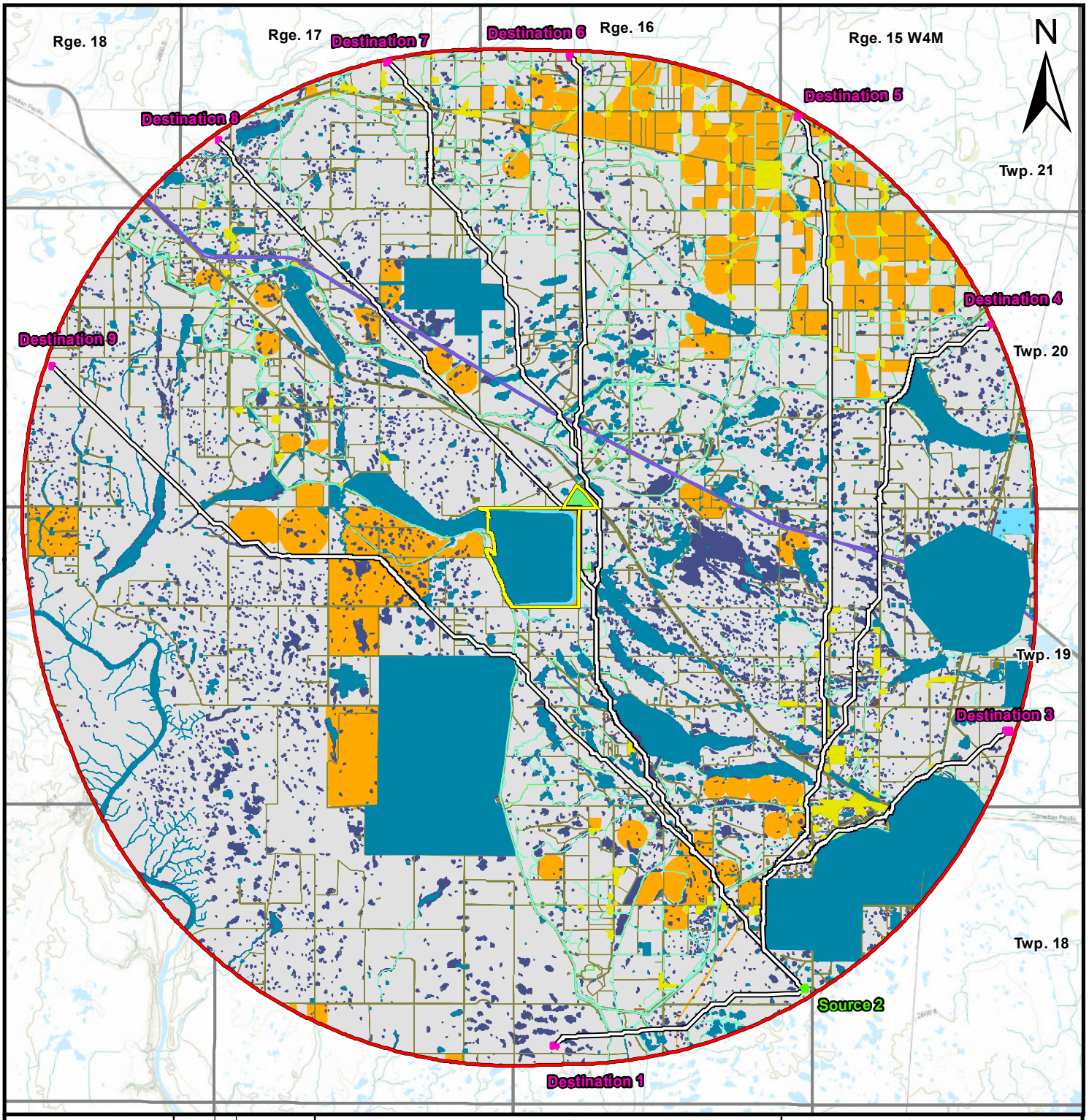
EID

Modelled Pronghorn Movement from Source 1 (South) to Eight Destinations Cumulative Effects Scenario

March 2025

REF.: AARES21-127
(Wildlife LCP)

Figure I5-38



SCALE: 1:180,000

m

1,200 0 1,200 2,400

Drafted:	JNB	Date:	Mar 20, 2025
Approved:	DS	Revision:	0
Route Source:		Date:	Nov 4, 2024
Raster		Revision:	0

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*Model Results from ESRI Least Cost Path GIS Tool.

AAR Environmental Services

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Legend

Routing

- Terrestrial Regional Study Area (TRSA)
- Snake Lake Reservoir Expansion Project Area
- Least Cost Path
- Source Location
- Destination Location

Least Cost Path Resistance Value*

- 1 Grassland/Pasture
- 2 Ephemeral WB, Ditch
- 3 Reclaimed Project Cropland
- 4 Semi-permanent Marsh Road, Gravel Road, Berm
- 5 Paved Road, Trees
- 6 Permanent Marsh, Wetlands, Railway
- 7 Dugout, Barbed Wire Fence
- 8 Canal
- 9 Divided Highway
- 10 Residential, Developed
- 11 Snake Lake Project, Reservoir, Open Water, Industrial Solar Projects, Agribusiness Development

EID

Modelled Pronghorn Movement from Source 2 (Southeast) to Eight Destinations Cumulative Effects Scenario

March 2025

REF.: AARES21-127
(Wildlife LCP)

Figure I5-39