

Comments re proposed EID Snake Lake Reservoir Expansion EIA proposed Terms of Reference

Southern Alberta Group for Environment

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Comments are provided in two parts. Part 1 includes general comments on definition of the project and local and regional study area that apply to all sections of the *Proposed EIA Terms of Reference*. Part 2 are comments on specified sections of the *Proposed EIA Terms of Reference* and are suggestions for augmenting or revising content of those sections.

PART 1: GENERAL COMMENTS

GENERAL COMMENTS ON PROJECT DEFINITION AND LOCAL STUDY AREA

The EIA Terms of Reference focuses assessment of environmental impact to the direct effects of construction of Snake Lake Reservoir, referred to as the “Project”. Not mentioned is expansion of ~5,000 irrigation acres that is proposed in conjunction with expansion of Snake Lake Reservoir. This proposed increase in irrigated acres on the assessment role of the Eastern Irrigation District and associated ongoing activities are integrally linked to proposed reservoir expansion and impacts will be necessarily incidental. Expansion of irrigation acres should be included in the definition, description and impact assessment of the project.

According to the Environmental Assessment Program Guide to Preparing Environmental Impact Assessment Reports in Alberta ([here](#)), “The Local Study Area is the area surrounding and including the Project Area, where there is a reasonable potential for immediate environmental impacts due to ongoing project activities”. The irrigation area supplied by Snake Lake Reservoir, currently and with proposed expansion, should be part of the Local Study Area.

The following demonstrates EID’s consideration of expansion of irrigated acres together with Snake Lake Reservoir expansion.

- On Feb 23, 2021 EID irrigators passed a plebiscite to increase their expansion limit by 34,000 acres to 345,000 acres. EID presentation notes from the information meeting for irrigators held on Feb 10, 2021 prior to the plebiscite include the following:
 - “5,000 acres can be added on unsupported areas today, to be supported by Snake Lake Reservoir” (screen 4);
 - “With the Snake Lake Reservoir expansion, the risk remains low with an expansion to 345,000 acres [from 340,000 acres]” (screen 7);
 - “The expansion limit will be capped at 340,000 acres until the expanded Snake Lake Reservoir is commissioned” (screen 9).
- EID entered into a funding agreement for a loan from the Canada Infrastructure Bank (CIB) to design and construct Snake Lake Reservoir expansion as well as canal upgrades (see Alberta Water Portal Society website [here](#)). EID is relying on approval of the Snake Lake Reservoir expansion and revenue generated from capital asset charges on the resulting irrigation expansion to repay the CIB loan. EID Borrowing Bylaw 947 (2020) part K. (Attachment A) states EID “wishes to design and construct irrigation works (the “District Projects”) to expand its water conveyance network and to provide

enhanced water security for its Irrigators, **and to allow for an increase in Irrigation Acres within the District...**” EID Expansion Meeting Notes (Feb 10 2021) state:

“The CIB’s security focuses on revenues that are generated from the sale of new irrigation acres through capital asset charges or other revenues generated from the irrigation acres, particularly the expansion acres created by these projects to fund the loaned amounts.” (screen 9)

Potential environmental impacts of expanding irrigated acres will not be assessed in any other decision-making process. In making a decision to add a parcel to the assessment roll of an irrigation district under the *Irrigation Districts Act* (section 95 (1)), the irrigation district must determine whether the land is suitable for irrigation purposes according to provincial land classification standards (topography and soil characteristics), whether there is sufficient water supply, whether there is drainage available if required and whether the expansion limit of the district would be exceeded. The full suite of potential environmental impacts, for example on native grasslands, wetlands and wildlife (including Species at Risk) or greenhouse gas emissions, are not assessed.

GENERAL COMMENTS ON REGIONAL STUDY AREA AND CUMULATIVE EFFECTS

According to the Environmental Assessment Program Guide to Preparing Environmental Impact Assessment Reports in Alberta ([here](#)), “the Regional Study Area is the area where there is the potential for cumulative and socio-economic effects, and that will be relevant to the assessment of any wider-spread effects of the project”. We suggest the regional study area for cumulative effects assessment is that encompassed by the “historic expansion of Alberta irrigation” first announced in Fall, 2020 and a subsequent announcement in Fall 2021. Snake Lake Reservoir expansion is one of four reservoirs proposed as part of this regional program that extends across the South Saskatchewan River Basin in Alberta. There is public interest in having assessment of potential environmental effects of proposed expansion of irrigation infrastructure and irrigated acres across the region, particularly with respect to river flows (quantity and quality), native grasslands and species at risk.

Information on projects proposed as part of the investment agreement(s) of Canada Infrastructure Bank, Government of Alberta and Irrigating Alberta Inc. are found on the Alberta WaterPortal Society Project information website ([here](#)). There is a map of approximately 90 irrigation infrastructure projects and three of four proposed new or expanded reservoirs, including Snake Lake Reservoir, located across nine irrigation districts in the South Saskatchewan River Basin that rely on water supply from rivers in the Oldman, Bow and South Saskatchewan river subbasins. Expansion of over 200,000 acres is proposed. At least 17% of that irrigated expansion is proposed by the Eastern Irrigation District.

Snake Lake Reservoir expansion is the second proposed project to require impact assessment as part of the proposed historic expansion of Alberta irrigation. This project and Chin Reservoir Expansion are the only components so far determined to require impact assessment under provincial legislation. Assessment of cumulative environmental effects regionally, particularly on river flows and biodiversity, is needed to inform public interest decisions regarding proposed new and expanded reservoirs and a proposed 15% expansion of irrigation acres in the South Saskatchewan River Basin of southern Alberta.

The WaterPortal Society website includes an analysis of the economic impacts of irrigation across all irrigation districts and several municipalities in southern Alberta including crops grown by farm enterprises on irrigated land, value-added food production in agri-food processing facilities, and

businesses that sell inputs to producers on irrigated land. This appears to be the regional study area defined by program proponents for identifying socio-economic benefits and justifying public investment in irrigation infrastructure. There has yet to be an assessment of cumulative environmental effects of proposed irrigation expansion at this regional scale.

Modelling and simulation software is available to understand the outcomes of our collective land use and resource management decisions, including [ALCES](#). Visual representation of data layers on rivers and streams, lakes and wetlands, water infrastructure, soils, precipitation, natural area, land use footprint (including agriculture), water use and water quality indicate that the basin has experienced major transformation in structure and function beginning in 1910 with accompanying adverse impact on indicators of ecological health. The trend is projected to increase into the future unless we collectively make decisions to optimize social, economic and ecological indicators. This type of cumulative modelling can be undertaken for the region in order to understand if critical limits on water withdrawals have been exceeded and if the ability of rivers to dilute pollution from all the activity currently on the landscape has been surpassed. Will proposed expansion of irrigation agriculture make our future less sustainable? Should our efforts and resources instead be focused on addressing major issues in land and water management, especially with predicted climate change?

Similarly section 4 SOCIO-CULTURAL ASSESSMENT of the proposed EIA terms of reference suggests a regional study area that extends to residents, businesses and services in communities well beyond the reservoir site and adjacent lands that is suggested for environmental impact assessment (i.e. that will be “altered or removed by the Project; or temporarily affected and reclaimed”). Regional study area for environmental impact assessment should align with regional study area for socio-cultural impact assessment.

The term ‘instream flow needs’ is used incorrectly in the Terms of Reference. Please be careful and precise in using the terms environmental flow/instream flow needs, water conservation objective and instream objective/minimum flow. Definitions we suggest be included in the Terms of Reference are as follows:

“Environmental Flow recommendations, commonly referred to as **Instream Flow Needs (IFN)** are defined as the science-based quantities and qualities of water that sustain the ecological integrity of riverine environments.” (Ref: *The Alberta desktop method for determining environmental flows (instream flow needs)* [here](#)). Instream Flow Needs (IFN) for protection of the aquatic environment in the Bow River are defined in [Instream Flow Needs Determinations for the South Saskatchewan River Basin, Alberta, Canada \(2003\)](#).

When the IFN values are compared to the actual river flows under current allocations and commitments, the conclusion is that in the Bow, Oldman, St. Mary, Belly and Waterton Rivers below major dams and diversion the IFN values are generally much greater than existing flows, and restoring flows to IFN values would be impossible with the present degree of allocation. In these rivers, the aquatic environment is believed to be in a state of long term declining health

“Water Conservation Objective (WCO) is the amount and quality of water necessary for the protection of a natural water body or its aquatic environment. It may also include water necessary to maintain a rate of flow or water level requirements.” (Ref: *Approved Water Management Plan South Saskatchewan River Basin (2006)* ([here](#))). The recommended WCOs in

the SSRB WMP are either 45% of the natural rate of flow, or the existing instream objective increased by 10%, whichever is the greater at any point in time. WCOs are not science-based and are considerably less than Instream Flow Needs (IFN). According to the *SSRB WMP* (p. 8) “The recommended WCOs will serve as an administrative tool that will foster opportunities to increase flows. These opportunities could include holdbacks from transfers, voluntary actions by licence holders, cancellations and purchases of transfers. These WCOs will serve on an interim basis until monitoring, research and public consultation identify a long-term WCO.”

Instream Objective (IO) – Regulated flows that should remain in the river via dam operations or as a restriction on licences. Below dams, Instream Objectives are in place throughout the SSRB, although some offer only limited protection of the aquatic environment. Instream Objectives have usually been set in response to fish habitat instream needs (the Fish Rule Curve) and/or water quality.

The reach below Bassano to the mouth of the river has three IO values (*SSRB WMP* p. 45):
39.6 m³/s (1,400 ft³/sec) for all licences except the Eastern Irrigation District (EID);
2.83 m³/s (100 ft³/sec) for EID’s 1963 licence (1903 priority);
11.3 m³/s (400 ft³/sec) for EID’s 1998 licence.

PART 2: COMMENTS ON SPECIFIED SECTIONS OF THE PROPOSED TERMS OR REFERENCE

PURPOSE OF THE TERMS OF REFERENCE

Paragraph 2 or 3

- Indicate Snake Lake Reservoir is an off-stream reservoir in the Red Deer River subbasin supplied by water from the Bow River.

Paragraph 5

- Clarify who “downstream users” are – parties supplied from the EID canal system below the reservoir and/or parties downstream of diversion on the Bow River? Return flow is into the Red Deer River – are there “downstream users” along that river?
- Does “a full year’s supply” stored in the reservoir refer to the amount needed to accommodate current demand or are demand and “full year’s supply” anticipated to increase with expansion of the reservoir and irrigated acres?
- It is incorrect or at least premature to state the project would help to maintain “instream flow needs” in the Bow River. During extended droughts will there be sufficient water available to fill the reservoir while also improving flow in the Bow River? Drought in 2023 resulted in reduced water limits per acre, a shut-off date of Sep 25 for irrigation, 2 weeks earlier than typical, and Snake Lake Reservoir at less than 20% of normal winter volume in November. The Bow River was at minimum flow from June through October.
- Is there a possibility that filling an expanded reservoir (including to accommodate proposed irrigation expansion) could compromise opportunities for improving flows in the Bow River downstream of Bassano Dam?

- The term ‘Instream flow needs’ is used incorrectly in the last sentence of this section. IFN for the Bow River downstream of Bassano Dam for fish habitat is a 25% reduction from the natural flow, with the added weekly constraint of environmental base flow (Ref: *South Saskatchewan River Basin Instream*

Flow Needs Determination p. 93 [here](#)). High levels of water withdrawal upstream result in this reach being considered degraded and IFN is not being achieved, so IFN cannot be maintained (Ref: *Summary of Riparian and Aquatic Condition Report* (p. 16-18) *South Saskatchewan River Basin Water Management Plan Phase Two: Background Studies: finding the balance between water consumption and environmental protection in the SSRB* [here](#).)

- “The lowest reach of the Bow River (Bassano Dam to Grand Forks) is warm in summer, nutrient rich, and shallow due to upstream extractions, so the ecological condition was considered degraded and among the worst of all river reaches in the SSRB.”

- What other opportunities are being considered through this project to increase flows to meet recommended Water Conservation Objectives (WCO) for the Bow River below Bassano Dam and the South Saskatchewan River below its confluence with the Oldman River?

SCOPE OF THE EIA REPORT

The EIA report will examine the “environmental and socio-cultural effects of the Project”. How will economic aspects be addressed?

The EIA report “will address applicable provincial and federal legislation, codes of practice, guidelines, standards, policies, and directives.” A listing of these would be useful. Our understanding is that the following apply:

Indigenous/Aboriginal Consultation

- Duty to Consult Indigenous Groups

While ultimately the provincial and federal Crown have the duty to consult with Indigenous groups, the SMRID may carry out some consultation activities with affected Indigenous groups. SMRID should be required to demonstrate how they have complied with guidance from the Alberta Aboriginal Consultation Office.

Intergovernmental

- *Master Agreement on Apportionment*

Federal Legislation

- *Canadian Environmental Protection Act*
- *Fisheries Act*
- *Impact Assessment Act*
- *Migratory Birds Convention Act*
- *Species at Risk Act*

Provincial Legislation

- *Alberta Soil Conservation Act*
- *Alberta Land Stewardship Act*
- *Environmental Protection and Enhancement Act*
- *Freedom of Information and Protection of Privacy Act*
- *Historical Resources Act*
- *Irrigation Districts Act*
- *Natural Resources Conservation Board Act*
- *Public Lands Act*
- *Water Act*

- *Weed Control Act*
- *Wildlife Act*

Plans, Directives, Orders, Policies and Guidelines

- *South Saskatchewan Regional Plan*
- *South Saskatchewan River Basin Water Management Plan*
- *Municipal Plans for County of Newell*
- *Alberta Wetland Policy*
- *Alberta Dam and Canal Safety Directive*
- *Bow, Oldman and South Saskatchewan River Basin Water Allocation Order*
- *Water for Life strategy and action plan*
- *Canadian Water Quality Guidelines for the Protection of Aquatic Life*
- *Environmental Quality Guidelines for Alberta Surface Waters*
- *Guidelines for Conservation of Native Grasslands*
- *Wildlife Land Use Guidelines*
- *Fish Conservation and Management Strategy for Alberta*
- *Prairie Conservation Action Plan*
- *Recovery plans for species at risk*
- *Canada's climate plans and targets*
- *Alberta's climate leadership plan*

Guidelines for impact assessments

- *Environmental Assessment Guide to Preparing Environmental Impact Assessment Reports in Alberta*
- *Cumulative Effects Assessment in Environmental Impact Assessment Reports under the Alberta Environmental Protection and Enhancement Act*
- *Practitioner's Guide to Federal Impact Assessments*

CONTENT OF THE EIA REPORT

1 [A] Public engagement program

- Describe how interested parties were identified and informed of engagement opportunities?
Where/how were verbal and written submissions received?

- Specify at what point the public engagement program begins. Since the “historic expansion of Alberta irrigation” (including Snake Lake Reservoir) was announced in Fall 2020, SAGE and other environmental interests through correspondence and meetings have communicated with EID and other irrigation districts, relevant provincial and federal government ministers and staff, as well as Canada Infrastructure Bank and Prairie Provinces Water Board, in an attempt to obtain information on what is proposed and to engage in discussion about our concerns.
- We are willing to provide all correspondence and meeting notes to SMRID for their documentation of public engagement and also to the EPA Director for the record.
- The Proponent has not been interested in engaging in conversations regarding environmental flows.
- Letters to Canada Infrastructure Bank and Prairie Provinces Water Board requesting information on their roles, responsibilities and processes in environmental assessment and indigenous consultation regarding proposed irrigation expansion have not received a response.
- An ATIA request to Canada Infrastructure Bank in November 2021 was denied. A FOIP request submitted November 2021 to Alberta Agriculture for a copy of the Dec 18, 2020 Agreement between GoA, CIB and Irrigation Districts (incorporated as Irrigating Alberta Inc.) and supporting documentation

has not been fulfilled after two years. As of April 2023 a planned release is under review by the Privacy Commissioner because one party objected to making the information publicly available.

PROJECT DESCRIPTION

2.1 Overview

[A] There is more than one legal entity that could be considered a proponent. History of project development suggests Alberta Agriculture and Irrigation (Including the Irrigation Secretariat) played a major role in prioritizing the project and procuring funding for development and design, including providing a provincial grant (major investment announced in Fall 2020). A coalition of irrigation districts, Irrigating Alberta Inc., is facilitating funding arrangements. Canada Infrastructure Bank may also be considered a proponent through providing low-interest loan(s). Explain the roles and responsibilities of these legal entities with respect to the project and the process that led to decisions to invest in the project.

[C] Purpose and rationale

- Reference the 2016 WaterSmart report on water management in the SSRB ([here](#)). Expanded off-stream storage in EID is not part of the “SSRB Adaptation Roadmap”. Explain why Snake Lake Reservoir expansion is not proposed?
- Has additional demand reduction been implemented in EID, part of the “SSRB Adaptation Roadmap”? If so, how will this affect rationale for the project?
- Reference AIDA’s 2019 *Report on Proposed Irrigation Storage Reservoir Ranking* and its shortcomings for broad-based water management planning. The goal of the ranking process was to identify additional storage with greatest benefit to the irrigation sector. There was not river flow modelling or assessment of impacts on instream flows or other assessment of environmental impacts or implications for Indigenous rights to water or water for junior licence holders.
- Project need is linked to mitigating impact of drought on water users. Has this assumption been tested using climate change scenarios? How will predicted extreme drought affect filling and operation of the Snake Lake reservoir (current and expanded) as well as annual evaporation from the reservoir surface?
- Explain any implications for purpose and rationale for Snake Lake Reservoir expansion from the WaterSMART/IDs South Saskatchewan River Operational Model (SSROM) Phase 3 process. What alternatives were considered?
- Project need is linked to maintaining instream flow needs. Has this assumption been tested using climate change scenarios. ‘Instream flow needs’ is used incorrectly. See comments above under PURPOSE OF THE TERMS OF REFERENCE.
- Clarify intent of EID to expand irrigation by 5,000 acres with commissioning of an expanded Snake Lake Reservoir (reference EID Borrowing Bylaw 947 (2020) and EID Expansion Meeting Notes (Feb 10 2021)). Is there justification for expansion of the reservoir without expansion of irrigated acres? See GENERAL COMMENTS above.
- How does purpose and rationale relate to broader public sector policies, plans and programs regarding protection of native grasslands and biodiversity (including species at risk)?
- Discuss how the Project will “help maintain instream flow needs in the Bow River” including how this would be operationalized?

[D] Future trends in water demand

- Consider for both the local and regional Project areas. What demand is there for water allocation transfers in the Bow River subbasin?

- Discuss intensification of water use by EID (with expansion of district limits) and how it addresses growing water demand in the Region. Will potential new users of water be required to locate in irrigation districts to obtain an allocation of water? How will this affect settlement/development trends?
- Discuss potential Indigenous demand for water and how that will be accommodated.
- Discuss existing and future demand for flows to sustain healthy aquatic ecosystems (e.g. *Water for Life* strategy and action plans, *South Saskatchewan River Basin Water Management Plan (2006)* and the WPAC review of its implementation (2018) (<https://landusehub.ca/review-of-the-ssrb-water-management-plan/>) and the *South Saskatchewan Regional Plan 2014-2024* objectives to support healthy ecosystems in managing Water and conserving Biodiversity & Ecosystems). Identify actions in the SSRB WMP (Sec 2.8.4) recommended to promote flow restoration and discuss any progress on these actions (e.g. improved dam management, voluntary restoration actions and restrictions, research on flow restoration benefits, and assessment of operating licences for government dams and WCO conditions).

[E] Key project activities

- Expansion of irrigated acres appears to be necessarily incidental to the Snake Lake Reservoir expansion. Describe the process for making decisions about adding parcels to the assessment roll of EID including accounting for demonstrated and verified capacity gains and assessment of potential environmental effects.

[F] Project components

f) Project phasing – Describe and map areas where expansion of irrigated acres is anticipated as a result of Snake Lake Reservoir expansion, including irrigability and important environmental features.

h) Water inputs and outputs – also describe amount of evaporation from the reservoir surface. A ‘typical’ year should reflect climate change scenarios characterized by increased evaporation rates and reduced river flows.

j) Alternatives to the project – One alternative is not proceeding with the project and instead focusing on improved irrigation efficiency and changes in crop mix to reduce demand and improve flows in the Bow River. See Nov 2023 paper in *Nature Water* by Richter et al. *Alleviating water scarcity by optimizing crop mixes* [here](#).

2.2 EIA Summary

- Include results and discussion of an economic (cost:benefit) analysis of the proposed public investment to determine if resources would be used efficiently. Compare quantifiable projected benefits with quantifiable projected costs into the foreseeable future. Evaluation criteria would include benefit-cost ratio, net present value of incremental socio-economic benefits, internal rate of return and pay-back period.

2.3 Constraints

[A] and [D] Constraints to development

The following laws, policies and plans apply and consistency with these should be considered in the EIA.

- *Fisheries Act* directives for protection and management of fish and fish habitat
- *Migratory Birds Convention Act* and regulations to protect migratory birds

- federal *Species at Risk Act* to prevent extinction of species
- provincial *Wildlife Act* that designates species at risk
- provincial *Water Act*
- *Canadian Environmental Protection Act* that controls and abates environmental pollution
- *South Saskatchewan River Basin Water Management Plan*
- *Review of Implementation of the Approved Water Management Plan for the SSRB*
- *Bow, Oldman and South Saskatchewan River Basin Water Allocation Order*
- *Water for Life strategy and action plan*
- *Canadian Water Quality Guidelines for the Protection of Aquatic Life*
- *Environmental Quality Guidelines for Alberta Surface Waters*
- *Alberta Wetland Policy*
- *Guidelines for Conservation of Native Grasslands*
- *Prairie Conservation Action Plan*
- *Wildlife Land Use Guidelines*
- *Fish Conservation and Management Strategy for Alberta*
- *Recovery plans for species at risk (e.g. Alberta lake sturgeon recovery plan 2011-2016)*
- *Canada's climate plans and targets*
- *Alberta's climate leadership plan*

▪ In discussing how the project is designed to meet the apportionment agreement with downstream provinces, include information on current risk (without the project) of meeting river flows required for apportionment and risk under climate change scenarios. Also include information on achieving water quality protection objectives of the Prairie Provinces Water Board ([here](#)).

▪ Re *South Saskatchewan Regional Plan*, discuss objectives on surface water quality including information contained in annual reports of the Water Quality Framework as well as objectives regarding biodiversity and ecosystems, including (p. 68) “Species At Risk are recovered and no new species at risk are designated” and “Intact grasslands habitat is sustained”. The *Project Description* states that 84% of sites sampled in the project area were native grass communities. There is high potential in the project area for plants and plant communities on lists of the Alberta Conservation Information Management System.

▪ Re *South Saskatchewan River Basin Water Management Plan*, discuss consistency with achievement of Water Conservation Objectives in the Bow River (see Attachment 1).

▪ Re *Water Act* and *Alberta Wetland Policy*, the *Project Description* states 5% to 10% of the project area is covered by wetlands including temporary and seasonal marshes, shrubby swamp, intermittent shallow open waterbodies and ephemeral waterbodies.

▪ Re *Fisheries Act* and *Wildlife Act* include information on risk to lake sturgeon in the Bow River.

▪ Re *Species at Risk Act* and *Wildlife Act* as well as *Migratory Birds Convention Act*, the *Project Description* states the following sensitive and at-risk species were observed on the site: American badger, pronghorn, little brown myotis, northern leopard frog, 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. Discuss additional risk the project poses to these species.

[B] Process and criteria to select sites for Project components

▪ Include potential irrigation expansion acres with particular attention to native grasslands (including wetlands) that may be at risk.

[E] Conflict with public lands - Include consideration of potential impacts for the neighbouring public lands and Antelope Creek Ranch, a 35+-year collaborative demonstration project on sustainable rangeland management to benefit both livestock and wildlife

2.6 Water Management

2.6.1 Water Supply

- Confirm that water supply is under Eastern Irrigation District's 1903 water licence 45541 allowing diversion from the Bow River through CPR works at the Horse Shoe Bend in the Blackfoot Indian Reserve of 561,000 acre-feet to irrigate 281,000 acres and a further 200,000 acre-feet during the non-irrigation season. Maximum rates of diversion are 3,000 cfs from Apr 1 - May 31, 990 cfs from Jun 1 - Jul 25, 1,000 cfs from Jul 26 - Oct 31 and 825 cfs from Oct 1 - Apr 30. At least 100 cfs must be allowed to flow through Bassano Dam. Would project plans be attached to this licence if approved?
- A 1963 licence amendment (45541-00-03) allowing EID to increase diversion Oct 1 – Apr 30 while ensuring at least 400 cfs flows through Bassano Dam is due to expire Dec 31, 2023. Discuss implications of the amendment expiry for operation of Snake Lake Reservoir and for flows in the Bow River.
- The Minister can forfeit, diminish quantity and change rates of diversion of the EID licence. Discuss potential amendments to the EID water licence that would meet current irrigation demand (without Snake Lake expansion) and guarantee improved flows (ideally achieving WCO) in the Bow River below Bassano Dam.
- Consider climate change scenarios in describing variability in water supply for proposed Snake Lake Reservoir expansion.

2.6.2 Surface Water Management

- Identify water losses throughout the EID system from leakage, evaporation (including reservoirs) and runoff and discuss past trends and future trends. Define the proportion of water diverted for irrigation that is actually applied to crops.
- Consider climate change scenarios in describing water requirements and demands of water users below Snake Lake Reservoir among seasons and years.
- Discuss location and volume of return flows, past trends and predicted future trends.
- Describe cumulative effects of the project (including expanded irrigation acres) and other water users and projects (current and proposed) on river flows not only on the Bow River downstream of Bassano dam but throughout the SSRB.
- Consider climate change scenarios in discussing the effects of the Project on achieving Instream Flow Needs (refer to Clipperton et al. 2003), Water Conservation Objectives (refer to SSRB WMP 2006) and Instream Objectives for the Bow River below Bassano Dam.

2.8 Conservation and reclamation

Conservation and reclamation plan - Refer to Alberta Guidelines for native grasslands [here](#) including *Conservation Assessments in Native Grasslands; Principles, Guidelines and Tools for all Industrial Activity in Native Grasslands in Prairie and Parkland Landscapes of Alberta; Revegetation Using Native Plant Materials: Guidelines for Industrial Development Sites; Recovery Strategies for Industrial Development in Native Prairie - Dry-Mixed-grass Natural Subregion.*

3 ENVIRONMENTAL ASSESSMENT

3.1 Air Quality and Noise

3.1.2 Impact Assessment

- Identify and discuss increase in air pollutants from the expanded reservoir (methane, carbon dioxide, nitrous oxide).
- Identify and discuss increase in air pollutants resulting from an increase in irrigated acres and activities associated with irrigation agriculture vs dryland farming or native grasslands. Pollutants include greenhouse gases (carbon dioxide, methane, nitrous oxide) produced from burning of fossil fuels, ammonia from fertilized fields, air-borne particulate matter from soil erosion, and air-borne pesticides.
- Discuss potential increase in GHG emissions and how that relates to Alberta's and Canada's emissions reduction targets.

3.2 Hydrogeology

3.2.2 Impact Assessment

- Assess potential effects of expanded irrigation acres on groundwater quantity and quality.

3.3 Surface Water Bodies

3.3.1 Baseline Information

- Include information on water quality in the Bow River which is the source of supply and in the Red Deer River which receives return flow.

3.3.2 Impact Assessment

- Discuss effects on water quality in the Bow River downstream of Bassano dam and in the Red Deer River which receives return flow.

3.4 Aquatic Environment Resources

3.4.1 Baseline Information

- Discuss the interrelationships of hydrology (range of variability), water quality, fish habitat, and riparian health
- Provide information on condition of the aquatic environment in river reaches downstream of the water diversion for the Project including lower Bow River and South Saskatchewan River. Available information includes Instream Flow Needs Determinations for the SSRB (2003), SSRB WMP Background Report (2003) and Aquatic and Riparian Condition Assessment of the SSRB (2007).
- Among fish species at risk from large volumes of withdrawal for irrigation is Lake Sturgeon listed At Risk under the Alberta *Wildlife Act* and considered Endangered by COSEWIC.
- Discuss changes in the aquatic environment with predicted climate change scenarios.

3.4.2 Impact Assessment

- Discuss the potential of the project to exacerbate the effects of climate change on the aquatic environment downstream of the diversion from the Bow River.

3.5 Terrain and Soils

3.5.1 Baseline Information

- Soils that could be affected by the project include those on parcels where irrigation expansion resulting from reservoir expansion is proposed to occur within EID.

3.5.2 Impact Assessment

- Discuss changes in soils when converted to irrigated cropland from native grassland and dryland cropland.
- Discuss current information on soil erosion of irrigated land in southern Alberta growing specialty crops (potatoes, sugar beets, soy beans) that are harvested too late to plant an overwintering cover crop

3.6 Vegetation

3.6.1 Baseline Information

- Map native grasslands and wetlands in the 5,000 acres proposed for conversion to irrigated cropland because of Snake Lake Reservoir expansion.
- Provide information on riparian condition in the Bow River downstream of the water diversion for the Project and how water withdrawals for irrigation affect riparian vegetation.
- Discuss intent within the *South Saskatchewan Regional Plan* to sustain intact native grasslands, and their role in maintaining biodiversity and long-term ecosystem health and resilience. Consider importance as nesting habitat for migratory bird species.
- Discuss absence of requirement for Irrigation Districts to consider conservation of native grasslands and wetlands in their decisions under the *Irrigation Districts Act* to approve applications for adding parcels to the assessment roll. Discuss lack of congruency with the *South Saskatchewan Regional Plan*.

3.6.2 Impact Assessment

- Consider that native mixed-grass prairie will be destroyed and further fragmented by this project. More than half of Alberta's grasslands have been converted to crops and other land uses. Efforts are underway to conserve what remains.

3.7 Wildlife and Wildlife Habitat

3.7.1 Baseline Information

- Discuss the Alberta Prairie Conservation Action Plan 2021-2025. Note that Snake Lake Reservoir expansion is within mapped high value landscapes for native biodiversity in Prairie and Parkland Alberta as are other areas potentially affected by the project, locally and regionally (PCAP Fig 4).

3.7.2 Impact Assessment

- Discuss potential effects of changes in instream flows in the Bow River for biodiversity and Species at Risk (e.g. lake sturgeon) in aquatic and riparian habitats
- Consultants for the proponent have identified at least 18 sensitive and at-risk species occupying habitat that will be directly impacted including American badger, pronghorn, little brown myotis, northern leopard frog, 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, and trumpeter swan. Evaluate the overall significance of loss of an area with this level of biodiversity of threatened species.

3.8 Climate Change

3.8.1 Baseline information

- Identify and discuss computer modelling used to assess risk of a water shortage in preparing the rationale for increasing expansion limits in EID in 2021. Discuss if or how climate change projections were considered.
- Identify and discuss GHG emissions from irrigation reservoirs in southern Alberta and from irrigation agriculture activities

3.8.2 Impact Assessment

- Using climate change scenarios assess risk of shortage of water supply to Snake Lake Reservoir with expansion.
- Using climate change scenarios assess risk to achieving WCOs in the Bow River with Snake Lake Reservoir expansion.
- Using climate change scenarios assess risk of shortage of water supply to meet demand of irrigators below Snake Lake Reservoir with expansion of the reservoir and irrigated acres.
- Discuss contribution to GHG emissions from the Snake Lake Reservoir and from expansion of irrigated acres due to changes in soil biology, fertilizer use, crop mixes, livestock production and use of fossil fuels. How does this contribute or hinder achieving Canada's 2030 Emissions Reduction Plan and commitment to be net-zero emissions by 2050?

<https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050.html>

4 SOCIO-CULTURAL ASSESSMENT

4.1 Land Use and Management

4.1.1 Baseline Information

- Map Antelope Creek Ranch and describe its value as 35+-year collaborative demonstration project on sustainable rangeland management to benefit both livestock and wildlife
- Discuss socio-economic implications of drought, both currently and with climate change. Reference the Government of Alberta Provincial Drought Response Plan and the Alberta Water Council: Building Resiliency to Multi-Year Drought ([here](#))

4.1.2 Impact Assessment

- Assess the potential effects on management of Antelope Creek Ranch.

4.5 Socio-economic Assessment

4.5.1 Baseline Information

- Discuss the socio-economic value of natural biodiversity, natural ecosystem functions (e.g. provided by native grasslands, wetlands and riparian areas) and nature-based recreation (e.g. nature appreciation, canoeing rivers).

- Discuss socio-economic implications of drought, both currently and with climate change. Reference the Government of Alberta Provincial Drought Response Plan and the Alberta Water Council: Building Resiliency to Multi-Year Drought ([here](#))

4.5.2 Impact Assessment

- Assess the socio-economic impact of loss of native grasslands and wetlands and associated biodiversity.
- Include results and discussion of an economic analysis of the proposed public investment to determine if resources would be used efficiently. Compare quantifiable projected benefits with quantifiable projected costs into the foreseeable future. Evaluation criteria would include benefit-cost ratio, net present value of incremental socio-economic benefits, internal rate of return and pay-back period.