
Volume 1, Section 3 Snake Lake Reservoir Expansion Project Project Description Constraints



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Executive Summary

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). The Project, located between the Town of Bassano and City of Brooks in Alberta, involves the construction of a roughly 8 km long, up to 20 m high dam to increase the storage capacity of the reservoir system from 19.25 million m³ to 87.4 million m³. This document provides a comprehensive description of the constraints to development in local and regional study areas surrounding the Project which meets the requirements outlined in the Final Terms of Reference (FTOR; Volume 2, Appendix A).

Multiple agreements, guidelines, jurisdictions, and management issues were analyzed to determine potential constraints to the Project. There are various best management practices (BMPs) outlined in the South Saskatchewan Regional Plan (SSRP; Government of Alberta [GOA], 2018) that constrain development, including items related to agriculture, energy resources, air emissions, biodiversity and ecosystems. Multiple Water Management Plans (WMP) and Watershed Plans, including the South Saskatchewan Region Surface Water Quality Management Framework, the instream objective (IO) for the Bow River below Bassano Dam, the provincial Drought Response Plan, and Bow River Basin Water Plan, are not constraints to development. Additionally, there are no constraints to development relating to Municipal Plans. The EID helps meet requirements in the apportionment agreement with Saskatchewan by ensuring 50% of base flow out of the South Saskatchewan River and its tributaries is always achieved. EID ensures this is met as part of its allocation under its Water Licence, and as no new water needs to be allocated for the Project, apportionment will not be affected. The Project aligns with the EID's Integrated Resource Management Strategy, which aims to improve management of land and natural resources within the EID, maintain healthy ecosystems, and contribute to the development of a strong, diversified, and sustainable economy (GOA, 1995), therefore this plan is not a constraint to development.

Environmental concerns and socio-economic factors were also investigated to outline potential constraints to development. No Traditional Land Use and Water Use constraints were identified for the Project, however it is unknown if there are any Traditional Use sites in or near the Project area as a Traditional Ecological Knowledge and Traditional Land Use study has not been completed. Environmental surveys and data analysis assessed potential environmental constraints relating to landscape features, soils, climate, native grasslands, weeds, wetlands, and wildlife. To address biophysical constraints and reduce the effects of grassland losses, EID plans to offset a portion of the losses by restoring native grasslands on the berms and other lands surrounding the Project area. Regional monitoring programs occur in the areas surrounding the Project to provide useful information on water quality and quantity, wildlife, vegetation and other resources. There have been no results identified that act as constraints to development and the monitoring activities are not constraints to development.

Regarding the possible constraints relating to the potential for changes in the regulatory regime, the specific regulatory changes for this Project area are not known or currently disclosed; therefore, these cannot be evaluated or discussed.



The criteria for site selection and potential constraints were discussed for multiple Project components including the new reservoir dam, water source, water conveyance structures, borrow sites, temporary facility, transportation and storage sites, and material disposal sites. The criteria for site selection includes but is not limited to the Project being located upstream of irrigable lands, availability of private lands, presence of protected areas. Infrastructure including road, irrigation and energy affected by the Project was considered, and where constraints existed, potential mitigation measures were discussed. Infrastructure including road, irrigation and energy affected by the Project was considered and mitigations were put in place.

A Historical Resources Impact Assessment (HRIA) was conducted. As cultural constraints were not identified for the Project site, they are not a constraint to development.

No soil stripping, excavation, or berm construction is permitted until the Project is approved by the Natural Resources Conservation Board (NRCB) under the Environmental Impact Assessment (EIA) process, however preparatory activities including vehicle access, tree clearing, site measurements, additional drilling programs, and rock hauling and storage may be completed as long as they avoid the mapped constraints.

The Project area lands are owned privately by the EID, with the exception of a road allowance in the centre of the expansion area. This road allowance is considered public land, being managed by the County of Newell. This road allowance is a constraint to development until it is closed and the land sold or leased to the EID. The road allowance is in the process of being closed by the county and the province, and the land will be leased to the EID. No approvals are needed under the *Public Lands Act*.



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Abbreviations

ABMI	Alberta Biodiversity Monitoring institute
ACIMS	Alberta Conservation Information Management System
ACSW	Alberta Arts, Culture and Status of Women
AIM	Alberta Irrigation Modernization
Alberta EPA	Alberta Environment and Protected Areas
asl	Above Sea Level
ATEC	Alberta Transportation and Economic Corridors
BMPs	Best Management Practices
CPKC	Canada Pacific Kansas City
DUC	Ducks Unlimited Canada
EDRAP	Economic Development in Rural Alberta Plan
EIA	Environmental Impact Assessment
EID	Eastern Irrigation District
EPEA	<i>Environmental Protection and Enhancement Act</i>
ESA	Environmentally Significant Area
ESC	Erosion Sedimentation Control
FSL	Full Supply Level
FTOR	Final Terms of Reference
FWMIS	Fish and Wildlife Management Information System
GOA	Government of Alberta
GOC	Government of Canada
HRIA	Historical Resources Impact Assessment
IO	Instream Objective
LSD	Legal subdivision
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides
NRCB	Natural Resources Conservation Board
PM _{2.5}	Fine particulate matter (<2.5 micrometers in diameter)
SARA	<i>Species at Risk Act</i>
SIRs	Supplemental Information Requests
SLR	Snake Lake Reservoir
SO ₂	Sulphur dioxide
SMEs	Subject matter experts
SSRP	South Saskatchewan Regional Plan
TIA	Traffic Impact Assessment
TWS	Temporary Work Space
WMP	Water Management Plan

3.1 CONSTRAINTS TO DEVELOPMENT

In this section, as per the final terms of reference (FTOR; Volume 2, Appendix A), a review of agreements, guidelines, jurisdictions, management issues, environmental concerns, and socio-economic factors that could be constraints to development, are considered. The FTOR constraints Section 2.2.1. requires the proponent to “discuss the process and criteria used to identify constraints to development, and how the Project has been designed to accommodate those constraints”.

3.1.1 Constraints Related to the South Saskatchewan Regional Plan

The South Saskatchewan Regional Plan (SSRP) guides sustainable development and manages growth in the South Saskatchewan watershed (Government of Alberta [GOA], 2018). The plan provides a set of strategies and objectives, which includes mandatory practices on Crown lands, and best management practices (BMPs) on private lands. The plan sets out strategic objectives and policies to issues such as resource development, conservation of natural areas, and infrastructure investment. As the Project occurs on private lands, all requirements under the SSRP are voluntary BMPs; the SSRP was reviewed to determine if adhering to any of these would be constraints to development. The most relevant of these are discussed below.

3.1.1.1 Agriculture

The SSRP recommends that the region’s agricultural industry be maintained and diversified by reducing fragmentation and conversion of agricultural land to non-agricultural uses. While the Project needs to convert agricultural (grazing land) to reservoir, there will be a net benefit to agriculture as it will help maintain the agricultural economy downstream. While grazing lands will be further fragmented, access to grazing lands will be maintained. The loss of agricultural land represents a constraint to development, and this change is assessed for impacts in Volume 2, Section 13 (Land Use and Management).

3.1.1.2 Energy Resources

The SSRP recommends that opportunities for the responsible exploration, development, and extraction of energy resources be maintained; however, to develop this land into a reservoir, energy activities need to be removed from the Project area. The loss of energy opportunities on Project land is a constraint to development, and this change is assessed for impacts in Volume 2, Section 13 (Land Use and Management).

3.1.1.3 Air Emissions

Emissions released during Project construction are recommended to align with the South Saskatchewan Region Air Quality Management Framework (GOA, 2014a) and the Alberta Ambient Air Quality Objectives and Guidelines (GOA, 2024a). As emissions of nitrogen oxides (NO_x), sulphur dioxide (SO₂) and small particulate matter (PM_{2.5}) may exceed established health guidelines, this represents a constraint to development. This potential effect on air quality is assessed for impacts in Volume 2, Section 4 (Air Quality).

3.1.1.4 Biodiversity and Ecosystems

The SSRP has several strategies to promote biodiversity and health ecosystem, including: maintenance of terrestrial and aquatic biodiversity; maintenance of long-term ecosystem health and resiliency; supporting species at risk recovery; sustaining intact grassland habitat; and promoting healthy, functioning, ecosystems, which provide benefits to Albertans.

The maintenance of biodiversity and impacts on grassland and wetland areas is a constraint to development. See Volume 2, Section 8 (Aquatic Resources), Section 10 (Vegetation and Wetlands), and Section 11 (Wildlife and Wildlife Habitat) for further information on these.

Other ways that the Project aligns with the SSRP for biodiversity resources include:

- Managing footprint: this will be implemented on the Project through the baseline assessment and protection of environmental values, including by avoidance, impact assessment, and reclamation on the Project footprint.
- Maintaining native grasslands: this will be implemented by reclaiming and restoring a portion of the lost grassland areas to reduce the effects on community diversity and species at risk habitats.
- Reducing the risk of invasive species: this will be implemented on the Project by monitoring and controlling invasive aquatic plants, fish, invertebrates and non-native weeds through the EID's existing non-native species management program.
- Maintaining wetlands: loss of wetland areas will be assessed per the Alberta Wetland Policy (GOA, 2013) to support a *Water Act* (GOA, 2000a) application to approve wetland removal and to approve the replacement of wetlands within the shallow areas of the new and extant reservoir.

All interactions of the SSRP recommendations and the Project are summarized in Volume 1, Attachment 2C, Table 2C-2.

3.1.2 Constraints Related to Water Management Plans

Water Management Plans (WMPs) assessed include the South Saskatchewan Region Surface Water Quality Management Framework (GOA, 2014b), the Master Agreement on Apportionment (Prairie Provinces Water Board, 2025); see Section 3.14 below), the instream objective (GOA, 2024b), and the Alberta Drought Response Plan (GOA, 2024c).

The South Saskatchewan Region Surface Water Quality Management Framework is a WMP to protect water quality in rivers. As the Project will not require any changes to the management of water withdrawal nor the return flow to rivers, there will not be any changes to water quality of the Bow (source) or Red Deer (return flow) rivers. This framework is therefore not a constraint to development.

The instream objective (IO) for the Bow River below Bassano Dam is part of a provincial management plan to protect aquatic ecosystems. IOs are minimum river discharge rates mandated by Alberta Government (via authorizations under the *Water Act*) to ensure there is sufficient downstream flow to meet needs for downstream uses, including junior license holders, municipal and industrial uses, Indigenous communities, and to protect aquatic ecosystems. These were developed under the provincial Environmental Flows Program which “incorporates ecological requirements for healthy aquatic ecosystems into water allocation decisions and water

management planning processes”, under the Surface Water Allocation Directive, which “provides an evaluation method for consistent water allocation decisions ... (and) balances both ecological needs and economic considerations” (GOA, 2019). As the diversion of water at Bassano Dam will continue to occur under the same water licence, which requires this IO be met, and as the EID has shown this objective can be met even in severe droughts, the IO is not a constraint to development.

The provincial Drought Response Plan (GOA, 2024c) ensures municipal water uses have priority over agricultural use in extremely low river flow years. The EID is committed to work with other water users to implement this plan when needed. The EID showed it was adaptable to drought conditions, ensuring upstream and downstream water municipalities along the Bow River had highest priority use of the water while local irrigation users voluntarily reduced their water use. The Drought Response Plan is therefore not a constraint to development.

3.1.3 Constraints Related to Watershed Plans

The Bow River Basin Water Plan has been discussed in Volume 1, Section 2.8.7. It does not represent a constraint to development.

3.1.4 Constraints Related to the Apportionment Agreement

The EID helps meet requirements in the apportionment agreement with Saskatchewan by ensuring 50% of base flow is always achieved. Alberta is entitled to consume, divert, or store 2,100,000 acre-feet (2,590 million m³) out of the South Saskatchewan River and its tributaries provided this can be achieved while ensuring the same amount of water or greater flows into Saskatchewan while ensuring the minimum flow of 1,500 cubic feet per second (42 m³/s) into Saskatchewan is also achieved. As discussed in Volume 1, Section 2.8.5, the EID works cooperatively with other water users in southern Alberta to ensure the apportionment agreement requiring that 50% of the South Saskatchewan River’s water flows into Saskatchewan. As no new water needs to be allocated for the Project, EID’s contribution to the apportionment agreement will not be affected.

Effects of flows under future climatic conditions is discussed in Volume 2, Section 12, where it is discussed that in most years (beyond 60 years) the Bow River is expected to maintain the needed flows as related to increases in winter, spring and fall precipitation, allowing the required volume of water to be stored in upstream reservoir. The EID will continue to meet the same minimum flows in future droughts, as long as the upstream flow is greater than the IO of 11.3 m³/s.

The FTOR requires a discussion of how meeting the Economic Development in Rural Alberta Plan (EDRAP) could affect the proponent’s ability to meet apportionment requirements; however, there is no reference to apportionment in this plan. Further the FTOR requires a discussion of how meeting the requirements in watershed plans, such as the Bow Basin Watershed Management Plan, affects the ability to meet apportionment requirements; however, the Bow River Basin Watershed Management Plan also does not address apportionment.

3.1.5 Constraints Related to Applicable Municipal Plans

Municipal Plans have been discussed in Volume 1, Section 2.8.8. The Project is in alignment with the County of Newell Municipal Development Plan. Therefore, there are no constraint to development related to municipal plans.

3.1.6 Indigenous Traditional Land Use and Water Use

Traditional Land Use and Water Use constraints have not been identified for the Project area. Traditional Land Use is further discussed in Volume 2, Section 15. While species of traditional importance likely occur in the Project area, the Project occurs on privately owned land and has not been accessible for Traditional Uses since the land was ceded as part of Treaty 7 and became private lands. While access to the Project area could have been achieved along the partly developed Range Road 165 road allowance, there is no evidence that this access has been used for traditional purposes. It is unknown if there are any Traditional Use sites in the Project area. A Traditional Ecological Knowledge and Traditional Land Use study has not been completed at this time, as there has been no request from the nearby Siksika First Nation or from any other Indigenous groups, to do so (see Volume 1, Section 12: Public and Indigenous Engagement, and Volume 2, Section 15: Traditional Ecological Knowledge and Traditional Land Use)..

3.1.7 Land Use and Resource Management Planning

Land Use and Watershed Plans have been discussed in Volume 1, Section 2.8. These have also been examined to see if they represent constraints to development. The Project aligns with the EID's Integrated Resource Management Strategy, which aims to improve management of land and natural resources within the EID, maintain healthy ecosystems, and contribute to the development of a strong, diversified, and sustainable economy (GOA, 1995). As the Project is in alignment with this plan, it is not a constraint to development.

3.1.8 Constraints Related to the Environmental Setting

The reservoir expansion is located within the Dry Mixedgrass Natural Subregion in the Grassland Natural Region of Alberta (GOA, 2006). Terrain in the subregion has low relief and is level to undulating with characteristic features such as rolling hills, reworked eolian features (dunes) and glaciofluvial or fluvial deposits in depressional (valley) areas. The climate of this subregion is warm and dry, with a mean annual temperature of 4.2°C. In summer, 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 natural subregion in Alberta (GOA, 2006). Drought years have occurred and are defined by prolonged reduction in precipitation and/or a sustained water deficit when evapotranspiration exceeds precipitation.

Surficial materials are dominated by medium textured, moderately calcareous glacial till deposits ranging from <2 m thick on undulating plains to over 10 m in hummocky landscapes (GOA, 2006). Topography in the Project area is typically gently undulating to undulating with slopes less than 5%. Overall, there is a gradual slope to the east (<1% mean gradient) and 18 m of relief, with a high point of 783 m and a low point of 765 m based on light detection and ranging (LiDAR) data. The greatest slopes occur on the west side adjacent to the existing East Branch Canal and SLR, and along the edges of a meltwater channel in the north half of Project site. Most of the area is underlain by till or glaciofluvial sands and gravels. These materials are saline to sodic in low lying areas. Depressions with wetlands and soil blowouts are also common. The dominant soils are Solonetz soils and Chernozems with lesser amounts of saline Rego Gleysols and peaty Rego Gleysols which are typical wetland soils. The Project area is mainly native grassland.

Constraints related to the environmental setting include constraints related to landscape features, soils, and climate. Constraints related to native grasslands and wetlands are discussed in Section 3.3.4 of this document.

3.1.8.1 Landscape Constraints

Topography, elevation, and drainage pattern are discussed in Volume 2, Section 9 (Soil and Terrain); refer to Figure G1-8 of that section. There are no unstable slopes or uncommon landscape features that would warrant avoidance or protection. The existing high lands to the west are sufficient for development of a reservoir and drainage to the east will continue to function after completion of the reservoir expansion. The current landscape of the Project area is not a constraint to development.

3.1.8.2 Soils Constraints

Solonchic and saline soils are a potential constraint to successful reclamation, as they could have affected the source of suitable soil for reclaiming the berms; however, the amount of suitable soils was determined to be sufficient for reclamation. Therefore, this is not a constraint to development.

3.1.8.3 Climate Constraints

Low precipitation may affect vegetation restoration and may necessitate watering of restored vegetation communities. While this may affect processes of Project reclamation, it does not pose a constraint to development. Long, cold winters will restrict earthworks, that must be completed when no frost is present. Winter work may include hauling and placing granular materials, especially as the soil will stay exposed during winters. Therefore, this will not be a constraint to development. Hot summer temperatures, drought, and low river flows due to poor snowpack in the Bow River's headwaters may affect the ability to fill the reservoir in some years of operations. This is a constraint that may delay operations in those years but will not affect construction of the Project.

3.1.9 Project-Specific and Regional Monitoring Constraints

Regional monitoring programs do occur in the areas surrounding the Project and have provided useful information on water quality and quantity, wildlife, vegetation and other resources. There have been no results identified that act as constraints to development; however, this monitoring helped to determine resources and indicators to measure and assess in discipline baselines and impact assessments on the Project area. For example, wildlife monitoring at nearby eBird and Alberta Biodiversity Monitoring Institute (ABMI) sites was used to help determine if species at risk were previously observed and if they should be included in sampling programs. Also, water quality monitoring is completed at several sites near the river intake, downstream of the SLR and near the outlets to Red Deer River. This has informed us that there are occasionally exceedances of parameters for the protection of aquatic life, livestock, recreation, or use for irrigation, and therefore, if post Project exceedances occur at a similar frequency, they are not likely to be Project related. Therefore, monitoring activities around the Project area are not constraints to development.

3.1.10 Potential for Changes in the Regulatory Regime

Section 2.2 1 j) of the FTOR requires a discussion of “the potential for changes in the regulatory regime” as a possible constraint. Specific regulatory changes for this Project area are not known or currently disclosed; therefore, these cannot be evaluated or discussed. If the various government departments involved in this review of this assessment provide the EID details on regulatory changes planned by the various levels of government, these can be addressed to determine if they will be a constraint to development.

As discussed in Volume 1, Section 2, there are many government-led initiatives in Alberta which promote improvement in water storage for irrigation uses. It is unlikely that existing regulatory processes, including need for an impact assessment approval under *Environmental Protection and Enhancement Act*, as regulated by the Natural Resources Conservation Board (NRCB) will change. Other government requirements, such as following the *Wildlife Act* and Regulations and the *Weed Act* and Regulations, obtaining additional approvals under the *Historical Resources Act* or *Water Act*, are also not expected to change. There is, however, a general concern that changes to regulatory regime could add more time to the approval process; this would potentially delay the development of this proposed reservoir. However, as the Project is backed solidly by the EID and its funding partners in the Alberta Government and Infrastructure Bank of Canada, it is likely that, other than a delay in approval, these will not be a constraint to development.

3.2 SITE SELECTION FOR PROJECT COMPONENTS

3.2.1 New Reservoir Dam

The following criteria were assessed to determine the best location to build an expanded reservoir, all of which were met by the Project location:

- The location needed to be upstream from irrigable land areas that will benefit from additional storage (Volume 1, Section 2, Attachment 2, Figure 2A-5). Reservoir options further downstream would be less able to send water to desired agricultural lands;
- Availability of private lands for construction of a large reservoir;
- No protected areas in or adjacent to the proposed site;
- Sufficient property size to meet desired water storage needs;
- Availability of an *in-situ* clay source they will provide the needs for berm construction;
- Not located on or adjacent to private dwellings; and
- No critical infrastructure immediately downstream of the planned reservoir site.

The location and general layout of the dam within selected reservoir area (Volume 1, Section 2, Attachment 2, Figure 2A-7) are determined based on the following:

- Maximum water storage; this required the dam to be placed as close to the outer edges of the Project lands as allowable; as per County of Newell requirements, the dam needed to be placed beyond a 100 m buffer of roads and road allowances. The County of Newell also requested that no fill be placed within 15 m of the roads.
- Accommodation of the shape of the available land; while the land area has square corners for dam integrity it was necessary to design the dam as a curved structure, slightly reducing the size and modifying the dam location.



- Design considerations for safety also affected the location of the dam (see Volume 1, Section 2, Attachment 2, Figure 2A-4). To safely store water at the updated fully supply level (FSL) of 782.0 m asl, additional freeboard height was needed. This affected dam heights, which subsequently affected dam widths, affecting the dam placement (see Volume 1, Section 2, Attachment 2, Figure 2A-2).

3.2.2 Additional Reservoir Land Area

No additional reservoir land areas will be required beyond what has already been defined. Therefore, this is not a constraint to development.

3.2.3 Water Source

See Volume 1, Section 2.5.1 for information of the Water Source at Bassano Dam. As the water will be sourced as part of the EID's existing allocation, and as there is ample allocation available to fill the reservoir, there is no constraint to development related to water source.

3.2.4 Water Conveyance Structures

Location of the water inlet and outlet were determined as follows:

- The existing water inlet on the west side of the SLR remains the same.
- The downstream Snake Lake Canal will occur at the location where the existing canal crosses the dam; a new reservoir outlet will be designed to tie into this canal.

3.2.5 Borrow Sites

Borrow sites were determined based on in-situ drilling programs to map subsurface resources. Planned sites (A1, A2) where borrow pits will be located in the footprint (based drilling evidence of deep clay) are shown in Volume 1, Section 2, Attachment 2, Figure 2A-2.

3.2.6 Temporary Facility, Transportation, and Storage Sites

As the Project will be built in stages, temporary storage areas will mainly be located on the development footprint and will be moved as needed to facilitate construction and excavation. This will include temporary storage for riprap and bedding gravel within the dam footprint for placement on the inside slopes of the dam berms. Filter sands and gravels will be stored on the outside of the dam fills to be used for construction of the filter drain. To minimize the need for repeated movement of materials, most materials will be excavated and used immediately for dam construction. Soil materials will be stored in the northeast corner of the Project area (see Volume 1, Section 2, Attachment 2, Figure 2A-6). As needed, temporary access roads will occur in the temporary workspace (TWS) surrounding the reservoir footprint. Vehicle parking will also occur on the Project footprint.

3.2.7 Material Disposal Sites

Unneeded or unusable materials gathered during site stripping and construction may include unsuitable rocks and soils, debris, woody plant materials, etc. Additionally, materials from the removal of temporary facilities and the decommissioned dam will be included. All disposal sites will be temporary, located on site and fenced to avoid material scatter and spread. As needed, these materials will be trucked to a landfill. There is ample area on the footprint and surrounding the EID lands for these temporary storage sites, so this is not a constraint.

3.3 INFRASTRUCTURE AFFECTED BY THE PROJECT

3.3.1 Road Infrastructure

The Project will have no major effects on roads, railways, or provincial highways; however, sites will be evaluated for upgrades (see Volume 1, Section 5). Upgrades, if any, would be completed by the County of Newell or Alberta Transportation and Economic Corridors (ATEC), in partnership with the EID. Infrastructure may be affected by the number of users, leading to congestion, at peak travel/shipping times, resulting in additional wear on the infrastructure, particularly associated with truck transport of rock and aggregate. As this could be a constraint to shipping and transport, a Traffic Impact Assessment (TIA) was completed as per the FTOR (Volume 1, Section 5). The TIA discusses where the primary shipping routes will occur, and potential mitigations required to facilitate industrial use of roads. These mitigations may include:

- Completing a pavement condition assessment to ensure roads are adequate for shipping and heavy equipment travel;
- Developing a traffic accommodation plan during each development phase to accommodate construction traffic;
- Adjusting some sharp-angle intersections from two-way to one-way travel for safety;
- completing a traffic assessment strategy including plans for detours or other methods to maintain public access during construction;
- Watering roads for dust control or enforcing vehicle maintenance or speed restrictions to mitigate dust and noise where required by the County of Newell;
- Adhering to road bans when put in place by the County of Newell;
- Providing ongoing maintenance of the EID and Project roads to minimize damage and structural impacts;
- Exploring partnerships or agreements with the County of Newell and ATEC for maintaining or co-funding maintenance activities; and
- Coordinating with Canadian Pacific Kansas City (CPKC) to use the railway crossing along Township Road 200, if required.

3.3.2 Irrigation Infrastructure

Irrigation infrastructure affected by the Project includes portions of the Snake Lake Canal within the reservoir footprint that will need to be closed prior to filling the reservoir. A new outlet structure will also be needed; it will be designed to handle larger flows up to 22.6 m³/s. The Snake Lake Canal will be upgraded as part of a separate project from the outlet to the confluence with Springhill Canal, to accommodate an increased flow rate from 8.5 m³/s to 22.6 m³/s. This increase will enable the EID to provide enough water to fully support the 50,000 acres (20,000 ha) of irrigated land downstream.

3.3.3 Energy Infrastructure

An AltaLink powerline runs east of the current reservoir within the planned reservoir footprint. Plans are being discussed with AltaLink to move the line and bypass the expanded reservoir. AltaLink has agreed to install the replacement powerline around the perimeter.

Extant pipelines and wellsites, owned by Torxen Energy (Torex), occur within the planned Project footprint. Discussions have been held with Torxen regarding removal of well sites and pipeline infrastructure on the Project site. To date, Torxen has abandoned all their infrastructure within the expanded reservoir footprint and will permit removal of pipelines that would affect the construction of the reservoir. Torxen Energy abandoned 29 gas wells and all pipelines within the Project footprint in 2024. The EID is currently working to excavate, remove, and backfill all gas lines that cross the dam footprint to minimize potential seepage.

3.3.4 Biophysical, Socioeconomic, and Cultural Constraints

3.3.4.1 Vegetation and Plant Communities

Potential vegetation constraints for the Project include native grasslands, plants and communities of conservation concern, and non-native weeds.

Native grassland areas are identified as a diminishing habitat in Alberta, and they have sustained high losses during conversion to cultivated croplands and other losses. Two factors may diminish the value of native grasslands in the Project area: (1) the Project is in the dry grassland natural subregion, which has the lowest amount of disturbance among grassland classes in Alberta, and (2) grasslands in the Project site are not pristine, with disturbance from infrastructure, grazing, and energy developments. Nevertheless, the loss of native grassland areas is a constraint to development and losses of native grasslands were assessed in the Vegetation and Wetlands assessment (Volume 2, Section 10). To reduce the effects of grassland losses, the Project plans to offset a portion of the losses by restoring native grasslands on the berms and other lands surrounding the Project area.

3.3.4.2 Plants and Communities of Conservation Concern

Searches of the Alberta Conservation Information Management System (ACIMS) database have shown previous observations of the rare species Dwarf Woollyheads (*Psilocarphus brevissimus*) within Township 19-16 W4M. This species is listed on Schedule 1 under the *Species at Risk Act* (Government of Canada [GOC], 2002) but it is not formally protected in Alberta, as it is not listed as threatened or endangered in the Alberta Wildlife Regulation (GOA, 1997). This species was not observed in site searches following standard rare plant protocols; therefore, it is not a constraint to development.

Rare plant species observed in the local study area include Silver Saltbush (*Atriplex argentea*), Endolepis (*Atriplex suckleyi*), Hoary Aster (*Dieteria canescens*), Prairie Rocket (*Erysimum asperum*), Cushion Cactus (*Escobaria vivipara*), Western Water-Horehound (*Lycopus asper*), Wild Begonia (*Rumex venosus*), Wild Tomato (*Solanum triflorum*), Moquin's Sea-Blite (*Suaeda nigra*), and Red Samphire (*Salicornia rubra*). While these species are ranked as rare (rating level S3) by ACIMS, they are not considered threatened or endangered provincially or federally; therefore, these species are not a constraint to development.

The uncommon Nuttall's Salt-meadow Grass community and Samphire Emergent Marsh have also been previously observed within this Township (GOA, 2022). The latter community was observed in the local area surrounding the Project footprint. Neither were observed on the Project site. Thus, these communities are not a constraint to development.

3.3.4.3 Non-native Weeds

Three noxious weeds: Canada Thistle (*Cirsium arvense*), Perennial Sow Thistle (*Sonchus arvensis*), and Field Bindweed (*Convolvulus arvensis*), plus two prohibited noxious weeds: Hoary Alyssum (*Berteroa incana*) and Nodding Thistle (*Carduus nutans*), were observed in the Project study area. These species are a constraint to development, as noxious weeds must be controlled and prohibited noxious weeds must be eradicated. An assessment of effects on plant species diversity, due to presence of weeds, is included in Volume 2, Section 10 (Vegetation and Wetlands). Before site development, a weed survey will be completed to identify if any noxious or prohibited noxious weeds are present. Discovery may delay activities in the area where these species occur until control methods are planned and implemented but should not affect the overall timeline for Project activities.

3.3.4.4 Open Water and Wetlands

No large open water areas occur on the Project site. There are several wetlands, primarily temporary marshes and intermittent saline shallow open water classes. Ephemeral waterbodies, ditches, canals, and ephemeral draws also occur. These features are all protected under the *Water Act* and approval for removal must be granted. Until this occurs, these features are constraints to development. Wetlands in the Dry Mixedgrass region are low in abundance due to losses from agricultural conversion and other industrial and infrastructure development. Several wetlands in the Project area are rated as high-value, which, per the Wetland Policy, should be avoided. An assessment of wetland losses was completed in Volume 2, Section 10. Per discussions with the *Water Act* approval team at Alberta EPA, permittee-responsible replacement will be included in the *Water Act* application, allowing the EID to replace lost wetland function. While this is considered a constraint, it should not affect the regulatory approval or Project activities.

3.3.4.5 Fish and Wildlife Species and Habitats

Several sensitive aquatic species have historically been reported in or around the Project area, including Bull Trout (*Salvelinus confluentus*), Rainbow Trout (*Oncorhynchus mykiss*), and Sauger (*Sander canadense*), although there have been no records of these species in the SLR. Sensitive fish are therefore not a constraint to development.

The Project overlaps several Sensitive Species Ranges: sensitive amphibians, Burrowing Owl (*Athene cunicularia*), Sharp-tailed Grouse (*Tympanuchus phasianellus*), Golden Eagle (*Aquila chrysaetos*), Ferruginous Hawk (*Buteo regalis*), Prairie Falcon (*Falco mexicanus*), and other sensitive and endangered species - grasslands (i.e., sensitive and migratory birds). Surveys were completed for each of these taxonomic groups. The following wildlife constraints were identified:

- Ferruginous Hawk Nesting Area – an active Ferruginous Hawk (Listed as Endangered in Alberta) nest was identified within the Project area. This active sensitive raptor nest is a constraint to development as under the *Wildlife Act*, no activities can occur within 100 m of the nest year-round and limited activities are allowed within 1000 m while it is occupied in the spring and summer. This constraint remains in effect and will not allow construction of the dam until either the nest is abandoned (which takes up to three years of inactivity to be in effect) or until it can be legally removed under authorization from the Minister

responsible for wildlife. However, per discussions with Alberta EPA, once the Project is approved, destruction of the nest becomes imminent, and an application for removal can be granted.

- A sensitive Plains Garter Snake (*Thamnophis radix*) and a Wandering Garter Snake (*T. elegans*) were observed in the Project area; however, a protected hibernaculum was not observed for either species. These species do not represent a constraint to development. As per the Wildlife Management Plan (Volume 2, Appendix I4), pre-construction surveys are recommended prior to clearing the Project site. If at that time a hibernaculum site for these species are observed, the species may become a constraint to development until application for removal can be granted.
- Sensitive Northern Leopard Frogs (*Lithobates pipiens*) were observed onsite in 2021 during amphibian visual surveys; however, they were not observed during pond checks in 2022 and 2023, nor observed incidentally during any other surveys, sweeps or site visits. These frogs were likely dispersing individuals that did not stay or survive on site, so they are not considered constraints to development. As per the Wildlife Management Plan, pre-construction surveys are recommended prior to clearing the Project site. If at that time this species is observed in a breeding pond on site, Northern Leopard Frogs will become a constraint to development until application for salvage and transplantation in a suitable offsite pond can be granted.
- No Burrowing Owl, other sensitive raptors, or Sharp-tailed Grouse were observed. No Yellow Rails (*Coturnicops noveboracensis*) or Short-eared Owls (*Asio flammenus*) were observed. Therefore, these species are not constraints to development.
- Sensitive Pronghorn (*Antilocapra americana*) occasionally pass through the Project area, but there is no evidence this species permanently resides onsite. This species would only be a constraint to development when present on site and may require temporary work stoppages until they leave the site. Fencing all or portions of the work area may be used to mitigate this constraint.
- Tracks for Long-tailed Weasel (*Neogale frenata*; Listed as May be at Risk in Alberta) were observed on site, but a burrow or den has not been identified. This species does not currently represent a constraint to development. As per the Wildlife Management Plan, pre-construction surveys are recommended prior to clearing the Project site. If at that time a burrow or dens site is observed, the species may become a constraint to development until application for removal can be granted.
- Other (nonsensitive) nesting raptors and sensitive or migratory nesting birds have occurred in and around the Project area during the spring and summer breeding seasons. Species nesting on the site have included Great Horned Owl (*Bubo virginianus*), Red-tailed Hawk (*Buteo jamaicensis*), Swainson's Hawk (*B. swainsoni*), Baird's Sparrow (*Hirundo rustica*), Chestnut-collared Longspur (*Calcarius ornatus*), Eastern Kingbird (*Tyrannus tyrannus*), Grasshopper Sparrow (*Ammodramus savannarum*), Long-billed Curlew (*Numenius americanus*), and Sprague's Pipit (*Anthus spragueii*). Other non-nesting species observed on or near the site include Golden Eagle, American White Pelican (*Pelecanus erythrorhynchos*), Bank Swallow (*Riparia riparia*), Barn Swallow (*Hirundo rustica*), Black-necked Stilt (*Himantopus mexicanus*), Common Nighthawk (*Chordeiles minor*), Common Yellowthroat (*Geothlypis trichas*), Eared Grebe (*Podiceps*

nigricollis), Great Blue Heron (*Ardea Herodias*), Sora (*Porzana Carolina*), Trumpeter Swan (*Cygnus buccinator*), and White-faced Ibis (*Plegadis chihi*).

- Additional sensitive species have been reported near this area in Alberta's Fish and Wildlife Management information System (FWMIS) database: American Kestrel (*Falco sparverius*) and Burrowing Owl. These species do not currently represent a constraint to development. As per the Wildlife Management Plan, pre-construction sweeps for these species and migratory birds are recommended prior to clearing the Project site. If at that time one of these species or migratory bird is found to be nesting on site, consultation with an Alberta EPA wildlife biologist would occur to determine a setback and the nesting site will become a constraint to development until either removal of the bird is permitted by Alberta or by the federal government for migratory species, or until the species raises its clutch to fledgling stage or until the species abandons their nest.

3.3.4.6 Environmentally Sensitive Features

Environmentally Significant Areas (ESAs) are defined as areas that are important to the long-term maintenance of biological diversity, physical landscape features and/or other natural processes, both locally and within a larger spatial context (Fiera Biological Consulting, Ltd. [Fiera], 2014). ESAs are intended to inform land-use and watershed planning for those areas identified as having high environmental significance, based on the best information available. Four legal subdivisions (LSD) on the Project footprint are identified under the provincial ESA mapping to be ESAs. Currently, there is no requirement to protect areas designated as ESAs. Thus, presence of ESAs is not considered a constraint to development.

3.3.4.7 Mapped Constraints

Environmental constraints, per data available to spring 2025, are shown in Attachment 3, Figure 3A-1. Some of these constraints may change as more information is collected or additional approvals are obtained. These are constraints to development as they affect access and activities on the land. This mapping includes known constraints that must be avoided until approvals are obtained, including wildlife (Species at Risk) nesting areas and their buffers, wetlands and drainages and their buffers, areas needing to be approved under the *Historical Resources Act* (GOA, 2000b). As certain sensitive features are not disclosed in public reports, there are two versions of the constraints map. The revised version with additional confidential information is provided directly to reviewers and, if approved, will be provided to personnel working on the site so they are aware of setbacks.

Currently the entire study area is not available for soil stripping, excavation, or berm construction until the Project is approved by the NRCB under the EIA process, however preparatory activities including vehicle access, tree clearing, site measurements, additional drilling programs, rock hauling and storage may be completed as long as they avoid the constraints shown on this map. This map will be updated prior to construction and as additional approvals are in place.

3.3.5 Historical and Cultural Sites

An Historical Resources Impact Assessment (HRIA) was conducted; however, the requirements letter issued by the Alberta Arts, Culture and Status of Women (ACSW), did not include a Traditional Land Use component. The methods employed during a standard HRIA do not include

working with traditional knowledge holders from the First Nations community. The HRIA relies on skills and knowledge dedicated to the identification and recovery of pre-modern material culture (in the case of archaeology) and preserved biological markers (in the case of palaeontology). However, if any evidence of traditional use sites are incidentally observed during future assessments, they would be recorded and reported; nevertheless, no traditional use sites were identified during the HRIA.

The Listing of Historical Resources (Listing) does not include references to existing 'cultural' sites for the Project area. The closest 'cultural' Listings are located 8.8 km to the west, associated with the Iniskim Umaapi/Majorville Medicine Wheel cultural resource. The viewshed and environs surrounding this resource are considered culturally significant by First Nations. Mapping of specific traditional land use locations is not available to the public or even individuals not working in direct partnership with First Nations. If sites of a Traditional Use nature did exist within the study areas, they would appear at LSD-scale resolution in the Listing.

As cultural constraints were not identified for the Project site, they are not a constraint to development.

3.3.6 Recreational Use Sites

The SLR is a publicly accessible site suitable for a variety of recreational activities including fishing, boating, trail activities, and birdwatching. A public boat launch is present in the southwest end of the extant reservoir. In the regional area surrounding the Project, there are many opportunities for outdoor spaces to be used recreationally. The EID's Wildlife Guide provides information on outdoor recreation sites on EID lands (EID, 2024). Use of the site for recreation may need to be restricted to western areas of the extant SLR during construction, but overall access will improve after reservoir completion. Therefore, this is not a constraint to development.

3.3.7 Protected Sites

There are no protected areas in the immediate vicinity of the Project. These are not a constraint to development.

3.3.8 Project Components with Locations to be Determined

All Project areas have been identified. No new areas need to be determined. These are not a constraint to development.

3.3.9 Cumulative Effects in the Regional Study Area

As per the EIA Approach (Volume 2, Section 2) those resources or indicators assessed as having adverse project related residual impacts effects were assessed for cumulative effects. Refer to each discipline section in Volume 2. Cumulative effects, if identified are not constraints to development, but do require a response in terms of addition mitigations, management, or monitoring activities, especially if the Project is a large contributor to these effects.

3.4 POTENTIAL CONFLICTS WITH PUBLIC LAND OR LAND USES

Most of the land within the Project footprint is owned privately by the EID. Only a road allowance in the centre of the expansion area is currently public land under County of Newell Control. Road



allowances are Crown lands that are under management control of municipalities. They do not fall under the rules of the *Public Lands Act* (GOA, 2000c), as they are under ATEC control. As it is Crown land, the allowance is a constraint to development until it is closed and the land sold or leased to EID. Public (Crown) lands also occur near the Project in the areas east and south of the Project (Antelope Creek Ranch and San Francisco Lakes) but these are not a constraint to development. Public (Municipal) Roads on road allowances also surround the east, north and, south sides of the Project area. The road allowance is in the process of being closed by the county and the province, and the land will be leased to the EID. No approvals are needed under the *Public Lands Act* (GOA, 2000c).

3.5 REFERENCES

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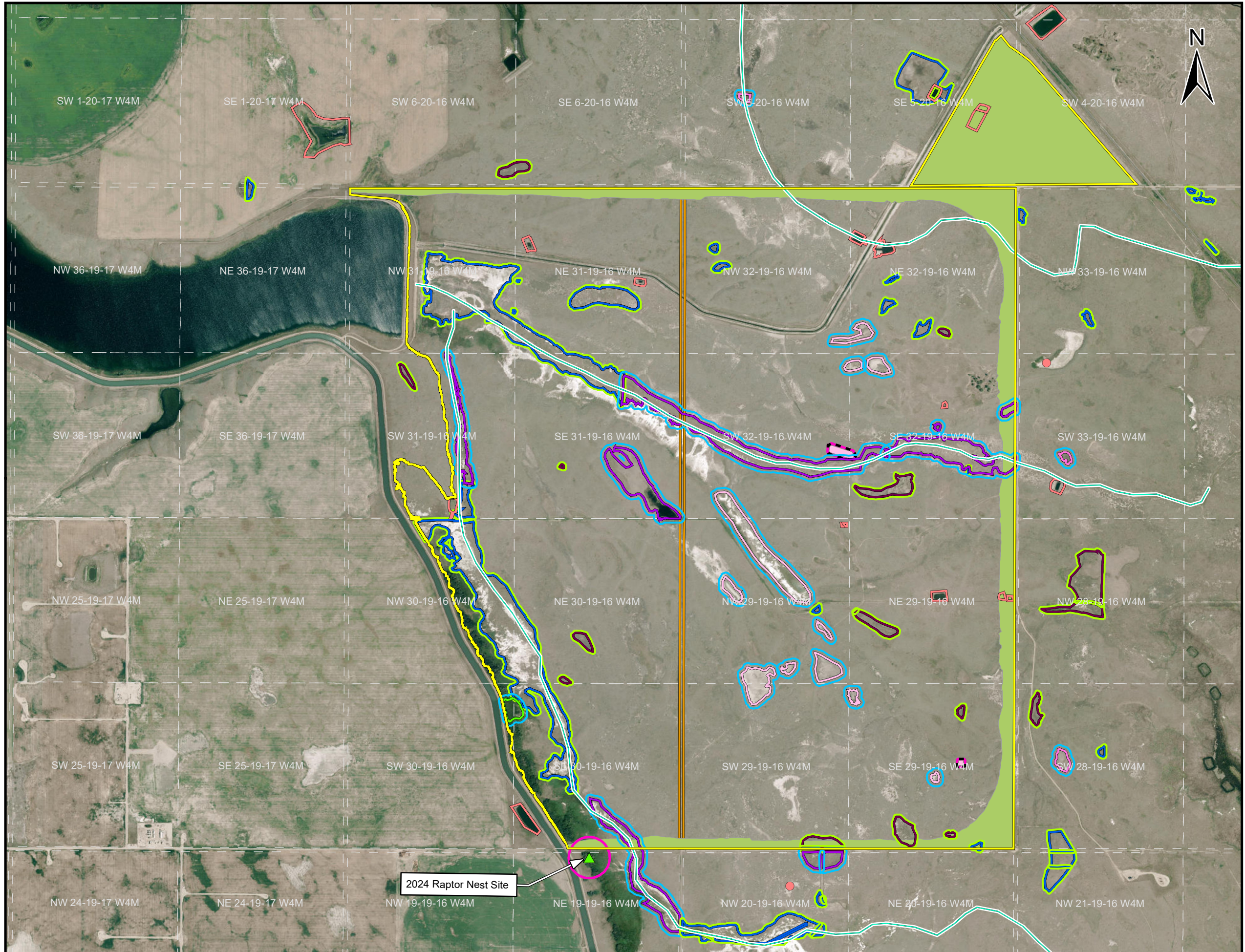
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Attachment 3

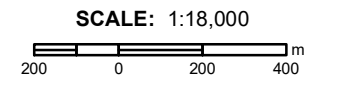


Figures

Figure 3A-1: Environmental Constraints as of March 2025 1



- Routing: Legend**
- Snake Lake Reservoir Expansion Project Area
 - County Road Allowance
 - Historical Resource Clearance Application Required
- Biophysical Issues*:**
- Rare Community Observation (Red Samphire Emergent Marsh)
 - Nest
 - Drainage
 - 100m Setback (Potential Raptor Nest)
 - Historical Resource Sites (HR)
 - 10m Buffer (HR Sites)
 - Temporary Marsh (M-G-II)
 - Seasonal Marsh (M-G-III)
 - Seasonal Swamp (S-S-III)
 - Shallow Open Water (W-A-VI)
 - Ephemeral Waterbody
 - Dugout
 - 10m Setback
 - 20m Setback
 - 6m Setback (Drainage)



Environmental Constraints as of March 2025

Drafted: MM	Date: March 7, 2025	Data Sources:
Approved: GM	Revision: 0	Imagery: ESRI. Date: 2021/07/10
Route Source:	Date: May 01, 2024	ATS Grid: AltaLIS 2007.
Shapefile	Revision: 0	*Approximate location based on field survey.



Please contact AARES for all other sources.

Please note that the imagery is from 2021 and although we have no reason to doubt the accuracy and completeness of it, users should be aware of that discrepancies may be present.

March 2025

REF.: AARES 21-127 (ProjectDescription)

Figure 3A-1

2024 Raptor Nest Site