Project Summary Table			
Proponent name:	Eastern Irrigation District (EID)	**Date:**	April 29, 2022
Project name:	Snake Lake Reservoir Expansion Project	**Company contact name and information:**	**Eastern Irrigation District** 550 Industrial Road West P.O. Box 128, Brooks, AB, T1R 1B2 (403) 362-1400 fax (403) 362-6206 Project Contact Ryan Gagley, P.L.Eng. – Engineering Manager ryan.gagley@eid.ca
Name of company that will hold approval:	Eastern Irrigation District	**Company website:**	Eastern Irrigation District https://www.eid.ca/
Type of project (e.g., water management, hydroelectric, etc.):	Water storage reservoir for irrigation	**New project, expansion, additional phase or modification:**	Expansion of the existing Snake Lake Reservoir
Project location (legal land description and municipality):	Sections 29, 30, 31, and 32-19-16 W4M within Newell County	**Total project area (ha):**	This project will add approximately 779 ha to the existing reservoir
Indicate whether the project is on private, federal or provincial land:	The proposed project is located on privately-owned land.	**List any parks/protected areas/conservation areas that may be impacted:**	N/A – refer to attached Project Location Maps (Appendix A)
Nearest First Nation Reserve(s) and Métis Settlements (name and km):	Siksika 146 is located approximately 22 km northwest of the proposed project area	**Nearest waterway/ water body (name and km):**	Nearest waterway: an unnamed tributary/outlet from the existing Snake Lake Reservoir is located within the project area based on the Fisheries and Wildlife Management Information System (FWMIS). Nearest waterbody: Existing Snake Lake Reservoir is located approximately 30 m west of the proposed project expansion area.
Nearest provincial highway (# and distance):	Highway 1 is located approximately 2.6 km northeast of the project area	**Potential annual water usage and source:**	Water is diverted from the Bow River into the EID conveyance system at the Bassano Dam. The Snake Lake Reservoir water source is the existing turnout structure off the East Branch Canal located in SE ¼ 3-20-17 W4M. The primary use of the reservoir is for irrigated agriculture.

Expected types of air emissions (e.g., SO_2, NO_X, CO_2, etc.):	Temporary and localized air emissions are anticipated from equipment during the construction of the reservoir. On-going air emissions are not anticipated during operation of the reservoir.	**Types of wastes generated and disposal location:**	Typical construction wastes anticipated during the construction of the reservoir, including building materials such as concrete. On-going waste production not anticipated during operation of the reservoir.

Brief Project Description

Include major project processes and products, components including capacity and size, infrastructure requirements and general project location.

Existing Reservoir

The Snake Lake Reservoir is located within townships 19 and 20, ranges 16 and 17, west of the fourth meridian, approximately 15 km southeast of Bassano and 32 km northwest of Brooks. The reservoir is contained by two earth-fill dams: one along the east end (East Dam) located in Section 31-19-16 W4M, and one along the west end (West Dam) located in Section 3-20-17 W4M. The reservoir is an off-stream irrigation storage facility originally constructed from 1995 to 1997 and is owned and operated by the Eastern Irrigation District (EID). The current storage total is 14,900 acre*feet of water with full supply level (FSL) at a geodetic elevation of 781.7 m. Water is diverted into the reservoir from the East Branch Canal via a gated inlet chute in combination with an online check structure. Outflow from the reservoir is through the East Dam Low Level Outlet Structure, located near the north end of the East Dam which supports approximately 50,000 acres of irrigated agriculture.

Planned Project Development

The EID is proposing to expand the size and capacity of the existing Snake Lake Reservoir. Most irrigation water within the EID is sourced from Rocky Mountain runoff via the Bow River. However, if there is little snow accumulation in the Rocky Mountains in any given year, there is reduced water available for agricultural uses. Excess spring water collected in reservoirs during the spring freshet is available to users later in the summer without additional diversion from the Bow River. Therefore, an expanded reservoir would help offset direct use of water from the Bow River when it tends to run lower in the summer. In future years, this should help alleviate impacts of climate change, while maintaining flows and supporting aquatic biodiversity in the Bow River.

All the land required for this project is owned by the EID, following a recent purchase. The EID have finalized the Sale Agreements and are in the process of preparing the closing documents required to register the land titles in the name of the EID. The proposed project would include expansion within Sections 29, 30, 31, and 32 of township 19, range 16, west of the fourth meridian (refer to Figure 1: Regional Location for the Proposed Snake Lake Reservoir Expansion).

Earthworks will include the construction of approximately 10 km of earthen banks up to 20 m in height. Total earthworks are estimated to require 7,000,000 m^3 of material. The project will attempt to excavate the material within the footprint of the dam and will create over 50,000 acre*ft of new storage. Removal of all or a portion of the East Dam will connect the existing reservoir with the reservoir expansion. Total storage in the expanded reservoir is estimated to be 70,000 acre*feet. No changes are proposed for the FSL of the reservoir.

Granular materials will need to be sourced including gravels for potential drainage chimneys and finger drains, and riprap and bedding gravel for erosion protection. Sands and gravels are relatively abundant within the County of Newell. Riprap is not readily available; EID will investigate the option of sourcing riprap from quarries in the Rocky Mountains. A new low-level outlet structure will need to be constructed at the north end of the expanded reservoir to deliver water into the existing Springhill Canal System.

Natural Environment and Land Use

The proposed project will occur in the County of Newell within the Dry Mixedgrass Subregion of Alberta. This subregion is an area of level to gently undulating semiarid prairie, with inclusions of hummocky and dissected uplands, broken in places by coulees, valleys, badlands, and dune fields. The climate supports grasses, shrubs, and herbs that are adapted to long cold winters with low snow cover followed by hot summers with high evaporation leading to moisture deficits and prolonged droughts. The underlying bedrock is mostly non-marine Upper Cretaceous sandstones, siltstones, and shales with some marine shales. Surficial materials are dominated by medium textured, moderately calcareous glacial till deposits. Brown Chernozems and Solonetzic soils are dominant. Land use within the project area consists of native grassland, which was used for livestock grazing until the EID purchased the land in 2021. Cultivated lands occurs west of the project and native grassland surrounds most of the areas to the north, east, and south. Wetlands are frequent in this area, covering 5-10% of the area. Human infrastructure includes fences, access trails and roads, irrigation infrastructure (dams, canals, dugouts), and remnants of oil and gas wellsites and gravel quarries. The Snake Lake Reservoir and an irrigation canal border the western boundary. The reservoir is used by local anglers in summer and winter.

Regional Management Framework

The project occurs within the South Saskatchewan Regional Plan area developed under the Alberta Land Use Framework. This plan identifies best management practices to protect and manage water and waterbodies, including minimizing land disturbances and reducing sedimentation. The plan encourages the development of source water protection plans and protection measures. It encourages the development of riparian and wetland mapping and inventories to maintain recharge capabilities of headwater areas, supporting flood management, and supporting water quality, quantity, and aquatic ecosystems.

Historical Resources

An Historical Resource Application was made to Alberta Culture and Status of Women (CSW). A signed requirement letter was issued (File No. 4825-21-0010-001), which called for an HRIA for all areas of high archaeological potential. An Archaeological Research Permit was issued on June 10, 2021. The HRIA was conducted between June 14 and June 30, 2021, using standard survey techniques involving pedestrian traverses, visual inspection of the ground surface, and subsurface testing of the proposed development area. Whenever possible, opportunistic soil exposures were inspected. A total of 12 shovel tests and 47 exposures provided positive results for cultural material. A total of 22 new archaeological sites were recorded. One previously recorded archaeological site, EdPb-20, was revisited during this HRIA. The HRIA identified three potentially significant sites. These sites have been mapped and flagged so onsite crews will avoid activities in this area. Once the HRIA is reviewed, any requirements from CSW will be followed. A paleontological HRIA is also in progress.

Wetlands

Wetlands cover about 3 percent of the Dry Mixedgrass Natural Subregion; baseline mapping shows they cover 5% to 10% of the project area. Most wetlands are associated with landform depressions. They are typically temporary or intermittent marshes, with open water present for a few weeks following snowmelt or summer rains. Seasonal to semipermanent marshes occur in deeper basins; open water occurs in these classes for several weeks to a few months. There are also anthropogenic waterbodies (dugouts). Field work in 2021 found 4 dugouts, 21 temporary marshes, 4 seasonal marshes, 1 shrubby swamp, 9 intermittent shallow open waterbodies, and 10 ephemeral waterbodies. Flooding of the reservoir would remove these wetlands.

Water Quantity and Quality

About two percent of the Dry Mixedgrass Natural Subregion is covered by rivers, streams, lakes, and reservoirs. The existing Snake Lake Reservoir stores 14,900 acre-feet of water at FSL (781.7 m). Bow River water is diverted into the reservoir via the East Branch Canal. The reservoir provides deep and shallow water areas. The maximum water depth recorded in the spring was 14.3 m and 12.8 m in the fall. The total yearly drawdown of approximately 2 m results in shore areas that are flooded in spring to summer and exposed in fall to winter. Data collected from the water gauge at the Snake Lake Reservoir dam shows drawdown beginning in late September. During the winter months water is slowly released from the reservoir to an elevation of 779.7 m. Water quality results were obtained during sampling events in spring, fall, and winter, 2021 to 2022. Snake Lake Reservoir has a pH range between 8.1 to 9.4. Water quality results taken did not show any signs of strong stratification. Dissolved oxygen levels varied between 8 and 22 mg/L among all field visits, showing the reservoir can support fish throughout the year. Oxygen levels in winter 2022, below 80 cm of ice, remained high enough to support overwintering fish. Water chemistry data was compared to Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life to show that the reservoir water is suitable for the protection of fish and other aquatic species. The water is also within the quality limits for irrigation. The flooding of the expanded reservoir areas would be expected to have positive impacts on water quantity and neutral effects on quality, maintaining aquatic life.

Fisheries and Aquatics

In the natural subregion, lake chub, flathead chub, white sucker, fathead minnow, and brook stickleback are common native fish. Snake Lake Reservoir provides a range of habitats that support sport and forage fishes. Substrates within the reservoir include areas of sand, gravel, fines, and boulders. At the east and west ends of the reservoir, riprap provides habitat for burbot and small cyprinid species. In the north bay of the lake there is sufficient vegetation to provide rearing habitat for northern pike. Deep areas with sand substrates provide good habitat for lake whitefish spawning. Fish species observed in Snake Lake Reservoir included lake whitefish, burbot, white sucker, northern pike, spottail shiner and Prussian carp. Recruitment of northern pike, white sucker, and lake whitefish occurs in the reservoir. In the spring, many of the pike were captured in spawning habitat less than 3 m deep, in proximity to shallow bays and aquatic vegetation, and showed evidence of recent spawning. The expanded reservoir is expected to increase the area of suitable fish habitat, increasing the number and biomass of fish present and supporting additional angling opportunities.

Soils and Terrain

The proposed project occurs within the Brown Soil Zone of southeastern Alberta, including the Dishpan, Duchess, Halliday, Hemaruka, Maleb, Pemukan, Ronalaine, and Youngstown soil series. Miscellaneous eroded soils occur in some areas. The project area includes relatively level to gently rolling terrain. In the Dry Mixedgrass Natural Subregion soils tend to be dry in areas with coarse, sandy soils and at locally high elevations. Lower slope positions receive more runoff water, with corresponding differences in soil development. Soils are mainly Orthic Brown Chernozems with some Solonetzic intergrades and Solonetzic soils, mainly occurring on thin glacial till and on lacustrine and eolian or glaciofluvial deposits. Sand plains and dunes have a high proportion of weakly developed Rego Chernozemic and Regosolic soils. Wetlands are a mixture of Humic, Orthic, and Luvic Gleysols. Soils and terrain areas within the footprint of the reservoir would be fully removed. Reclamation on the outer berms and dam structures would replace some of these losses.

Vegetation and Rare Plants

The Dry Mixedgrass Natural Subregion is characterized by a mix of short and mid-height grasses, including blue grama, needle-and-thread, June grass, and western wheat grass. Northern wheatgrass and western porcupine grass are common in hummocky areas. Shrubs, such as western snowberry, sagebrush, and prickly rose occur in areas with higher moisture. Trees are uncommon except where subsurface water is plentiful. The vegetation communities observed in the project area included a mix of native and non-native (agronomic) grasses. Noxious weeds were not common. Of the total sites sampled, 84% were native grass communities. Most areas were heavily grazed. The project area is not located within the AEP Sensitive and Endangered Plant Species Range, but the potential for rare plants, as tracked by the Alberta Conservation Information Management System, is high. There have been previous observations of the rare plant dwarf woollyheads within township 19, range 16, W4M (Figure 1). Another rare species, common beggarticks, and two rare plant communities, Nuttall's salt-meadow grass community and red samphire marsh have also been previously observed within this township. Spring and summer rare plant surveys were conducted in 2021, as per Alberta Native Plant Council guidelines, throughout the project area. No rare plants or rare plant communities were observed. Impacts on vegetation will include losses of native prairie habitats. Offsetting opportunities will be explored to reduce these effects.

Wildlife

The Dry Mixedgrass Subregion contains wildlife typical of grassland habitats. The habitats in and near the project area include lightly to highly grazed grasslands, open prairies, tall shrub and woodland areas, wetlands, and deep and shallow water habitats. Several endangered and threatened species occur in the Grassland Natural Region, including burrowing owl, long-billed curlew, and Sprague's pipit. The project is within the following Provincial Sensitive Wildlife Ranges:

- Sensitive Amphibians
- Burrowing Owl
- Sharp-tailed Grouse
- Sensitive Raptor: Golden Eagle, Ferruginous Hawk, Prairie Falcon
- Other Sensitive and Endangered Species: Grassland

During wildlife surveys in 2021, the following sensitive and at-risk species were observed:

- Amphibians: northern leopard frog
- Birds: Baird's sparrow, barn swallow, black-necked stilt, chestnut-collared longspur, common nighthawk, common yellowthroat, eared grebe, ferruginous hawk, grasshopper sparrow, great blue heron, long-billed curlew, sora, Sprague's pipit, trumpeter swan
- Mammals: American badger, pronghorn

Losses of wildlife habitat and wildlife will occur during the flooding of the reservoir, although some new shoreline habitat will be created. Permitting to remove sensitive species features will be required and offsetting opportunities will be examined.

Environmental Permitting and Offsetting

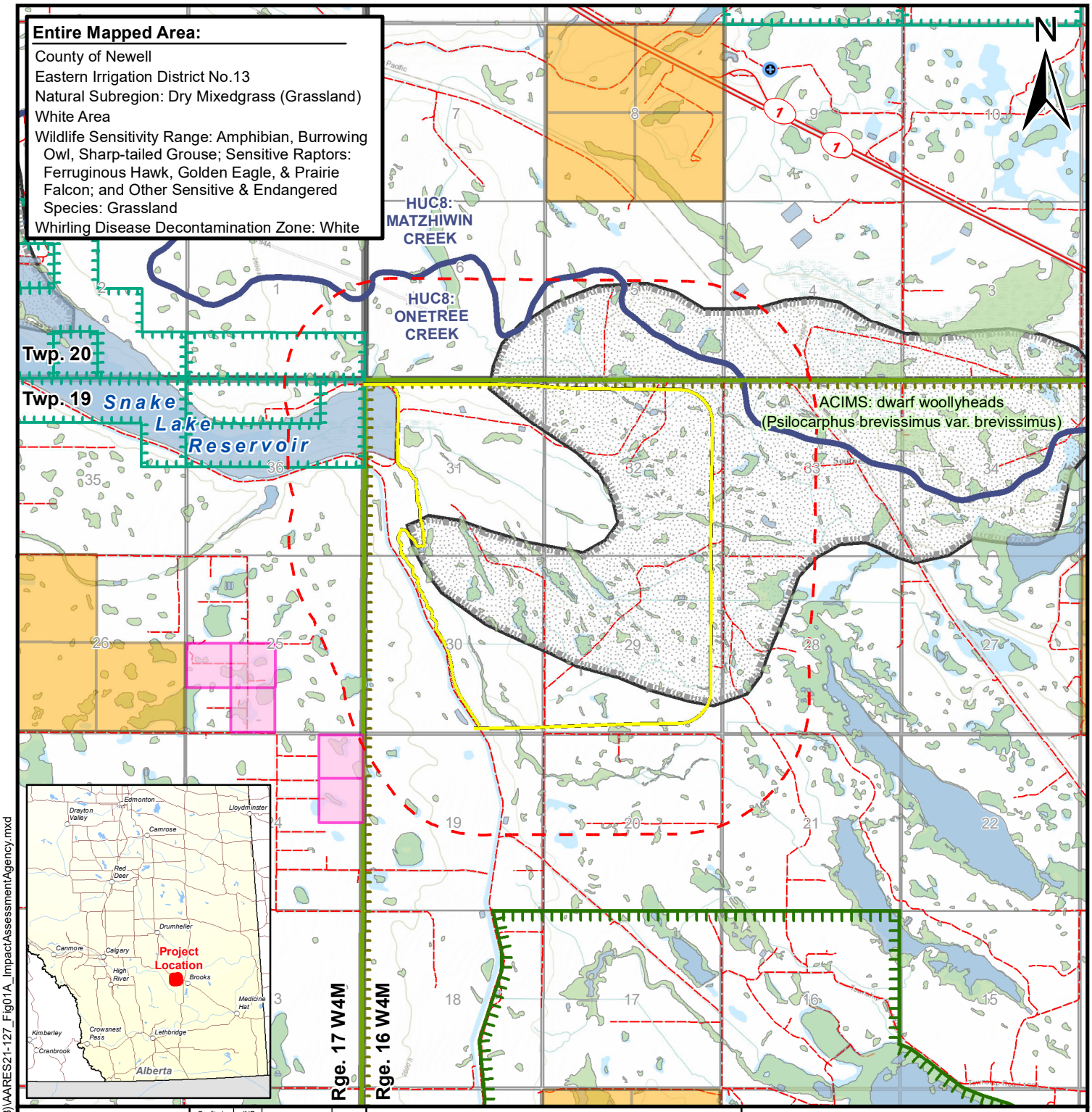
Development of the project will result in losses of native grassland habitat and wetlands. Wetlands will be avoided, and impacts minimized, where possible, or removed and replaced as per the Alberta Wetland Policy. EID has a long history of working with Ducks Unlimited on Wetland Habitat Projects and will examine the use of these sites as possible offsets for wetland losses. Opportunities for grassland habitat offsets will need to be discussed with the Alberta Government. A permit will be needed to salvage frogs from the northern leopard frog breeding pond for transplantation into suitable offsite habitats. A ferruginous hawk nest will need to be removed under a permit from AEP. Offset nesting habitats may be used to support maintenance of habitat for this species. Impacts on other wildlife species will be minimized by clearing habitat outside of the breeding season.

Environmental Protection Supporting Current Activities

- A geotechnical drill program is being completed in 2022 to understand subsurface geology to provide information needed for reservoir design. This program required the development of a perimeter access road and use of drill rigs to collect core samples. Tree clearing activities have also commenced along the west side of the project area.
- A wildlife management plan has been developed for the protection of sensitive breeding wildlife species during the design phase of the project. This includes nest surveys and sweeps throughout the spring and summer breeding season, establishing setback buffers as recommended by AEP, and if activities occur within the buffer, completing nest-site monitoring and enforcing shut-down measures if signs of distress/abandonment are identified. Travel restrictions have been included to minimize effects of vehicle noise and activity on wildlife while travelling on existing trails and roads.
- Activities that interact with wetlands are being permitted through the Water Act, including a Code of Practice for Access across wetlands, and a *Water Act* application for geotechnical drilling within wetlands.
- Activities near potentially significant historical resources have been setback to protect these features.
- Access into open water wetlands is being avoided by implementing a 20 m setback. Activities will be allowed in this setback if a wildlife sweep shows no sensitive or protected wildlife species in these areas.

Impact Assessment Triggers

The proposed project will be funded by the Alberta Government, Canada Infrastructure Bank, and the EID. As per Schedule 1 – *Mandatory Activities of the Environmental Assessment (Mandatory and Exempted Activities) Regulation*, the proposed reservoir will comprise a dam with a height greater than 15 m, and a capacity greater than 30 million cubic meters, and is therefore considered a Mandatory Activity under the *Environmental Protection and Enhancement Act*. The proposed project is receiving federal infrastructure bank loan, and not grants, which should not trigger assessment under the federal *Impact Assessment Act*.



SCALE: 1:50,000

m
250 0 250 500

Drafted:	JNB	Date:	Revision:
QA/QC:	DJS		
Approved:	WB	Mar 25, 2022	0
Development Source:		Date:	Revision:
Survey Drawing		Feb 4, 2022	1

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

*AbaData 2.0
**Alberta Merged Wetland Inventory

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 of that discrepancies may be present.

Legend

- Proposed Reservoir Expansion Area
- Local Study Area (1000 m Buffer)
- Water Well
- ACIMS: Sensitive Township Boundary
- HUC8 Watershed Boundary
- Paved Road
- Unpaved Road
- Crown Land (Provincial)
- HBC Lands
- Spills*
- Listing of Historic Resources
- Sand and Gravel Deposit

AMWI:** Marsh Open Water

EID

Regional Location for the Proposed Snake Lake Reservoir Expansion

March 2022

REF.: AARES 21-127 (INFO)

Figure 1

Map Location: Y:\01_GISProject\AARES_21\AARES21_127 (5653)\AARES21-127_Fig01A_ImpactAssessmentAgency.mxd