PROPOSED TERMS OF REFERENCE
ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR MD OF ACADIA AND SPECIAL AREAS BOARD'S PROPOSED

MD OF ACADIA AND SPECIAL AREAS JOINT IRRIGATION PROJECT

Approximately 250 km east of Calgary and 100 km north from Medicine Hat, Alberta

ISSUED BY: **MD OF ACADIA AND SPECIAL AREAS BOARD**

DATE: **FEBRUARY 22, 2025**

TABLE OF CONTENTS

PURPOSE OF THE TERMS OF REFERENCE

The purpose of this document is to identify for the Municipal District of Acadia (MD of Acadia), Special Areas Board, the public, Indigenous communities and appropriate stakeholders the information required by government agencies for an Environmental Impact Assessment (EIA) report prepared under the *Environmental Protection and Enhancement Act* (EPEA) for the MD of Acadia and Special Areas Joint Irrigation Project (the Project).

The MD of Acadia and Special Areas Board (the Proponent) proposed the Project to increase the irrigation capacity in areas within the MD of Acadia and Special Areas (Special Area No. 2).

The Project centre point is located between ATS 22-3-W4M and 23-3-W4M. The Project is located approximately 250 km east of Calgary, AB, and 100 km north of Medicine Hat, AB. The Project is located within the MD of Acadia, Special Area No. 2, and Special Area No. 3; however, the irrigation area will service only the MD of Acadia and Special Area No. 2.

The Project will involve pumping water from the Red Deer River and storing it in reservoirs to use for irrigation.

The Project will include the creation of two preliminary reservoirs referred to as Reservoir A1, located approximately 1 km north of the Red Deer River, on the boundary between the MD of Acadia and Special Area No. 3, and Prince's Spring Reservoir, located approximately 5.5 km southwest of Bindloss, AB. Reservoir A1 will have a live storage volume of approximately 34,000,000 m^3 and a maximum dam height of 30.5 m. Prince's Spring Reservoir will have a live storage volume of approximately 134,000,000 m^3 and a maximum dam height of 40 m. The water in these reservoirs will be used to irrigate approximately 43,706 ha (108,000 acres) within the project's 54,450 ha (134,550 acres) of agricultural area. The 43,706 ha of irrigation is split with an estimated 19,900 ha (49,200 acres) in the MD of Acadia and 23,800 ha (58,800 acres) in Special Area No. 2. The total project area is approximately 56,047 ha (138,495 acres) including the agricultural area, and areas covered by dams, reservoirs, pumping stations, water intake, power generation and water conveyance.

The Project requires a new Red Deer River pump station, where water is diverted out of the Red Deer River and is pressurized for pumping. The maximum instantaneous diversion from the Red Deer River is estimated to be 15 m^3/s. Various secondary pump stations, water conveyance canals, secondary reservoirs, and a pipeline network will be constructed within the Project area. These ancillary components will provide water supply and delivery for the Project.

On-site generation is anticipated to power the pumps at the river intake, Acadia Booster Pumping Station and Prince's Spring Reservoir; grid-supplied energy will be available for reliability. Two gas powered generation facilities (30MW combined output) will be located in Special Areas Board lands near the Red Deer River and Prince's Spring, and one solar facility (approximately 20 MW) will occupy approximately 1/4 section of private land near the A1 reservoir in the MD of Acadia.

The Proponent proposed the Project to increase the irrigation capacity in areas within the MD of Acadia and Special Areas Board (Special Area No. 2). At present, irrigation infrastructure is limited, and dryland farming practices occur in these areas. Through the development of irrigation infrastructure, the Project aims to increase the yield and variety of crops that may be cultivated by producers and provide associated opportunities such as increased job growth, community growth, and stability, as well as benefits to the local, regional, and national economy.

SCOPE OF THE EIA REPORT

The Proponent shall prepare and submit an EIA report that examines the environmental and socio-economic effects of the Project.

The EIA report shall be prepared considering all applicable provincial and federal legislation, codes of practice, guidelines, standards, policies and directives.

The EIA report shall be prepared in accordance with these Terms of Reference and the environmental information requirements prescribed under EPEA and associated regulations, and the *Impact Assessment Act,* if applicable. The EIA report will form part of the Proponent's application to the Natural Resources Conservation Board (NRCB). An EIA report summary will also be included as part of the NRCB Application.

The Proponent shall refer to the *Guide to Preparing Environmental Impact Assessment Reports in Alberta* published by Alberta Environment and Parks (the Guide) and these Terms of Reference when preparing the Environmental Impact Assessment report. In any case where there is a difference in requirements between the Guide and these Terms of Reference, the Terms of Reference shall take precedence.

CONTENT OF THE EIA REPORT

1 PUBLIC ENGAGEMENT AND INDIGENOUS CONSULTATION

[A] Document the public engagement program implemented for the Project including:

a) a list of meetings (including dates, attendees, and information discussed) and the specific comments or issues raised at the meetings;
b) a list of other consultation methods including communication via websites, radio, television, newspaper, and the intended audience reached;
c) a description and documentation of concerns and issues expressed by the public, the Proponent's analysis of those concerns and issues, and the actions taken to address those concerns and issues; and,
d) a description of how the public input was incorporated into the Project development, impact mitigation, and monitoring.

[B] Document the Indigenous consultation program implemented for the Project including:

a) a list of meetings (including dates, attendees, and information discussed) and the specific comments or issues raised at the meetings;
b) a description and documentation of concerns and issues expressed by Indigenous communities and groups, the Proponent's analysis of those concerns and issues, and the actions taken to address those concerns and issues;
c) a description of how Indigenous values are considered in the framework of decision making;
d) how Indigenous knowledge helped shape Project development, impact mitigation, monitoring, and reclamation; and,
e) the consultation undertaken with Indigenous communities and groups with respect to traditional ecological knowledge and traditional use of land and water.

[C] Describe plans to maintain the public and Indigenous engagement process and Indigenous consultation process following completion of the EIA report to ensure that the public and Indigenous peoples will have an appropriate forum for expressing their views on the ongoing development, operation, and reclamation of the Project.

[D] Provide the presentation materials and associated documents (e.g., agendas, minutes, briefings) used for public meeting and Indigenous consultations.

2 PROJECT DESCRIPTION

2.1 Overview

[A] Provide a brief Project description in sufficient detail to provide context for the EIA, including:

a) Proponent information;
b) the need for the Project and why this Project was chosen over other projects;
c) roles of various government departments and agencies and non-governmental organizations;
d) which communities would benefit from the Project;
e) amount and source of energy required for the project;
f) the development plan and schedule; and,
g) the legal entity that will manage and operate the completed Project and hold the operating approvals.

[B] Describe how the Project links to and realizes the outcomes of the Irrigation Strategy.

[C] Describe the benefits of the Project, including jobs created, local training, employment opportunities and business opportunities, and royalties and taxes generated that accrue to:

a) the Proponent;
b) local and regional communities, including Indigenous communities;
c) the local authority;
d) Alberta; and,
e) Canada.

[D] Describe the rationale for the Project, explaining the need to improve irrigation water management to meet future demands. Identify opportunities for improvement in water management and sustainability based on potential changes in water supply and future demands. Discuss how the purpose and rationale are related to broader public sector policies, plans, and programs, such as the Provincial Irrigation Strategy and climate change policies and objectives.

[E] Provide a list of chemical products to be manufactured, processed, or otherwise used for the Project and describe, in general terms, how these products will be stored and managed. Identify products containing substances that are:

a) listed in the *Canadian Environmental Protection Act, Schedule 1, List of Toxic Substances*;
b) listed on the *National Pollutant Release Inventory*;
c) dangerous goods as defined by the federal *Transportation of Dangerous Goods Act*; and,
d) on the *Domestic Substances List* and categorized as requiring further assessment under Canada's *Chemicals Management Plan*.

[F] Discuss how the Project will:

a) address rural and regional economic development objectives;
b) ensure instream flow needs are met in Red Deer River; and,
c) provide recreational opportunities.

[G] Describe the current users of the Project's water supply (i.e., Red Deer River), including junior licence holders, municipal and industrial uses, and Indigenous communities. Discuss:

a) past and existing contracts that the Proponent has entered into with non-irrigators to supply water for domestic, commercial, or industrial uses; and,
b) whether alternative (non-irrigation) water contracts have been explored for water above the current Proponent requirements up to the Proponent's total licence allocation.

[H] Detail planned water conservation practices to be adopted by the Proponent and the outcomes on the water balance, including:

a) a description of the need for storage considering past and future gains realized through conservation and efficiency practices (e.g., enclosed distribution systems, low pressure pivots).

[I] Discuss the current need for the Project including:

a) the need for drought mitigation and climate resiliency;
b) rural and regional economic development objectives;
c) changes in agricultural practices on lands using the water supply from the Proponent on lands currently without a secure water supply; and,
d) enhancement of public recreational opportunities.

[J] Provide an estimate of future trends in water demand downstream of the reservoir and discuss the water sourcing for the reservoir as per the Proponent's Water Licence and the average and range of water output levels expected in normal, wet, or drought years.

[K] Describe key Project activities during construction and operations stages. Describe how mitigation measures and/or offsets will reduce environmental and socio-cultural effects.

[L] Describe and provide maps and/or survey drawings of the components of the Project, including but not limited to:

a) the proposed dam structures, water supply, water conveyance structures, reservoir, surface borrow pits, access roads, and any other associated works, showing adjacent land uses and important environmental features in the local area;
b) existing infrastructure, leases, and clearings;
c) proposed facilities, buildings, and infrastructure;
d) temporary structures;
e) transportation and access routes;
f) sources of aggregate resources, borrow material and other construction material and locations of any stockpiles that will be developed, if known;
g) waste and debris storage and disposal sites;
h) borrow pits;
i) power generation facilities and related infrastructure (e.g. power lines); and,
j) total potential flooded areas in extreme (e.g., 1 in 100-year).

[M] Describe alternatives to the Project considered for addressing downstream irrigation needs, including technical design options and concepts to demonstrate the best available technologies. Examine other reservoir options, reservoir sizes and capacities, and other methods to provide similar off-stream water storage. Discuss feasibility of implementation and likelihood of success for these options.

[N] Discuss the implications for a delay in proceeding with the Project, or any phase of the Project, or not going ahead with the Project.

[O] Discuss the potential for future expansion of modification of the dam and reservoirs.

[P] Identify sources of construction materials, including use of in-situ aggregate materials, offsite borrow pits, or purchased materials. Describe excavation methods and temporary stockpiling plans. Provide information on studies of the suitability of in-situ materials for dam construction.

[Q] Describe the construction activities for the proposed dam and appurtenant structures, including:

a) site clearing and grubbing;
b) topsoil stripping;
c) construction and use of temporary works or structures (e.g., temporary roads, runoff controls, construction camps, and laydown areas);
d) excavations, slope stabilization, and foundation preparations;
e) construction of dams and appurtenant structures;
f) management and authorization of design changes during construction;
g) methods to ensure quality assurance and quality control (QAQC) during construction;
h) installation of impervious linings and erosion protection measures, if required;
i) installation of instrumentation, mechanical, and electrical equipment, if required;
j) upgrading existing access roads, if required;
k) testing and commissioning the facility; and,
l) removal and reclamation of temporary construction facilities.

[R] Discuss preparation and filling of the reservoirs, including:

a) management of water levels in the reservoirs;
b) the planned approach to ensure successful first filling;
c) estimated time for the new reservoirs to be filled, and the expected water elevation, surface area and distribution of water, and volumes of water during the filling process;
d) management efforts to ensure dam safety during this activity, including development of a safety management plan and an emergency management plan, including an assessment of effects on downstream infrastructure if the new dam were breached while filling; and,
e) methods for managing fish, wildlife, debris, and shoreline stability during reservoir filling.

[S] Discuss the overall positive and negative economic, environmental, and social impacts of the Project.

[T] Provide the adaptive management approach that may be implemented throughout the life of the Project if monitoring identifies that mitigation is not producing desired results. Include how monitoring, mitigation, and evaluation were incorporated.

[U] Provide a list of commitments the Proponent has made. This would include any mitigation, monitoring, and operational commitments made as part of this Assessment.

[V] Proposed mitigations or offsets to manage or reduce negative effects or enhance positive effects.

[W] Proposed monitoring programs to verify the conclusions of the EIA and measure the effectiveness of proposed mitigation plans. Discuss:

a) The Proponent's plans for addressing and mitigating any environmental impacts identified in the monitoring program;
b) how monitoring information could be used to affect changes in construction, filling, or operations;
c) how monitoring data will be disseminated to the public and other interested parties; and,
d) how the results of monitoring programs will be integrated within an environmental management system.

[X] Provide a summary of the Cumulative Effects Assessment

2.2 Constraints

[A] Discuss the process and criteria used to identify constraints to development, and how the Project ensures apportionment commitments are met; and

[B] Discuss the process and criteria used to identify constraints to development, and how the Project was designed to meet the objectives and goals to accommodate those constraints, including the following:

a) any applicable *Alberta Land Stewardship Act* Regional Plan, sub-regional plan;
b) the apportionment agreement with Saskatchewan and how apportionment commitments are met;
c) Provincial Irrigation Strategy;
d) applicable municipal and intermunicipal plans;
e) any approved water management plan enacted under the *Water Act*;
f) management plan implemented by Watershed Planning and Advisory Councils and/or Watershed Stewardship Groups;
g) Red Deer River Municipal Users Group (RMRMUG);
h) applicable municipal plans;
i) the Government of Alberta Rural Economic Development Action Plan;
j) Indigenous traditional land and water use;
k) land use policies and resource management initiatives that pertain to the Project;
l) the environmental setting;
m) results of Project-specific and regional monitoring; and,
n) potential for changes in the regulatory regime.

[C] Describe the process and criteria used and options considered to select sites for Project components, including:

a) the dams and reservoirs;
b) water conveyance structures;
c) the source of water, including intake;
d) borrow sites;
e) material disposal temporary facility and storage sites; and
f) energy sources and electric power required for the Project.

[D] Provide a list of Project components for which locations, if any, will be determined later. Discuss the selection criteria that will be used to determine the specific location of these if any are proposed.

[E] Describe roads, pipelines, well sites, power lines, or other infrastructure that may be affected by the Project.

[F] Identify and describe potentially affected infrastructure including:
a) railways; and,
b) provincial highways

[G] Document communication with the owner of infrastructure regarding potential impacts and relocation requirements and other measures required to mitigate permanent or short-term impacts.

[H] Describe proposed protection, relocation, or construction of infrastructure and measures proposed to mitigate impacts during construction.

[I] Identify constraints related to on-site biophysical features, socio-economic conditions, and cultural activities in the local and regional areas, including:
a) important species and their habitats, ecological communities, landscape features, open water and wetland features, or environmentally sensitive features;
b) Indigenous traditional use sites;
c) cultural use and recreational use sites;
d) monitoring sites; and,
e) protected sites.

[J] Describe public lands or public land uses that may conflict with the Project.

[K] Describe the cumulative effects of the Project in combination with any other activities in the Regional Study Area.

2.3 Regional and Cooperative Efforts

[A] Discuss the Proponent's involvement is regional and cooperative efforts to address environmental and socio-economic issues associated with regional development, including environmental stewardship and habitat improvement programs or initiatives, participation in regional organizations or forums, or multi-party research programs.

[B] Describe opportunities for sharing infrastructure (e.g., access roads, utility corridors, water infrastructure) with other resource development stakeholders, or the local municipality. Provide rationale where these opportunities will not be implemented.

[C] Discuss potential cooperation with other parties regarding water related infrastructure and management including, but not limited to, water supply, water intakes, pipeline, water storage and withdrawals, flow monitoring and reporting, and ecological monitoring.

2.4 Transportation Infrastructure

[A] Discuss the potential impacts of the Project on Highway 41, as well as the Bindloss bridge crossing Range Road 30A, including:
a) freeboard impacts, wave/wind run-up impacts, ice impacts, bank erosion impacts, scour impacts, and structural capacity; and,

b) conceptual solutions to address any adverse effects. Include a cost assessment that considers initial costs and predicted operation and maintenance costs. Discuss anticipated changes to highway traffic (e.g., type, volume) due to the Project.

[B] Prepare a Traffic Impact Assessment as per the latest Transportation and Economic Corridor, including the following:

a) describe and map the Project boundary, internal road network, and any existing or proposed access location to/from the provincial highway system;
b) discuss the options considered for the proposed highway access locations and provide rationale for selecting the preferred option;
c) discuss compatibility of the preferred option with Transportation and Economic Corridors' future highway plans;
d) describe existing and future background traffic and development traffic, and consider the cumulative effects from other existing and planned developments that are or will be using the same highways and highway accesses;
e) consider the potential traffic impacts for all stages of the Project (e.g., construction, operations, expansion, shutdown, etc.), and determine any necessary improvements to maintain the safe operations of the highway intersection and access road equipment and on-site infrastructure; and,
f) provide a schedule for undertaking the necessary improvements prior to commencing the Project.

[C] Describe any Project infrastructure (e.g., utilities and facilities that cross or in close proximity to a provincial highway) that may impact the provincial highways, and any effects from the Project (e.g., smoke, dust, light, noise, precipitation, etc.), and determine any necessary improvements maintain the safe operations of the highway intersection and access road equipment and on-site infrastructure.

[D] Provide a summary of any discussions with Alberta Transportation and Economic Corridors in regard to the Project and its traffic impacts.

[E] If the Project involves the transport of dangerous goods by trucks, include the following:

a) state the classes, divisions, and characteristics of the dangerous goods; and,
b) state where the dangerous goods will be transported to.

2.5 Air Emissions Management

[A] Discuss the selection criteria used, options considered, and rationale for selecting mitigation measures to minimize air emission and ensure air quality management.

[B] Provide emission profiles (type, rate, and source) for the Project's construction and operating emissions including point and non-point sources, area, mobile and fugitive emissions. Discuss:

a) odorous and visible emissions from the Project;
b) greenhouse gas emissions during all stages of the Project. Identify the primary sources and provide calculations;
c) amount and nature of criteria air contaminants emissions; and,
d) control technologies and mitigative measures used to reduce emissions.

2.6 Dam Safety

[A] Describe how the Project will adhere to the Alberta Dam and Canal Safety Directive, including:

a) the Project components and scope;
b) the overall approach for design and technical specifications;
c) any hypotheses and assumptions used;
d) data collection methods, models, and studies used to support the design;
e) assumptions used in developing designs and technical specifications;
f) planned duration of construction, reservoir filling, and operations;
g) the degree of uncertainty, reliability, and sensitivity of models and analytical techniques used to reach conclusions in the design process; and,
h) any gaps in knowledge and understanding related to key conclusions on the designs and technical specifications, including steps to address these gaps.

[B] Describe the physical characteristics of the proposed reservoirs, including:

a) normal operating range;
b) spatial extent/overlap into other tributaries, if any;
c) surface area at the maximum normal reservoir level;
d) normal operation water volume; and,
e) the volume between the maximum normal reservoir level and the minimum normal reservoir level.

[C] Determine the Consequence Classification of the proposed dam as per Schedule 1 of the Alberta Dam and Canal Safety Directive.

[D] Describe the consequence classification of the Project and its appurtenant structures.

[E] Describe preliminary design of the proposed structures, including:

a) characteristics of the proposed site, including field and lab test results and geotechnical properties;
b) principal dimensions of the structures and related works including spillway/outlet structures;
c) anticipated quantities of materials required for construction;
d) seepage controls and drainage provision for both the dam and rim of the proposed reservoirs;
e) use of stability analysis under usual and unusual loading conditions, and factors of safety in the designs; and
f) freeboard requirements;
g) potential challenges that could impact design and safety during construction and operation stages, and potential mitigation measures;
h) any assessments completed of alternative design concepts, technical options, and structure locations to demonstrate the selection of best available technology; and
i) the expected performance of the structures under usual and unusual loading conditions, including required mitigation measures for unusual conditions.

[F] Describe expected performance of the dams and its appurtenant structures during and after extreme weather events (e.g., floods) including:

a) ability of the structures (e.g., earth dams, diversions, flow control) to withstand those events and potential challenges and mitigation measures;

b) potential challenges or issues that could impact the design and safety of the proposed structures; and,
c) proposed measures to mitigate challenges identified.

[G] Describe construction activities of the proposed structures, including;
a) site clearing and grubbing;
b) construction and operation of any temporary structures required (e.g., cofferdam, river diversion, etc.) if any;
c) excavation and stockpiling of suitable material, including drilling, blasting, sorting, and screening in rock quarries, and moisture conditioning of impervious material;
d) excavated slope stabilization and foundation preparation;
e) placing impervious lining and erosion protection;
f) installation of instrumentation, mechanical and electrical equipment; and,
g) testing and commissioning.

[H] Describe decommissioning, removal, and/or reclamation of the existing or temporary infrastructure, including:
a) removal of temporary structures (e.g., coffer dams, etc.); and,
b) breach/removal of any existing structures.

[I] Describe the operation of structures, including:
a) approach used for the first filling of the reservoir;
b) debris management during reservoir filling;
c) shoreline stabilization during reservoir filling, including stages, and potential impacts with higher reservoir water levels on the reservoir shoreline;
d) operation, maintenance, and surveillance needs for safe operation of the structures;
e) expected fluctuations in the reservoir and its impacts; and,
f) approach to manage the reservoirs in usual and unusual conditions.

[J] Provide details regarding potential accidents or malfunctions, including:
a) identification of potential accidents and malfunctions that could occur during all stages of the Project's construction (e.g., cofferdam leakage or failure or other dam safety incidents) for all stages of the Project. Complete a risk management plan as per the Alberta Dam and Canal Safety Directive. Include, if warranted, an assessment of cascade failure of downstream irrigation canals and dams;
b) description of inundation areas caused by dam breach and estimated time for flood wave to arrive;
c) assessment of the potential for cascade failure and the impacts of such a cascade failure if there are other dam or canal structures located in failure impacts areas.

[K] Identify if any blasting will be required; if so, list the frequency and method, types of explosives, and safe storage and use of explosives.

[L] Describe challenges that could affect safety of the proposed structures, and measures to minimize the risk of accidents and malfunctions during excavation, reservoir filling, dam operations, and maintenance activities.

[M] Describe planned mitigation measures and management practices to address accidents or malfunctions, water and debris management, emergency preparedness, and response plans.

[N] Provide details of dam, reservoir, canal and other infrastructure performance monitoring during construction, reservoir filling, and Project operations, to ensure potential failures are identified and addressed proactively and to ensure the Project will meet environmental and performance objectives.

[O] Describe the normal operating characteristics of the proposed reservoirs, including:
- a) operating depth and volume ranges; and,
- b) flooded surface area at maximum reservoir levels.

2.7 Water Management

2.7.1 Water Supply

[A] Describe the Project effect on flows within the Red Deer River downstream of the Project area and whether this may affect apportionment requirements, instream flow needs, water conservation objectives, and transboundary objectives.

[B] Describe the water supply requirements for the Project as it relates to the source of water for the reservoir, including:
- a) the water requirements and sources for normal operation of the reservoir. Identify the volume of water to be diverted from the Red Deer River and how this will be licensed;
- b) The flow split between the Acadia (A1) and Prince's Spring Reservoirs.;
- c) the variability in the amount of water required on an annual and seasonal basis as the Project is implemented;
- d) the expected water balance prior to and resulting from all stages of the Project including, but not limited to:
  - i) total annual diverted volumes of water;
  - ii) water input, water storage, and water outflow to the irrigation distribution systems and water gains or losses from precipitation, run-off, evaporation, and seepage;
  - iii) volume of water lost from canals and reservoirs,
  - iv) volume of return flows;
  - v) licensed volumes used for other purposes than irrigation (e.g., agricultural and industrial water conveyance agreements);
  - vi) volume of remaining licence water available for crop use; and,
  - vii) volumes of consumptive use.
- e) a complete water balance for the reservoir (including existing and proposed conditions using historical hydrologic data [especially watershed natural runoff yield and natural flow]);
- f) the expected cumulative effect on water losses/gains resulting from the Project's operations and other water users on the Red Deer River downstream from the diversion location during Project operations; and
- g) a discussion of assumptions made or methods chosen to arrive at the water balances.

[C] Describe the water supply requirements for the Project as it relates to process and/or potable water needs during construction, operation, and/or decommissioning, including;
- a) the process water, potable water, and non-potable water requirements and basin water supply sources for construction and normal operation of the reservoir. Identify

the volume of water to be withdrawn from each of the sources and potential changes in the operation of upstream water supply reservoirs;
b) potable water treatment systems for all stages of the Project;
c) type, quantity, and process of potable water treatment chemicals used; and,
d) measures for ensuring efficient use of water such as water use minimization, recycling, conservation, and technological improvements.

2.7.2 Surface Water

[A] Describe the surface water management strategy for all stages of the Project, including:
a) design factors considered, such as:
i) site drainage;
ii) run-on and run-off management;
iii) road run-off;
iv) erosion/sediment control;
v) geotechnical stability concerns;
vi) surface water protection and groundwater interaction;
vii) wetland and waterbody draw-down or increases in water level;
viii) groundwater seepage; and,
ix) flood protection.
b) permanent or temporary alterations or realignments of drainages, watercourses, and wetlands (including the relevance of the Alberta Wetland Policy and *Water Act*); and,
c) the pre- and post-disturbance alignment and condition of ephemeral and permanent drainages, watercourses, streams, wetland, and waterbodies, including those created by the Project.

[B] Describe and map all roadway, pipeline, powerline and any other utility crossings of drainages, watercourses, and wetlands or waterbodies, pre and post construction.

[C] Evaluate the agricultural water needs downstream of the Project in normal and severe drought years and compare to the current reservoir volume and planned expansion reservoir volume.

[D] Discuss effects of the Project on maintenance of Red Deer River including water conservation objectives and instream objectives on instream flow needs in normal and drought conditions.

2.7.3 Wastewater Management

[A] Describe the types and characteristics of wastewater that will be generated during the Project, including (as applicable) wastewater from construction camp facilities, portable toilets, personal washing/hygiene facilities, and industrial sources of wastewater, including accidentally contaminated surface waters, on-site precipitation, run-on and runoff.

[B] Describe the wastewater management strategy for each wastewater type generated during all stages of the Project, including:
a) the criteria used, options considered, and rational for the selection of wastewater treatment and wastewater disposal, and a discussion of why the other options were not chosen;

b) how wastewater will be collected, treated, stored, and disposed;
c) whether temporary facilities will be brought to site or constructed on site to handle wastewater;
d) the proposed mitigation and monitoring measures (water management and wastewater management treatment systems) to protect surface water quality; and,
e) design and operation of facilities that will collect, treat, store, and release wastewater streams.

2.8 Waste Management

[A] Describe the types and characteristics of waste that will be generated during all stages of the Project.

[B] Discuss the selection criteria used, options considered, and rationale for waste disposal during construction and decommissioning. Include:
a) the location, availability of on-site waste disposal; and
b) site suitability from a water quality protection perspective, geotechnical perspective and with regard to existing and potential human activities.

[C] Characterize and quantify the anticipated dangerous goods, hazardous, non-hazardous, and recyclable wastes generated by the Project, and describe:
a) the composition and volume of specific waste streams and discuss how each stream will be managed collected, sorted, and stored prior to disposal;
b) plans for pollution prevention, waste minimization, recycling, and management to reduce waste quantities for all phases of the Project;
c) planned methods for waste disposal during construction, including on-site or off-site disposal options; and,
d) for on-site disposal, provide information supporting disposal site suitability considering water quality protection, geotechnical considerations, and environmental considerations including health of wildlife, vegetation, and human land uses. Describe the nature and amount of on-site hydrocarbon storage.

[D] Describe the nature and amount of on-site hydrocarbon storage, such as fuel, lubricants, hydraulic fluids, or other chemicals. Discuss containment and other environmental protection measures used at storage sites.

2.9 Conservation and Reclamation

[A] Describe the life of the Project, the entity responsible for reclamation at the end of the Project life, and details on finances secured for final Project reclamation.

[B] Provide a conceptual conservation and reclamation plan for all phases of the Project. Describe and map, as applicable:
a) borrow pits;
b) waste material disposal sites;
c) temporary roadways or utility corridors;
d) any other potential disturbance;
e) current land use and capability and proposed post-development land use and capability;

f) anticipated timeframes for completion of reclamation stages including an outline of the key milestone dates for reclamation and how progress to achieve these targets will be measured;
g) constraints to reclamation such as timing of activities, availability of reclamation materials, and influence of natural processes and cycles including natural disturbance regimes and the implications of climate change;
h) a revegetation plan for the each of the disturbed terrestrial, riparian, and wetland areas, correlated to ecosite types and appropriate species;
i) reclamation and revegetation of the dam's backslopes and of temporary facility or infrastructure sites;
j) reclamation material salvage, storage areas, and handling procedures; and,
k) existing and final reclaimed site drainage plans.

[C] Discuss from an ecological perspective, the expected timelines for establishment and recovery of vegetative communities and wildlife habitat, the expected success of establishment and recovery, and the expected differences in the resulting communities.

[D] Describe how the Proponent considered the use of progressive reclamation in Project design and reclamation planning.

[E] Discuss uncertainties related to the conceptual reclamation plan.

3 ENVIRONMENTAL ASSESSMENT

3.1 Air Quality, Climate and Noise

3.1.1 Baseline Information

[A] Identify residences or other facilities that could be affected by air emissions, dust, noise, or vibration from construction, operation, and decommissioning.

[B] Discuss baseline air quality conditions, including appropriate ambient air quality parameters and baseline noise conditions.

[C] Identify key sources of noise, including the intensity and frequency of sound generated and the distance to the Project site and to the nearest receptors.

[D] Discuss baseline soil drifting from the footprint of the reservoir during current reservoir draw-down.

3.1.2 Impact Assessment

[A] Identify construction and operational components of the Project have the potential to increase noise levels or affect air quality.

[B] Discuss the nature, severity, extent, and duration of activities likely to produce noise, vibration, dust, or affect air quality that could impact residences, livestock, other facilities or receptors during construction and operation.

[C] Assess the probability of soil drifting during reservoir draw-down from the reservoir.

[D] Discuss the frequency, severity, and potential impacts of dust generation.

[E] Describe how air quality, dust, and noise impacts resulting from the Project will be mitigated, including emissions and noise management and monitoring plans, and complaint resolution, if applicable.

[F] Discuss the Project's relative contribution to cumulative effects on regional air quality and noise.

3.2 Hydrogeology

3.2.1 Baseline Information

[A] Provide an overview of the existing geologic and hydrogeologic setting. Document new hydrogeological investigations, including methodologies, analysis, results, and interpretations undertaken as part of the EIA, and:

a) present regional and Project area geology to illustrate depth, thickness, and spatial extent of lithology, stratigraphic units, and structural features; and
b) describe and review the geology of the region and Project area, including both surficial and bedrock units (both aquifer and non-aquifer units).

[B] Present regional and Project area hydrogeology describing:

a) the major aquifers, aquitards and aquicludes (Quaternary and bedrock), their spatial distribution, properties, hydraulic connections between aquifers, hydraulic heads, gradients, groundwater flow directions and velocities, and sections, include maps and cross sections;
b) the chemistry of groundwater aquifers including baseline concentrations of major ions, metals, and hydrocarbon indicators;
c) the potential groundwater discharge zones, potential sources and zones of groundwater recharge, areas of groundwater-surface water interaction, and areas of Quaternary aquifer – bedrock groundwater interaction; and,
d) an inventory of water well development and groundwater use.

[C] Provide a detailed review and inventory with site reconnaissance for the entire Project area to determine what boreholes are present, including:

a) a determination of which party will be responsible for the cost of decommissioning and if replacement is required. Identify where the new wells will be installed;
b) an outline of how decommissioning will be completed. Identify what regulatory authorizations are required for the replacement of existing water wells; and,
c) details of the compensation requirements if new wells cannot be installed.

[D] Describe the potential for current seeps or flows from watercourses (permanent and intermittent) bringing overland agricultural contaminated runoff into the current channel or the proposed reservoir expansion.

3.2.2 Impact Assessment

[A] Describe Project components and activities that have the potential to affect groundwater resource quantity and quality at all stages of the Project.

[B] Identify areas that may experience seepage from the reservoirs and predicted interactions with aquifers or surface waterbodies. Describe mitigation measures to reduce or eliminate these effects.

[C] Describe the nature and significance of the potential Project impacts on groundwater with respect to:
- a) inter-relationship between groundwater and surface water in terms of both water quantity and quality;
- b) implications for terrestrial or riparian vegetation, wildlife, and aquatic resources, including wetlands;
- c) changes in groundwater quality, quantity, and flow;
- d) potential conflicts with other groundwater users, and proposed resolutions to these conflicts;
- e) groundwater protection, including reclaiming wells in the Project area prior to construction of the Project;
- f) potential implications of seasonal variations in water storage within the reservoir;
- g) groundwater withdrawal for Project operations, including expected alterations in the groundwater flow regime during and following Project operations; and,
- h) a discussion of the groundwater vulnerability below the proposed reservoirs and along the meltwater valley channel.

[D] Describe the proposals, and/or mitigation strategies to protect the potential contamination of groundwater aquifers.

[E] Discuss the Project's relative contribution to cumulative effects on regional groundwater with respect to:
- a) Changes in regional groundwater quality and quantity; and,
- b) Conflicts with regional groundwater users.

3.3 Hydrology

3.3.1 Baseline Information

[A] For the local and regional study areas:
- a) describe the rationale used to define the local and regional study areas considering the location and range of probably Project and cumulative effects;
- b) provide maps illustrating the boundaries of the local and regional study areas, and how the boundaries were determined;
- c) describe meteorological conditions;
- d) describe the environmental conditions that affect hydrology in the local and regional study areas, including climatic and topographical considerations;
- e) describe and map the surface hydrology; and,
- f) describe the sediment yield.

[B] Provide an inventory of surface water users who have existing approvals, permits, or licences in the local and regional study areas, including traditional agricultural and household users.

[C] Describe baseline surface water quantity characteristics, including:
- a) seasonal variation, low, average, and peak flows for watercourses; and,
- b) low, average, and peak levels and trends for the waterbodies impacted by the Project.

[D] Identify local sites susceptible to erosion and sedimentation.

3.3.2 Impact Assessment

[A] Identify Project activities that may affect surface water during all stages of the Project, including site preparation, construction, operation, decommissioning and reclamation.

[B] Discuss potential hydrological changes (in terms of quantity, extent, and duration) to watersheds due to the Project implementation, including changes in:
a) surface and near-surface drainage conditions;
b) channel regime (during minimum, average and peak flows);
c) water levels in waterbodies and watercourses;
d) evaporation, transpiration, and seepage amounts;
e) sediment transport and yield; and,
f) open-water surface areas.

[C] Describe the extent of hydrological changes that will result from potential changes to groundwater and surface water movement, and:
a) include changes and timing of those changes to the quantity of surface flow and water levels in waterbodies and wetlands;
b) assess the potential impact of alterations in flow and water levels on local or regional hydrology and identify temporary and permanent alterations or disturbances;
c) assess changes in runoff rates and volumes before, during and after construction of the Project; and,
d) identify changes in erosion including changes in sedimentation in watercourses resulting from the Project.

[D] Discuss changes to surface and near-surface drainage conditions surrounding the proposed reservoirs such as flow impediments, run-off capture, and open water surface areas.

[E] Describe how water conservation objectives may be adversely affected with the development of the Project.

[F] Describe the impacts on other surface water users resulting from the Project. Identify any potential water use conflicts.

[G] Discuss how potential impacts of temporary and permanent roads on wetland hydrology will be minimized and mitigated.

[H] Describe mitigation measures to address surface water quantity impacts during all stages of the Project including:
a) alteration in flow regimes;
b) potential drought events;
c) potential flood events; and,
d) potential water use conflict.

[I] Discuss the impact of low flow conditions and in-stream flow needs on water supply and water and wastewater management strategies.

[J] Describe mitigation measures to address surface water quantity impacts during all stages of the Project including:
a) alteration in flow regimes;
b) potential drought events; and,

c) increased loading of water quality parameters of concern.

[K] Discuss how potential hydrological impacts of new temporary and permanent roads will be minimized and mitigated. Identify if a Code of Practice notification for crossing a waterbody is required or if a Water Act application for approval of temporary to permanent direct or indirect effects on waterbodies is required.

[L] Discuss the Project's relative contribution to cumulative effects on regional surface water, including:

a) water quantity (e.g., timing, volume, peak and minimum flow rates of watercourses or waterbody levels); and,
b) conflicts with regional surface water users.

3.4 Surface Water Quality

3.4.1 Baseline Information

[A] Describe the baseline water quality of watercourses and natural and human-made waterbodies in the Local Study Area and in the Red Deer River near the proposed intake site. Provide a rationale for the selection of sampled waterbodies. Discuss the effects of seasonal and flow variations, other controlling factors, and temporal and spatial trends. Include water quality for high flow events (1 in 20-year and 1 in 100-year and 1 in 300-year) under current conditions. Include appropriate water quality parameters (e.g., field measurements of dissolved oxygen, temperature, total dissolved solids and pH), water sampling results of routine parameters, including ions, salinity, fluoride, and sodium adsorption ratio; total suspended solids, total and dissolved metals, including ultra-low mercury and methylmercury; nutrients, pesticides, BOD, DOC, TOC, bacteria, chlorophyll-a, volatile organic compounds (BTEX), and polycyclic aromatic hydrocarbons. For standing waters, include cyanotoxins (e.g., microcystins), and phytoplankton community composition. Discuss existing information on benthic invertebrates, aquatic plants, and benthic and planktonic algae as they relate to water quality. Provide a summary of existing information on surface water quality in the Local and Regional Study Area available from literature review(s). Compare water quality data to the Environmental Quality Guidelines for Alberta Surface Waters for the applicable water uses in the Local Study Area.

[B] Describe and map the current point sources and identify non-point sources in the Local Study Area.

[C] Identify local sites susceptible to erosion and sedimentation.

3.4.2 Impact Assessment

[A] Identify Project activities that may affect surface water quality during all stages of the Project, (including site preparation, construction, reservoir filling, operation, maintenance, decommissioning and reclamation). Determine the local and regional extent of potential impacts as well as their frequency, duration, magnitude, and seasonality.

[B] Describe and predict the potential impacts of the Project (during site preparation, construction, operation, maintenance, decommissioning, and reclamation) on surface water quality and downstream (natural or manmade) bodies of water using modelling or other scientifically defensible approach, including:

a) changes in water quality that may exceed the Environmental Quality Guidelines for Alberta Surface Waters, the Canadian Water Quality Guidelines for the Protection of Aquatic Life and Agriculture, Guidelines for Canadian Recreational Water Quality, the Federal Environmental Quality Guidelines, or triggers and limits outlined for mainstem reaches in the Surface Water Quality Management Framework included as part of in the South Saskatchewan Regional Plan;
b) changes in concentrations, loading amounts, and timing of water quality parameters that could impact downstream (natural or manmade) bodies of water, including:
c) impacts on their use as a drinking water supply, recreation, agriculture, domestic use, aesthetics, and other water uses;
    i) potential implications to aquatic resources (e.g., aquatic and benthic invertebrates, biota, vegetation, algae, biodiversity, habitat);
    ii) changes in water quality due to seasonal and flow variation;
    iii) changes in water quality due to changes in groundwater – surface water interactions;
    iv) changes in the quality of surface water runoff;
    v) implications to the health and extent of riparian lands;
    vi) impacts in the event of a catastrophic failure of the structure; and,
    vii) impact on creek banks during flood events.
d) the level of uncertainty derived from the models and tools used in the analysis; and,
e) any limitations of expected water quality on municipal/domestic use, recreational use, fisheries, agricultural use or other uses.

[C] Describe the water quality expected in the Project and downstream (natural or manmade) bodies of water. Include water quality for high flow events (1 in 20-year and 1 in 100-year and 1 in 300-year) under expected reservoir conditions.

[D] Describe the potential and implications for metals (e.g., lead, arsenic, cadmium, selenium, and mercury) methylation in the Project to:
a) enter the aquatic food chain, including downstream in the Project and downstream (natural or manmade) bodies of water; and
b) impact treatment of water from the Project and downstream (natural or manmade) bodies of water for drinking water purposes.

[E] Describe the potential and implications for changes in organic carbon and nutrients in the Project based on the proposed operating regime to:
a) impact treatment of water the Project and downstream (natural or manmade) bodies of water for drinking water purposes (e.g., disinfection by-products); and,
b) impact productivity of aquatic vegetation (e.g., macrophyte, algae).

[F] Describe the potential and implications for cyanobacterial toxin generation in the proposed reservoirs to:
a) Impact treatment of water from the Project and downstream (natural or manmade) bodies of water for drinking water purposes; and,
b) impact recreation in the Project and downstream (natural or manmade) bodies of water.

[G] Describe the potential and implications for release and contamination of hydrocarbons and associated materials from pipelines and other oil and gas infrastructure, farm

infrastructure and/or contaminated surface soil or subsoil in the area, on water quality and aquatic environment.

[H] Describe the potential and implications for changes in surface water quality because of irrigation return flows to impact water uses in downstream (natural or manmade) bodies of water.

[I] Describe mitigation measures to address surface water quality impacts during all stages of the Project including:
a) alteration in flow regimes;
b) potential flood events;
c) potential water use and operations conflicts; and,
d) increased loading of water quality parameters of concern.

[J] Provide a summary of the management plan to prevent or reduce impacts to surface water, and a spill response plan should an accidental release occur.

[K] Discuss the contribution of the Project to cumulative effects on water quality, including downstream (natural or manmade) bodies of water, and discuss the implications to the South Saskatchewan Region – Surface Water Quality Management Framework and any other regional initiatives.

[L] Discuss the impact of low flow conditions and in-stream flow needs on water quality and water and wastewater management strategies.

[M] Identify the Surface water quality monitoring program that will be implemented to assess the future impacts of construction and operation (including maintenance) of the reservoirs. Consider appropriate water quality parameters (e.g. metals, nutrients, pesticides, temperature, BOD/TOC, bacteria, aquatic and benthic invertebrates, aquatic plants, algae, dissolved oxygen, etc.) and any seasonal and flow variations.

3.5 Aquatic Ecology

3.5.1 Baseline Information

[A] Describe and map the fish, fish habitat, and other aquatic resources (e.g., aquatic macrophytes, and benthic invertebrates) for waterbodies and watercourses and other waters affected by the Project that may provide habitat for fish.

[B] Describe the species composition, distribution, relative abundance, quantitative population estimates, seasonal movement trends, and general life history parameters, and:
a) qualify fish species occurrence based on spring and fall sampling events over one year of sampling, using methods that will minimize fish mortality;
b) identify any fish species that are:
    i) listed as “At Risk,” “May Be at Risk” and “Sensitive” in the General Status of Alberta Wild Species (Alberta Environment and Protected Areas);
    ii) At Risk” “May Be at Risk” and “Sensitive” in the General Status of Alberta Wild Species (Alberta Environment and Protected Areas);
    iii) listed as “Threatened” or “Endangered” under the Alberta Wildlife Act;
    iv) listed as “Threatened” or “Endangered” under Schedule 1 the federal Species at Risk Act;

v) listed as “Threatened” or “Endangered” by The Committee on the Status of Endangered Wildlife in Canada (COSEWIC); and
vi) traditionally used species of cultural significance;
vii) invasive fish species; and,
viii) sport fisheries.

[C] Quantitatively describe the current extent of aquatic habitat and identify:
a) select key indicators fish species and provide the rational and selection criteria used;
b) habitat used by fish, whether seasonally or year-round, for waterbodies and watercourses and other connected waterbodies that may provide habitat for fish, including critical or sensitive areas, such as spawning, rearing, and over-wintering habitats;
c) water quality parameters in waterbodies and watercourses that may affect suitability for fish; and,
d) current and potential use of the fish resources by Indigenous peoples.

3.5.2 Impact Assessment

[A] Describe and assess the potential impacts of the Project to fish, fish habitat, and other aquatic resources during site preparation, construction, reservoir filling, and operation stages, including but not limited to:
a) change in habitat suitability and availability during construction and operation of the Project;
b) survival of eggs and fry, chronic or acute health effects, and increased stress on fish populations from release of contaminants, bioaccumulation of methylmercury, sedimentation, flow alterations, temperature, and habitat changes;
c) changes to movements of fish, including entrainment of fish in canals and resulting immigration/emigration;
d) changes to riparian areas that could affect aquatic biological resources and productivity;
e) changes to benthic invertebrate communities that may affect food quality and availability for fish;
f) the potential for increased fragmentation of aquatic habitat;
g) potential quantity changes;
h) acidification and/or eutrophication;
i) groundwater-surface water interactions; and,
j) potential for thermal plumes to affect aquatic habitat.

[B] Identify the key indicator fish species and provide the rationale and selection criteria used.

[C] Discuss the design, construction, and operational factors including specific diversion and reservoir operations that will be incorporated into the Project to minimize impacts to fish and fish habitat and protect aquatic resources.

[D] Identify plans proposed to offset a reduction in the productivity of (or to enhance) fish habitat resulting from the Project. Indicate how environmental protection plans address applicable provincial and federal policies on fish habitat protection.

[E] Discuss the potential impacts of new water control structures on seasonal fish movements relative to baseline conditions.

[F] Discuss the potential effects on fish and fish habitat during the filling of the new reservoir, including mitigations to protect fish during the filling process.

[G] Discuss the potential for aquatic invasive species to occur and the potential for the Project to affect occurrence or distribution of these species. Describe measures to monitor and remove aquatic invasive species should they be encountered during Project works.

[H] Discuss the potential increase in fishing pressures that could arise from the improved access from the Project in the region and how the sport fishery could change.

[I] Identify plans proposed to offset any loss in the productivity of fish habitat. Indicate how environmental protection plans address applicable provincial and federal policies on fish habitat including the development of a no net loss fish habitat objective.

[J] Describe the effects of surface water withdrawals and water diversions from the Red Deer River including cumulative effects on fish, fish habitat, and other aquatic resources.

[K] Discuss the effects of the new reservoir on recreational fishing.

[L] Discuss changes in the aquatic environment with predicted climate change scenarios, with and without the Project in the local and regional study areas.

3.6 Vegetation

3.6.1 Baseline Information

[A] Describe and map the vegetation communities (including ecological range/community classes and anthropogenically modified classes) to include native grasslands, wetlands, wetland habitat and riparian lands. Describe and map rare plants occurrences and potential, invasive species and communities of rare and scarce distribution. Identify the occurrence, relative abundance and distribution and identify any species that are:

a) listed as “At Risk,” “May Be at Risk” and “Sensitive” in the *General Status of Alberta Wild Species* (Alberta Environment and Protected Areas);
b) listed as “Threatened” or “Endangered” under the *Alberta Wildlife Act*;
c) listed as “Threatened” or “Endangered” under Schedule 1 the federal *Species at Risk Act*;
d) listed as “Threatened” or “Endangered” by COSEWIC; and
e) species tracked by the Alberta Conservation Information Management System (ACIMS) as being SU, S1, S2, S3;
f) rare ecological communities as tracked by ACIMS; and,
g) traditionally used plant species.

[B] Discuss the potential of each ecosite phase or ecological range site to support rare plant species, plant species of cultural significance, and plant communities of limited distribution. Consider their importance for local and regional habitat, rare plant habitat and the hydrologic regime.

[C] Describe each vegetation community based on any available data, including occurrence and relative abundance (cover) of dominant species, species richness or diversity metrics, soil characteristics, and topographical or site characteristics.

[D] Identify the occurrence and distribution of Prohibited Noxious and Noxious weeds and of other non-native plant species.

[E] Describe the regional relevance of landscape units that are identified as rare.

[F] Describe and quantify the current extent of habitat / community fragmentation due to anthropogenic land disturbances.

[G] Describe and quantify the local and regional relevance of native grassland, and:
a) discuss the distribution and relative abundance;
b) native grassland units;
c) discuss locations and size of native grassland units;
d) characterize the flora and fauna of the native grassland units; and,
e) evaluation and discuss native grassland integrity.

[H] Identify, classify, and map wetlands. Identify, describe, and map other surface hydrological features including springs, ephemeral waterbodies, ephemeral drainages, watercourses, and anthropogenic waterbodies. Describe these hydrological features, including:
a) distribution and area of each class; and,
b) dominant and indicator plant species, observed wildlife, basin characteristics, topographical influences and capture basins, soil characteristics, and hydrology including assessed hydroperiod and mineralogy.

3.6.2 Impact Assessment

[A] Quantify and map the area of each vegetation community and wetland class that will be:
a) altered or removed by the Project; or,
b) temporarily affected and reclaimed.

[B] Identify vegetation community classes or wetlands that should be avoided and protected during construction, where possible.

[C] Discuss the expected timelines for establishment and recovery of ecological range/community classes in reclaimed areas. Discuss indicators in the reclaimed areas in comparison to plant cover, species composition, and soil/site characteristics in natural or reference community classes.

[D] Discuss strategies for control of weeds and other non-native species during construction, reclamation, and operations.

[E] Describe the Project's relative contribution to cumulative effects on:
a) native grassland communities;
b) populations of plant "species of conservation concern" and "communities of conservation concern";
c) wetlands;
d) riparian areas; and,
e) unique sites or special features.

[F] Identify the area of each vegetation community mapped, including various native grassland plant communities, that would be permanently lost due to the Project.

[G] Identify and quantify areas that will be temporarily lost to the Project and will be reclaimed (e.g., access routes).

[H] Discuss the predicted changes to upland, native grassland, riparian, and wetland habitats resulting from increased fragmentation.

[I] Identify areas that will be avoided during construction.

[J] Discuss the potential Project impacts on rare plants, endangered species, or rare ecological communities, and describe any required regulatory authorizations and/or possible mitigation plans/strategies needed to address these impacts.

[K] Describe and assess the potential impacts of the Project on vegetation communities considering:

a) both temporary (include time frame) and permanent impacts;
b) the potential for introduction and colonization of weeds and non-native invasive species and how those species will be managed;
c) potential increased fragmentation and loss of upland, native grassland, riparian and wetland habitats;
d) implications of vegetation changes for other environmental resources (e.g., terrestrial and aquatic habitat diversity and quantity, water quality and quantity, erosion potential); and,
e) the species that will be used in reclaiming areas disturbed during construction and for erosion control and site stabilization.

[L] For temporary disturbances, discuss from an ecological perspective, the expected timelines for establishment and recovery of vegetative communities and the expected differences in the resulting vegetative community structures.

[M] Describe how the *Alberta Wetland Policy* was considered in the assessment of impacts, including but not limited to:

a) avoidance, minimization, reclamation, or replacement of wetlands in accordance with the Alberta Wetland Mitigation Directive;
b) temporary and permanent alterations (direct and indirect) to wetlands classified under the Alberta Wetland Classification System;
c) any expected changes in wetland class or type and cause for this change; and,
d) consideration of cumulative effects in the watershed to wetlands.

[N] Discuss the effect of a loss or development of wetlands and riparian areas, including how the loss or development will affect land use.

[O] Discuss the regional significance of the indirect effects of the conversion of native grassland pasture to tame pasture or cultivated lands with an increase in water availability.

3.7 Wildlife

3.7.1 Baseline Information

[A] Describe and map current and potential wildlife resources (amphibians, reptiles, birds, and terrestrial and aquatic mammals). Describe species relative abundance, distribution, and their use and potential use of habitats. Also identify species that are:

a) listed as “At Risk,” “May Be at Risk” and “Sensitive” in the General Status of Alberta Wild Species (Alberta Environment and Protected Areas);
b) listed as “Threatened” or “Endangered” under the *Alberta Wildlife Act*;
c) listed as “Threatened” or “Endangered” under Schedule 1 the federal *Species at Risk Act*;
d) listed as “Threatened” or “Endangered” by COSEWIC; and
e) migratory bird species listed under the *Migratory Birds Convention Act*; and,
f) species of cultural significance

[B] Describe and map existing wildlife habitat and habitat disturbance including assessment activities. Identify habitat disturbances that are related to existing and approved Projects.

3.7.2 Impact Assessment

[A] Describe and assess the potential impacts of the Project to wildlife and wildlife habitats, and biodiversity considering:
a) how the Project will affect wildlife relative abundance, habitat availability, habitat fragmentation, mortality, movement patterns, and distribution for all stages of the Project, including a prediction of future use due to habitat alteration;
b) how improved or altered access may affect wildlife, including future prediction of wildlife use and movements, potential obstruction of movements, and increased vehicle-wildlife collisions;
c) how altered habitat conditions (loss, change, fragmentation) may effect wildlife and biodiversity values. Consider habitat change (e.g., riparian), the availability of habitat and the influence of anthropogenic features and infrastructure on wildlife movements and predator-prey relationships;
d) the contribution of the Project to changes in regional biodiversity and the impact to local and regional ecosystems;
e) potential effects on wildlife resulting from changes to air and water quality, including both acute and chronic effects to animal health;
f) how the risk to wildlife and habitat can be managed, including the use of setbacks; and
g) the resilience and recovery capabilities of wildlife populations and habitat to disturbance.

[B] Describe how wildlife may be affected during filling of the new reservoirs.

[C] Provide a strategy and mitigation plan to avoid or minimize impacts on wildlife and wildlife habitat for all stages of the Project considering:
a) consistency of the plan with applicable regional, provincial, and federal wildlife habitat objectives and policies;
b) a schedule for the return of habitat capability to areas temporarily affected by the Project;
c) pre-clearing of vegetation prior to the main breeding season, to reduce nesting and denning opportunities, such that wildlife interactions should be reduced during construction operations in breeding season;
d) measures to prevent human-wildlife encounters, especially encounters between equipment/vehicles and wildlife, including activities within the Project site and within access roads used by workers and equipment to travel to the Project site;

e) use of pre-construction wildlife sweeps within the main breeding seasons to identify species in need of protection;
f) the use of setbacks to protect habitat and connectivity of habitat for species of conservation concern;
g) the use of setbacks to protect habitat areas and timing restrictions during critical periods to protect "species of conservation concern" during construction and operations;
h) measures to prevent wildlife from contacting or ingesting harmful substances;
i) anticipated/use of access controls or other management strategies to improve connectivity across access roads and protect wildlife during construction and operations;
j) measures to prevent human-wildlife encounters and consequent destruction of wildlife;
k) habitat fragmentation and habitat connectivity resulting from linear features (e.g., above ground canals, roads etc.) and other Project infrastructure and activities.
l) management of noise, lighting, and use of equipment to reduce sensory disturbance effects;
m) installation of offset habitat structures such as nesting platforms in suitable offsite areas;
n) programs to capture and transport sensitive wildlife to suitable offsite habitat areas;
o) use of habitat enhancements or planting of selected species to improve habitat quality in areas temporarily affected by the Project;
p) measures to deter use of reservoir substrate for nesting or denning prior to filling of the reservoirs; and,
q) measures to enhance use of the new reservoir for use by aquatic and semiaquatic wildlife species.

[D] Identify opportunities for habitat creation or enhancement which may occur as a result of the Project.

[E] Identify the key wildlife and habitat indicators used to assess Project impacts. Discuss the rationale for their selection.

[F] Describe the Project's relative contribution to cumulative effects, if any, on:
a) wildlife habitat quality;
b) movement patterns and distribution; and,
c) wildlife "species of conservation concern".

3.8 Terrain and Soils

3.8.1 Baseline Information

[A] Describe and map the terrain and soils conditions, including:
a) surficial geology and topography;
b) soil types and their distribution
c) agricultural land capability;
d) soil type capability of reclamation;
e) soils that could be affected by the Project;
f) specific locations of erosion sensitivity and saline-sodic soils, and,

g) an inventory of geohazards, such as soils affected by erosion, landslides, floods etc., or human use.

3.8.2 Impact Assessment

[A] Describe Project activities and other related issues during construction and operations that could affect the terrain and soil resources, soil quality (e.g., wetting/drying/rewetting of soil, salinization, silt accumulation, soil crusting, compaction, anaerobic decomposition of organic matter, contaminants) and:

a) indicate the amount (ha) of surface disturbance from the Project construction, operation, and decommissioning activities;
b) indicate the size and location of soil types and land capability classes that will be stripped, left intact, disturbed, and reclaimed;
c) describe potential sources of soil contamination (e.g., industry infrastructure and activities, agricultural infrastructure, and activities, contaminated sites, etc.), along with the appropriate remedial measures;
d) describe the impact of the Project on soil types and reclamation suitability, and approximate the volume of soil materials that are salvaged for reclamation;
e) discuss constraints or limitations to achieving vegetation/habitat reclamation based on anticipated soil conditions (e.g., compaction, contamination, salinity, soil moisture nutrient depletion, or erosion etc.), which occur naturally or due to the Project;
f) discuss potential changes to the rate and type of soil erosion;
g) discuss potential changes to slope instability, wind erosion, and other geohazards, in intact and reclaimed areas;
h) discuss the relevance of changes for the local landscape on biodiversity, productivity, ecological integrity, aesthetics, and future use; and,
i) discuss relevance of changes to agricultural land capability.

[B] Discuss the potential impacts caused by the mulching and storing woody debris considering, but not limited to, vulnerability to fire, degradation of soil quality and increased footprint.

[C] Provide a mitigation plan including:

a) possible measures to minimize surface disturbance;
b) possible actions to mitigate effects of constraints or limitations to habitat reclamation;
c) possible actions to mitigate compaction, contamination, salinity, soil moisture issues, nutrient depletion, and erosion;
d) possible actions to address impacts to land capability; and,
e) any other measures to reduce, eliminate, or offset the potential impacts that the Project may have on soil capability and/or quality including:
    i) soil mapping and typical profiles;
    ii) losses of agricultural soils;
    iii) erosion issues; and,
    iv) characteristics related to handling, reclamation of site disturbance.

[D] Describe the Project's relative contribution to cumulative effects on terrain and soil resources.

3.9 Land Use and Management

3.9.1 Baseline Information

[A] Describe and map the ownership status of the subject lands, including lands owned by the Crown, local municipalities, and patented lands. Describe and map the current land uses in the Project area, including private land, Crown land dispositions, and Crown land reservations.

[B] Describe and map the existing land and resource uses and potential conflicts that exist considering oil and gas development, renewable energy production, agriculture, tourism, Indigenous uses, and outdoor recreational activities.

[C] Identify and map unique sites or special features such as Parks and Protected Areas, Heritage Rivers, Historic Sites, Environmentally Significant Areas, culturally significant sites, and other designations (e.g., World Heritage Sites, Ramsar Sites, Internationally Important Bird Areas).

[D] Identify any land use policies and resource management initiatives or strategies related to the Project and discuss how the Project will be consistent with the intent of these initiatives.

[E] Describe and map land clearing activities, showing the timing of the activities.

[F] Describe existing access control measures.

3.9.2 Impact Assessment

[A] Identify the potential impacts of the Project on land uses, including:

a) unique sites or special features;
b) effects caused by changes in public access, including secondary effects related to increased hunter, angler and other recreational access, and access to traditional use sites;
c) the implications of relevant land use policies and resource management initiatives for the Project, including constraints to development; and,
d) the anticipated changes (type and extent) to the topography, elevation, and drainage pattern within the Project area.

[B] Identify existing private land uses that would be impacted by the Project and describe the:

a) area of land affected and the nature of the impact;
b) opportunities for mitigation and compensation, including the cost of implementation; and,
c) procedures that will be followed in compensating landowners for lands required for the Project and for associated damages or disturbances.

[C] Provide a fire control plan highlighting:

a) fire prevention, detection, reporting, and suppression measures, including proposed fire equipment; and,
b) measures taken to ensure continued access for firefighters to adjacent wildland areas.

[D] Discuss mitigation strategies, including:

a) the need and plans for addressing access management during and after Project operations (e.g., for public and traditional users);

b) the process for addressing the other land users in the Project area;
c) Project effects that may lead to changes in land use.

3.10 Climate Change

3.10.1 Baseline Information

[A] Describe climate norms and variability as they relate to agricultural productivity in the Project area.

[B] Identify elements of the Project that are sensitive to changes or variability in climate parameters, including frequency and severity of extreme weather events and discuss the potential impacts over the life of the Project.

[C] Discuss the baseline climatic conditions including the type and frequency of meteorological conditions.

[D] Describe the greenhouse gas emissions and carbon sequestration capacity of the Project area.

3.10.2 Impact Assessment

[A] Describe and assess the greenhouse gas emissions during construction, operation, and decommissioning phases.

[B] Estimate the impacts of the Project to carbon sequestration capacity, including impacts on sequestration in soil and water systems across the new reservoirs.

[C] Discuss the benefits and consequences of the Project on the affected area with regards to its ability to counteract climate change impacts and the associated risks.

[D] Evaluate the feasibility of the Project under scenarios of climate change, including an explanation of:
a) How drier conditions would affect the long-term viability of local agriculture with or without the Project;
b) how potential adverse effects of excess rainfall events will be mitigated by the Project; and,
c) how changes to the volume and timing of spring runoff and river flows may affect the supply of water from the Red Deer River and/or the reservoirs and the risks posed to water availability for the reservoirs.

[E] Review and discuss potential changes in local climate under multiple climate projections; and:
a) Identify representative climate change scenarios that reflect a full range of future climate variability (e.g., we and dry conditions); and,
b) Evaluate relative changes in climate indices (e.g., annual/seasonal precipitation and temperature) between baseline and future periods.

[F] Describe potential effects of climate change on water demands and supply, including:
a) Changes in water demand for irrigation;
b) Potential changes in flow and impacts on downstream watercourses and waterbodies; and,
c) A description of adaptations (e.g., reservoir operation) to climate change for sustainable water resource management.

4 HISTORIC RESOURCES

4.1 Baseline Information

[A] Provide a brief overview of the regional historical resources setting including a discussion of the relevant archaeological, historic, and paleontological records, as well as Project lands overlapping the *Listing of Historic Resources*.

[B] Describe and map known historic resources sites in the Project area, considering:
a) site type and assigned Historic Resources Values; and
b) existing site-specific *Historical Resources Act* requirements.

[C] Summarize/provide an overview of previous historic resource studies or Historic Resources Impact Assessments within or near the Project area, including:
a) description of the spatial extent of previous assessments relative to the Project area, noting any assessment gap areas; and,
b) a summary of *Historical Resource Act* requirements and/or clearances that have been issued for the Project to date.

[D] Complete a Sensitivity Model for Historic Resources to identify locations within the Project area that may or are likely to contain previously unrecorded historic resources, as per the *Complex Project (Areal) Historical Resources Act Compliance Land Use Bulletin*, including:
a) identification of areas of "high," "moderate," and "low" potential for historic resources, integrating existing environmental, geological, topographic, and historic resources information; and,
b) Completion of a Statement of Justification outlining the methods and rationale used to develop the sensitivity model.

[E] Describe consultation with Alberta Arts, Culture, and Status of Women (ACSW) concerning the need for Historical Resource investigation for the Project and the program and schedule for *Historical Resources Act* requirements for the Project, including:
a) any historic resources issues or concerns raised during consultation/engagement on the Project; and,
b) any Historical Resources Act programs required to evaluate and mitigate the impacts on historic resources.

4.2 Impact Assessment

[A] Describe Project components and activities, including all ancillary activities, that have the potential to affect historic resources at all stages of the Project.

[B] Provide a summary of the results of any Historic Resources Impact Assessments that have been conducted for the Project.

[C] Describe the nature and magnitude of the potential Project impact on historical resources, considering:
a) effects on historic resources site integrity; and
b) implications for the interpretation of the archaeological, historic, and paleontological records.

[D] Provide recommendations for the management of all historic resources within the Project area.

5 TRADITIONAL ECOLOGICAL KNOWLEDGE AND LAND USE

[A] If consultation with Indigenous groups reveals traditional use areas and spiritual sites within lands affected by the Project, provide:

a) a map and description of traditional land use areas including fishing, hunting, trapping, water use (e.g., for drinking, cooking, and navigation) and nutritional medicinal, or cultural plant harvesting by affected Indigenous peoples (if the Indigenous community or group is willing to have these locations disclosed); and,

b) a map of cabin sites, spiritual sites, cultural sites, graves, and other traditional use sits considered historic resources under the *Historical Resources Act* (if the Indigenous community or group is willing to have these locations disclosed), as well as traditional trails and resource activity patterns.

[B] Discuss any limitations to access for traditional uses during all stages of the Project.

[C] Describe how Traditional Ecological Knowledge and Traditional Land Use information was incorporated into the Project, EIA development, the conservation and reclamation plan, monitoring, and mitigation.

[D] Determine the impacts of the Project on traditional, medicinal, and cultural land use and identify possible mitigation strategies to encourage or improve Traditional Use in the Study Area.

[E] Discuss the species, abundance, and availability of vegetation, fish, and wildlife used for food, traditional, medicinal, and cultural purposes in the identified traditional land use areas, considering all Project related impacts.

6 PUBLIC HEALTH AND SAFETY

6.1 Public Health

[A] Describe aspects of the Project's activities and emissions during construction and operation that may have implications for public health or the delivery of regional health services.

[B] Conduct a human health risk assessment following guidance from Alberta Health for project components that have implications for public health and describe the results.

[C] Document any health concerns raised by stakeholders during consultation/engagement on the Project, and how these were addressed.

[D] Document health concerns identified by Indigenous communities or groups resulting from impacts of existing development and of the Project, specifically on their traditional lifestyle. Include an Indigenous receptor type in the assessment.

[E] Describe mitigation plans for adverse impacts to public health resulting from the Project.

[F] Describe any health impacts from increased regional traffic volumes, and the increased risk of contamination due to leaks and spills on water or soil resources and effects on food sources, including plant and animal sources.

6.2 Public Safety

[A] Describe aspects of the Project that may impact or have implications for public safety. Specifically:

a) describe the emergency response plan including public notification protocol and safety procedures to ensure public safety and minimize adverse environmental impacts effects, including emergency reporting procedures for spill containment and management;
b) document any safety concerns raised by stakeholders during consultation on the Project and the actions taken to address those concerns;
c) describe how local residents will be contacted during an emergency, and the type of information that will be communicated to them; and,
d) describe the existing agreements with area municipalities or industry groups such as safety cooperatives, emergency response associations, regional mutual aid programs and municipal emergency response agencies or other industry partner emergency response/spill response agreements.
e) describe the potential safety impacts resulting from higher regional traffic volumes.

[B] Discuss mitigation plans to safeguard/ensure workforce and public safety for construction and operation of the Project.

[C] Describe the potential challenges that could impact the safety of the proposed structures and proposed mitigation measures (e.g., during excavations, during reservoir filling, debris management, operations, maintenance, and surveillance philosophy, performance under extreme weather events [floods, tornados, etc.,], emergency preparedness and response, etc.)

7 SOCIO-ECONOMIC ASSESSMENT

7.1 Baseline Information

[A] Describe the existing socio-economic conditions in the region and in the communities in the region.

[B] Describe factors that may affect existing socio-economic conditions including:
a) population changes;
b) workforce requirements for all stages of the Project, including a description of when peak activity periods will occur;
c) planned accommodations for the workforce for all stages of the Project. Discuss the rationale for their selection;
d) the policies and programs regarding the use of local, regional, and Alberta goods and services;
e) housing and land costs;
f) the Project schedule;
g) education;
h) recreation opportunities;
i) the overall engineering and contracting plan for the Project;
j) protective services;
k) infrastructure services; and,
l) municipal finance.

[C] Describe the socio-economic contribution of current agricultural operations (irrigated and non-irrigated) in the local and regional study areas including:
a) historic and current livestock operations;

b) historic and current cropping patterns;
c) historic and current irrigated acreages; and,
d) other agricultural uses (e.g., greenhouses).

[D] Describe the current impact of drought on agricultural operations in the local and regional study area including:
a) revenue losses (e.g., productivity loss and forced timing of sale of products);
b) drought-related costs (e.g., emergency water supply, and trucking of livestock and feed);
c) impacts to operations (e.g., forced herd reduction);
d) costs related to drought recovery; and,
e) long-term community impacts.

[E] Describe the process used to establish rates ($/unit water) for supplying water to irrigated crop producers, and include:
a) current water rates (2023-2024); and,
b) forecast water rates following the Project.

[F] Describe the socio-economic impact of the current wetlands within the Project area.

7.2 Impact Assessment

[A] Describe the socio-economic impacts of construction and operation of the Project on:
a) land owners;
b) agricultural productivity and activities;
c) local and regional infrastructure and community services;
d) availability and quality of health care services;
e) local training, employment, and business opportunities;
f) housing;
g) recreational activities; and,
h) First Nations and Métis (e.g., traditional land use and social and cultural implications).

[B] Provide a discussion as to which communities will benefit from the Project.

[C] Discuss opportunities to work with Indigenous communities and groups, other local residents, and businesses regarding employment, training needs and other economic development opportunities arising from the Project.

[D] Provide the estimated total Project cost, including a breakdown for engineering and project management, equipment and materials, and labour for both construction and operation stages, including maintenance of the Project. Indicate the percentage of expenditures expected to occur in the region, Alberta, Canada, outside of Alberta, and outside of Canada.

[E] Provide an estimate of the costs and benefits of providing livestock watering facilities supported from the Project as it relates to improved range management and livestock production.

[F] Provide an estimate of the Project's impact on current irrigators (e.g., increased output, more stable output, increased demand, water rates) and impact on average annual farm income.

[G] Provide details on the total number of existing and new irrigable acres to be serviced by the Project, including the costs and benefits of expanding irrigable acres.

[H] Discuss considerations made by irrigation districts when evaluating requests to add new irrigated parcels.

[I] Provide an estimate of the nature and cost of the development of recreational infrastructure.

[J] Provide a benefit/cost analysis value of the Project, including costs of construction, operation, and maintenance, increase value of agricultural production, indirect and induces benefits (livestock production, food processing etc.), recreational activities and sport fisheries. Present a sensitivity analysis of assumptions used to generate these values.

[K] Identify non-quantifiable benefits and costs expected during the life of the Project. Discuss how these might affect the overall Project benefit/cost analysis.

[L] Provide an estimate of the wetland losses and gains related to the Project and the economic costs and benefits considering Alberta's current wetland policy.

[M] Provide an estimate of the losses and gains of native grasslands and associated biodiversity related to the Project and the economic costs and benefits.

8 MITIGATION MEASURES

[A] Discuss mitigation measures planned to avoid, minimize, or compensate the potential impacts for all stages of the Project.

[B] Identify the mitigation objectives for each associated impact and describe those mitigation measures that will be implemented. Provide rationale for their selection, including a discussion on the effectiveness of the proposed mitigation.

9 RESIDUAL IMPACTS

[A] Describe and characterize the residual impacts of the Project following implementation of Project mitigation measures and the Proponent's plans to manage those residual impacts.

10 ACCIDENTS AND MALFUNCTIONS

[A] Describe the potential challenges that could impact safety of the proposed structures and proposed mitigation measures (e.g., during excavations, during reservoir filling, debris management, operations maintenance and surveillance philosophy, performance under extreme weather events [floods, tornados, etc.], emergency preparedness, etc.)

11 MONITORING

[A] Describe the surface water quality monitoring program that will be implemented to assess the future impacts of construction and operation (including maintenance) of the new reservoirs. Consider appropriate water quality parameters (e.g., metals, nutrients, pesticides, temperature, BOD/TOC, bacterial, aquatic and benthic invertebrates, aquatic plants, algae, dissolved oxygen, etc.) and their spatial (e.g., lateral and depth) and temporal (e.g., seasonal) flow variations.

[B] Describe the proposed monitoring programs, including:

a) how the monitoring programs will assess any Project impacts and measure the effectiveness of mitigation plans. Discuss how the Proponent will address any Project impacts identified through the monitoring program;
b) How the Proponent will contribute to current and proposed regional monitoring programs;
c) Monitoring performed in conjunction with other stakeholders, including Indigenous communities and groups;
d) New monitoring initiatives that may be required as result of the Project;
e) Regional monitoring that will be undertaken to assist in managing environmental effects and improve environmental protection strategies;
f) How monitoring data will be disseminated to the public, Indigenous communities, or other interested parties;
g) How the results of monitoring programs and publicly available monitoring information will be integrated with the Proponent's environmental management system; and,
h) How these programs help address monitoring needs for the various disciplines in the EIA report.