PROPOSED TERMS OF REFERENCE
ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR ST. MARY RIVER IRRIGATION DISTRICT

PROPOSED CHIN RESERVOIR EXPANSION PROJECT

Located in Southern Alberta within
Lethbridge County, County of Warner and the Municipal District of Taber

ISSUED BY: **St. Mary River Irrigation District**
DATE: **November 3, 2022**

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PURPOSE OF THE TERMS OF REFERENCE

The purpose of this document is to identify for St. Mary River Irrigation District (SMRID), 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 Chin Reservoir Expansion Project (the Project).

PROJECT BACKGROUND

Chin Reservoir is an off-stream storage reservoir that is located roughly in the middle of SMRID system, approximately 30 kilometers (km) east of Lethbridge and 15 km south of Taber. The existing reservoir is located between NE-27-8-18-4 and SE-26-7-16-4. It is the largest off-stream reservoir within SMRID and has a current storage volume of 154,320 acre-foot (ac-ft) (190,350 cubic decameter [dam^3]) at the operating full supply level (FSL) of 861.40 meters (m).

Chin Reservoir is located in a major glacial melt coulee known as Chin Coulee. The reservoir is impounded by two dams on its east and west ends: Chin 1 (West Dam), and Chin 2 (East Dam). Chin Coulee continues to the west and east of both dams. West of the West Dam is Stafford Reservoir. An ephemeral creek channel extends eastward from the East Dam. Typically, the flow in the channel stops by mid-summer, stranding small pockets of water that, depending on the environmental conditions of a given year, may or may not dry up by the end of summer.

The two dams were completed in 1955 and no major modifications have been completed since their construction. In 1989, Forty Mile Coulee Reservoir, 50 km to the east of the Chin Coulee Reservoir, was added to SMRID for water storage for irrigation.

Since the addition of Forty Mile Coulee Reservoir, there has been a dramatic increase in the demand for water for irrigation purposes. To meet the increased demand for irrigation, SMRID has proposed to expand the existing Chin Reservoir (the Project). The expansion is planned for privately held land where landowners continue to be included in the planning of the Project. The Project involves the creation of a new dam at the invert of Chin Coulee which will result in a larger reservoir. The new dam and eastern limit are within SW 23-7-15-W4 and NW-14-7-15-W4 in the MD of Taber and County of Lethbridge. The new dam will be approximately 40 m in height and is expected to inundate (flood) approximately 650 hectares (ha) of Chin Coulee east of the existing East Dam.

Three noteworthy aspects of the operation of the SMRID system limit the potential effects of the Project. The first is that the water in the SMRID system is drawn from the Milk River Ridge Reservoir and not directly from a river. The water diverted to the Milk River Ridge Reservoir is managed and controlled by the Government of Alberta and not SMRID. Decisions regarding Water Conservation Objectives and Instream Objects are under the jurisdiction of the Government of Alberta. Second, while the goal is to increase storage capacity, the additional capacity would be filled without the need for SMIRD to exceed the water allocation of their existing water license. Finally, water released downstream of the Chin Reservoir cannot increase due to the constraints of the existing conveyance infrastructure.

SCOPE OF THE EIA REPORT

The SMRID (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 the 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 and associated regulations, and the *Impact Assessment Act*, if applicable. The EIA report will form part of the application to the Natural Resource 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 Protected Areas (the Guide) and these Terms of Reference when preparing the EIA 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 and the specific comments or issues raised at the meetings;
b) 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
c) how 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 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) how Indigenous input was incorporated into the Project development, impact mitigation and monitoring; and
d) the consultation undertaken with Indigenous communities and groups with respect to traditional ecological knowledge and traditional use of land.

[C] Describe plans to maintain the public engagement 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.

2 PROJECT DESCRIPTION

2.1 Overview

[A] Identify the legal entity that is the champion for the Project, the legal entities that will develop, design, and construct the Project and the legal entity that will manage and operate the completed Project and hold the operating approvals.

[B] Outline the original purpose and rationale for the Project including the roles of various government departments and agencies and non-governmental organizations.

[C] 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 SMRID and on lands currently without a secure water supply; and
d) potential wetlands enhancement.

[D] Provide an estimate of future trends in water demand for the Project area.

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

a) the proposed dam structure;
b) the water supply;
c) water conveyance structures;
d) reservoirs;
e) borrow pits;
f) access roads; and
g) any associated works.

[F] Provide a generalized project phasing and construction schedule for the Project.

[G] Discuss the alternatives for the Project and the rationale for not selecting the identified alternatives.

[H] Discuss the implications resulting from a delay in proceeding with the Project, or any phase of the Project, and the implications of not going ahead with the Project.

[I] Discuss the overall economic, environmental, and social impacts of the Project in comparison to its economic, environmental and social benefits.

2.2 Constraints

[A] Discuss the process and criteria used to identify constraints to development, and how the Project was designed so that it meets the objectives and goals of:

a) any applicable *Alberta Land Stewardship Act* Regional Plan, sub-regional plan or watershed plan;
b) apportionment agreement with downstream provinces how the apportionment commitments are met;
c) applicable Municipal Plans; and
d) the Government of Alberta Rural Economic Development Action Plan.

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

a) the dam:
b) water conveyance structures;
c) the source of water; and
d) borrow sites.

[C] Describe the potential effects of raising the FSL on the West Dam, Chin Chute, Chin Power Plant, and the Chin conduits.

[D] Describe the potential effects of raising the FSL on the Highway 36 causeway.

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

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

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

[H] Describe public lands that may overlap with the Project.

2.3 Regional and Cooperative Initiatives

[A] Discuss the Proponent's involvement in regional and cooperative efforts to address environmental and socio-economic issues associated with regional development.

[B] Describe opportunities for sharing infrastructure (e.g., access roads, utility corridors, water infrastructure) with other resource development stakeholders. 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 intakes, pipelines, water storage and withdrawals, flow monitoring and reporting and ecological monitoring.

2.4 Dam Safety

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

a) the Project components and scope;
b) the overall approach for design and technical specification;
c) any hypotheses and assumptions used;
d) data collection methods, models and studies;
e) the degree of uncertainty, reliability and sensitivity of models used to reach conclusions; and
f) any gaps in knowledge and understanding related to key conclusions, including steps to address these gaps.

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

[C] Describe:

a) the principal dimensions of the dam and appurtenant structures;
b) the anticipated quantities of material used to construct the dam and appurtenant structures;
c) seepage control and drainage provisions;
d) freeboard requirements;
e) the field and lab testing that has been performed to determine the suitability of the materials; and
f) the characteristics/geotechnical properties of the in-situ and construction materials and describe their suitability for use as construction materials.

[D] Describe the physical characteristics of the proposed reservoir, 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 operating water volume; and
e) the volume between the maximum normal reservoir level and the minimum normal reservoir level.

[E] Describe the activities for construction of the dam and other appurtenant structures, including:

a) site clearing and grubbing;
b) construction and operation of the temporary works required for construction (e.g., cofferdam, river diversion, etc.), if any;
c) excavations, slope stabilization and foundation preparation;
d) construction of the dam and its appurtenant structures;
e) placing impervious lining and erosion protection;
f) installation of instrumentation, mechanical and electrical equipment;
g) testing and commissioning the facility; and
h) removal of temporary construction facilities.

[F] Describe the construction activities required in preparation of the filling and raising of the reservoir, including:

a) the breach of the existing East Dam by tabulating the expected flood arrival times, changes to water surface elevations, and expected spatial distribution of water downstream of the existing East Dam.
b) describe the possibility of cascade failure and its impacts downstream of the existing East Dam, and
c) methods for managing wood debris and shoreline stabilization during reservoir filling and raising.

[G] Describe the borrow locations, excavation and stockpiling of suitable material, including drilling, blasting, sorting and screening in rock quarries and moisture conditioning of impervious material.

[H] Describe activities of the operations phase, including:

a) operation and maintenance activities needed for the safe operation of the dams and to prolong their operational capacity;
b) reservoir fluctuations;
c) water management approach (for flood, normal and drought conditions), including reservoir operations and resulting downstream flows and water levels; and
d) operation and maintenance plans.

[I] Describe the decommissioning of temporary construction facilities and associated reclamation (e.g., cofferdam).

2.5 Water Management

2.5.1 Water Supply

[A] Describe the water supply requirements for the Project, including:

a) the criteria used, options considered and rationale for selection of water supply;

b) the expected water balance during all stages of the Project. Discuss assumptions made or methods chosen to arrive at the water balances;
c) the process water, potable water, and non-potable water requirements and sources for construction and normal operation of the reservoir. Identify the volume of water to be withdrawn from each source;
d) the variability in the amount of water required on an annual and seasonal basis as the Project is implemented;
e) the expected cumulative effects on water losses/gains resulting from the Project operations;
f) potable water treatment systems for all stages of the Project;
g) type and quantity of potable water treatment chemicals used; and
h) measures for ensuring efficient use of water such as water use minimization, recycling, conservation, and technological improvements.

2.5.2 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 management,
    iii) road run-off,
    iv) erosion/sediment control,
    v) geotechnical stability concerns,
    vi) surface water protection and groundwater interaction,
    vii) waterbody dewatering,
    viii) groundwater seepage, and
    ix) flood protection;

b) permanent or temporary alterations or realignments of watercourses and waterbodies; and

c) the pre and post-disturbance alignment and condition of ephemeral and permanent streams and waterbodies including those created by the Project.

[B] Describe and map roadway, pipeline, powerline and other utility crossings of watercourses or waterbodies.

2.5.3 Wastewater Management

[A] Describe the wastewater management strategy during construction, including:

a) the criteria used, options considered and rationale for the selection of wastewater treatment and wastewater disposal and a discussion of why the other options were not chosen; and
b) design of facilities that will collect, treat, store and release wastewater streams.

2.6 Waste Management

[A] Discuss the selection criteria used, options considered, and rationale for waste disposal during construction. 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.

[B] Characterize and quantify the anticipated dangerous goods, hazardous, non-hazardous, and recyclable wastes generated by all phases of the Project, and describe:

a) the composition and volume of specific waste streams and discuss how each stream will be managed; and
b) plans for pollution prevention, waste minimization, recycling, and management to reduce waste quantities for all stages of the Project.

[C] Describe the nature and amount of on-site hydrocarbon storage. Discuss containment and other environmental protection measures.

2.7 Conservation and Reclamation

[A] Provide a conceptual conservation and reclamation plan for the Project.

3 ENVIRONMENTAL ASSESSMENT

3.1 Air Quality and Noise

3.1.1 Baseline Information

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

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

3.1.2 Impact Assessment

[A] Identify construction and operational components of the Project that 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 and dust that could affect residences or other facilities during construction and operation.

[C] With respect to the reservoir, assess the probability of soil drifting during reservoir draw-down. If a significant increase from the baseline is predicted, discuss the frequency, severity, potential impacts, and mitigation measures.

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

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) present regional and Project area hydrogeology describing:

i) the major aquifers, aquitards and aquicludes (Quaternary and bedrock), their spatial distribution, properties, hydraulic connections between aquifers, hydraulic heads, gradients, groundwater flow directions and groundwater chemistry;
ii) 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
iii) an inventory of water well development and groundwater use.

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 reservoir and how the seepage could be mitigated.

[C] Describe the nature and significance of the potential project impacts spatially and temporally on groundwater with respect to:

a) inter-relationship between groundwater and surface water in terms of surface water quantity and quality;
b) implications for terrestrial or riparian vegetation, wildlife and aquatic resources including wetlands;
c) changes in groundwater quality and quantity;
d) 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; and
g) groundwater withdrawal for project operations, including expected alterations in the groundwater flow regime during and following project operations.

3.3 Surface Water Quality and Quantity

3.3.1 Baseline Information

[A] Define and map local and regional study areas and:

a) describe the rationale used to define the local and regional study areas considering the location and range of probable project and cumulative effects;
b) illustrate the boundaries of the local and regional study areas; and
c) describe meteorological conditions.

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

[C] For baseline surface water quality characteristics:

a) describe and map the existing reservoir and surface water features downstream of the existing East Dam;
b) assess surface water quality based on spring, summer, fall, and winter sampling events over one year of sampling; and
c) measure the following water quality parameters: routine parameters, nutrients, biochemical oxygen demand, organics, fecal coliforms, total metals, dissolved

metals, ultra-low mercury, methyl-mercury, volatile organic compounds, and polycyclic aromatic hydrocarbons.

[D] Describe baseline surface water quantity characteristics, including:

a) seasonal variation and flow in the ephemeral channel downstream of the existing East Dam; and
b) low, average, and peak levels and trends for the waterbodies impacted by the Project.

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] Describe and discuss potential changes to water quality characteristics and parameters as a result of the Project noting 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 or the Water Quality Management Framework (WQMF) included in the South Saskatchewan Regional Plan.

[C] Discuss changes to watersheds, including surface and near-surface drainage conditions, potential flow impediment, natural runoff captured in the system and potential changes in open-water surface areas caused by the Project. Calculate potential water losses through evaporation from the expanded reservoir.

[D] 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 watercourses (during minimum, average and peak flows) and water levels in waterbodies;
b) assess the potential impact of alterations in flow 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.

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

[F] Describe impacts on other surface water users resulting from the Project. Identify 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 quality and quantity impacts during all stages of the Project including:

a) alteration in flow regimes;
b) potential flood events;
c) potential water use conflicts; and
d) increased loading of water quality parameters of concern.

[I] Describe navigated waterways and the results of navigation assessment(s) for waterways that may be affected by the Project.

3.4 Aquatic Environment

3.4.1 Baseline Information

[A] Define and map local and regional study areas and:

a) describe the rationale used to define the local and regional study areas considering the location and range of probable project and cumulative effects; and
b) illustrate the boundaries of the local and regional study areas.

[B] Describe the existing fish and other aquatic resources (e.g., aquatic and benthic invertebrates) for water bodies and watercourses and other waters potentially affected by the Project that may provide habitat for fish. Identify species composition, distribution, relative abundance, seasonal movement trends, and general life history parameters.

[C] Assess fish species occurrence based on spring and fall sampling events over one year of sampling, using methods that best minimize fish mortality.

[D] Identify fish species that are:

a) listed as "at Risk, May be at Risk and Sensitive" in The 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 of cultural significance.

[E] Collect:

a) ageing structures from sport fish species; and
b) muscle tissue samples from 20 sport fish for analysis of mercury concentration and characterization of baseline mercury body burden conditions.

[F] Assess:

a) aquatic invertebrates (e.g., zooplankton) in Chin Reservoir based on spring, summer, fall, and winter sampling events over one year of sampling;
b) benthic invertebrates in Chin Reservoir based on a fall sampling event over one year of sampling; and
c) autotrophic phytoplankton community in Chin Reservoir based on spring, summer, fall, and winter sampling events over one year of sampling.

[G] Quantitatively describe the current extent of aquatic habitat. Describe and map, as appropriate, the fish habitat and aquatic resources in water bodies and watercourses and other waters potentially affected by the Project and identify:

a) key indicator fish species and provide the rationale and selection criteria used;
b) habitat used by fish, whether seasonally or year-round, for water bodies and watercourses potentially affected by the Project and other connected water bodies that may provide habitat for fish, including critical or sensitive areas such as spawning, rearing, and over-wintering habitats;

c) water quality parameters in water bodies and watercourses that may affect suitability for fish; and
d) current and potential use of the fish resources by Indigenous or sport fisheries.

3.4.2 Impact Assessment

[A] Describe and assess the potential impacts to fish, fish habitat, and other aquatic resources considering:

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, sedimentation, flow alterations, temperature and habitat changes;
c) changes to riparian areas that could affect aquatic biological resources and productivity;
d) changes to benthic invertebrate communities that may affect food quality and availability for fish; and
e) the potential for increased fragmentation of aquatic habitat.

[B] 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.

[C] Identify plans proposed to offset a reduction in the productivity of fish habitat. Indicate how environmental protection plans address applicable provincial and federal policies on fish habitat protection.

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

[E] Discuss the potential effects on fish and fish habitat during the filling of the expanded reservoir and decommissioning of the existing East Dam.

[F] 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 remove aquatic invasive species should they be encountered during project works.

[G] 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.

3.5 Terrain and Soils

3.5.1 Baseline Information

[A] Define and map local and regional study areas and:

a) describe the rationale used to define the local and regional study areas considering the location and range of probable project and cumulative effects; and
b) illustrate the boundaries of the local and regional study areas.

[B] Provide descriptions and maps of the terrain and soil resources, including:

a) surficial geology and topography;
b) soil types and their distribution;

c) soils that could be affected by the Project;
d) specific locations of erosion sensitive and saline-sodic soils; and
e) an inventory of geohazards, such as erosion, landslides, floods etc.

3.5.2 Impact Assessment

[A] Describe project activities and other related issues that could affect 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 reservoir expansion, infrastructure construction and other construction and operation activities;
b) indicate the size and location of soil types and land capability classes that will be disturbed;
c) describe potential sources of soil contamination;
d) describe the impact of the Project on soil types and reclamation suitability and the approximate volume of soil materials for reclamation. Discuss constraints or limitations to achieving vegetation/habitat reclamation based on anticipated soil conditions (e.g., compaction, contaminants, salinity, soil moisture, nutrient depletion, erosion, etc.);
e) discuss potential changes to soil erosion causality;
f) discuss potential changes to slope instability and wind erosion and other geohazards; and
g) discuss the relevance of changes for the local landscape on biodiversity, productivity, ecological integrity, aesthetics and future use.

[B] 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 such as compaction, contaminants, salinity, soil moisture, erosion, nutrient regime, etc.;
c) possible actions to address impacts to land capability; and
d) any other measures to reduce or eliminate the potential impacts that the Project may have on soil capability and/or quality and include:
    i) soil mapping and typical profiles;
    ii) losses of agricultural soils;
    iii) erosion issues; and
    iv) characteristics related to handling, reclamation of site disturbances.

3.6 Vegetation

3.6.1 Baseline Information

[A] Define and map local and regional study areas and:

a) describe the rationale used to define the local and regional study areas considering the location and range of probable project and cumulative effects; and
b) illustrate the boundaries of the local and regional study areas.

[B] Describe and map vegetation communities for each ecosite phase. Identify the occurrence, relative abundance and distribution and identify species that are:

a) listed as ‘Threatened’ or ‘Endangered’ under the *Alberta Wildlife Act*;

b) listed as ‘Threatened’ or ‘Endangered’ under Schedule 1 of the federal *Species at Risk Act*;
c) listed as ‘Threatened’ or ‘Endangered’ by COSEWIC;
d) species tracked by the Alberta Conservation Information Management System (ACIMS) as being SU, S1, S2, S3; and
e) plant species of cultural significance.

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

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

[E] Describe and quantify the current extent of habitat fragmentation.

[F] Describe and map wetlands, wetland habitat, and riparian communities, including:
a) a discussion on their distribution and relative abundance;
b) a discussion on their location and sizes;
c) the wetland type and condition;
d) the condition of the upland zone surrounding the wetland or riparian area and list activity occurring in the upland zone;
e) a characterization of the flora and fauna of the wetland or riparian area; and
f) an evaluation of the wetland function and ecosystem components that contribute to the integrity of the wetland.

3.6.2 Impact Assessment

[A] Identify the area of each vegetation community mapped that would be permanently lost due to the Project.

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

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

[D] Identify areas that should be avoided during construction if possible.

[E] Discuss potential impacts the Project may affect rare plants or endangered species.

[F] 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.

[G] 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 and cause for this change; and

d) consideration of cumulative effects in the watershed to wetlands.

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

[I] Provide a mitigation strategy that will avoid or minimize project effects.

[J] Discuss weeds and non-native invasive species and describe how these species will be assessed and controlled during construction, reclamation of construction disturbances and project operation.

3.7 Wildlife and Wildlife Habitat

3.7.1 Baseline Information

[A] Define and map local and regional study areas and:

a) describe the rationale used to define the local and regional study areas considering the location and range of probable project and cumulative effects; and
b) illustrate the boundaries of the local and regional study areas.

[B] Describe and map existing wildlife resources (amphibians, reptiles, birds and terrestrial and aquatic mammals) in terms of spatial occurrence, habitat association, abundance, species richness and diversity.

[C] Identify species of conservation concern that are:

a) listed as "at Risk, May be at Risk and Sensitive" in The 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 of cultural significance.

[D] Describe, quantify and map wildlife habitat suitability, availability and connectivity.

[E] Identify the key wildlife and habitat indicators used to assess project effects such as the relative occurrence and abundance of species of conservation concern.

3.7.2 Impact Assessment

[A] Describe project components and activities that may negatively or positively affect wildlife habitat in terms of availability, suitability, and connectivity.

[B] Describe project components and activities that may negatively or positively affect wildlife in terms of spatial occurrence, movement patterns, abundance, species richness, and diversity.

[C] Describe and assess the potential effects of the Project on wildlife mortality including:

a) potential direct causes of mortality such as inundation, vehicle-wildlife collisions, release contaminants etc.; and
b) potential indirect causes of mortality such as disturbance and displacement of animals.

[D] Describe the effects on wildlife populations resulting from changes to habitat availability and connectivity from the flooding of the reservoir expansion.

[E] Describe the resilience and recovery capabilities of wildlife populations and habitats to disturbance.

[F] Provide a strategy and mitigation plan to avoid or minimize effects 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) the use of setbacks to protect habitat and connectivity of habitat for species of conservation concern;
d) anticipated access controls or other management strategies to protect wildlife during construction and operation;
e) measures to prevent human-wildlife encounters and consequent destruction of wildlife; and
f) habitat fragmentation and habitat connectivity resulting from linear features (e.g., above ground canals, roads etc.) and other project infrastructure and activities.

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

3.8 Climate Change

3.8.1 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.

3.8.2 Impact Assessment

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

[B] Evaluate the feasibility of the Project under scenarios of climate change.

a) Explain how drier conditions would affect the long-term viability of local agriculture with and without the Project.
b) Explain how potential adverse effects of excess rainfall events will be mitigated by the Project.

3.9 Land Use and Management

3.9.1 Baseline Information

[A] Identify and map the ownership status of the subject lands, including lands owned by the Crown, local municipalities and patented lands.

[B] Identify and map the current land uses, including 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.

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

3.9.2 Impact Assessment

[A] Identify the potential effects 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 decreased 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 pre-disturbance topography, elevation and drainage pattern within the Project area.

[E] Identify existing private land uses that would be directly affected 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 to ensure landowners receive fair compensation for lands required for the Project and for associated damages or disturbances.

[F] Discuss possible mitigation strategies to address:

a) the need for, and plans to address, access management during and after project operations (public, traditional use);
b) the process for addressing the needs of other land users in the Project area; and
c) project effects that may lead to changes in land use.

4 HISTORICAL RESOURCES

[A] Describe consultation with Alberta Culture and Status of Women (ACSW) concerning the need for Historical Resource studies for the Project, and:

a) provide a general overview of the results of previous historic resource studies that have been conducted, including archaeological resources, palaeontological resources, historic period sites; and
b) any other historical resources as defined within the *Historical Resources Act*;

[B] Provide a summary of the results of studies conducted to assess the potential impact of the Project on archaeological, palaeontological and historic resources.

[C] Describe and map historic resources sites in the Project area.

[D] Provide an outline of the program that ACSW may require the Proponent to undertake to further assess and mitigate the impacts of the Project on historic resources.

[E] Document historic resources concerns raised during consultation on the Project.

5 TRADITIONAL ECOLOGICAL KNOWLEDGE AND TRADITIONAL USE

[A] If consultation with Indigenous groups reveals traditional use areas and spiritual sites within project affected areas, provide a map and description of traditional use areas and spiritual sites if the Indigenous community or group is willing to have these locations disclosed.

[B] Discuss the species, abundance and availability of vegetation, fish and wildlife for food, and for medicinal and cultural purposes in the Project area.

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

[D] Determine the impacts of the Project on traditional uses and identify possible mitigation strategies.

6 PUBLIC HEALTH AND SAFETY

6.1 Public Health

[A] Describe aspects of the Project that may have implications for public health or the delivery of regional health services. Determine quantitatively whether there may be implications for public health arising from the Project.

[B] Document health concerns raised during consultation on the Project.

[C] 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.

[D] Describe health impacts from higher regional traffic volumes and the increased risk of accidental leaks and spills.

6.2 Public Safety

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

[B] Describe how potentially affected residents will be contacted during an emergency and the type of information that will be communicated to them.

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

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. Describe factors that may affect existing socio-economic conditions including:

a) changes in population and demographics;
b) income and employment;
c) costs of housing and land;
d) education;
e) recreation opportunities;
f) protective services;
g) infrastructure services; and
h) municipal finance.

[B] Describe the socio-economic contribution of current farm operations in the study area on the regional and provincial economy including:

a) historic and current livestock operations; and
b) historic and current cropping patterns.

[C] Describe the impacts of drought on farm operations in the study area and on the regional and provincial economy 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.

[D] Describe the socio-economic impacts of the current wetlands within the Project area.

[E] Describe the Project alternatives considered for addressing increasing regional irrigation needs.

7.2 Impact Assessment

[A] Describe the socio-economic impacts of construction and operation of the Project on:

a) land owners;
b) agricultural productivity;
c) construction and construction related businesses;
d) local training and employment opportunities;
e) housing;
f) hospitality businesses;
g) community services such as medical and policing;
h) recreational activities; and
i) traditional land use.

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

[C] Discuss the potential effects of the Project construction schedule on elements noted in 7.2.A.

[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.

[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 annual costs and benefits of irrigation farming and its relationship to the farming operation. Estimate the potential effect on farm income from higher crop yields with a more reliable water supply.

[G] Provide details on the total number of irrigable acres to be serviced by the Project.

[H] Provide an estimate of the extent to which anticipated farm incomes may generate indirect and induced economic impacts in the SMRID and outside the SMRID.

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

[J] Provide a summary of the quantifiable benefits and costs of the Project, including the costs of construction, operation and maintenance, increased value of agricultural production,

recreational activities and sport fisheries and improved reliability of water supply. Present a sensitivity analysis of assumptions used to generate these values.

[K] Provide the calculations for the net present value and benefit/cost ratio for the Project.

[L] Discuss potential local employment or contracting opportunities that may be generated as part of long-term operations and maintenance requirements of the Project.

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

[N] Discuss options:

a) to work with local residents and businesses regarding economic development opportunities arising from the Project; and
b) to mitigate socio-economic concerns raised by the local municipalities and other stakeholders in the region, if any.

8 MITIGATION MEASURES

[A] Summarize the environmental protection, mitigation and enhancement measures to be incorporated into the Project. Summarize how mitigation measures are to avoid, minimize or eliminate the potential impacts for all stages of the Project.

9 RESIDUAL IMPACTS

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

10 CUMULATIVE EFFECTS

10.1 Air Quality and Noise

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

10.2 Hydrogeology

[A] 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.

10.3 Surface Water Quality and Quantity

[A] Discuss the Project's relative contribution to cumulative effects on regional water quantity (e.g., timing, volume, peak and minimum flow rates of water courses, waterbody levels), with a focus on the potential effects on the St. Mary and Oldman Rivers.

[B] Discuss the Project's relative contribution to cumulative effects on water quality (e.g., physical parameters, nutrients, dissolved metals, total methyl mercury, ultra-low mercury, petroleum hydrocarbons, volatile organic carbon, polycyclic aromatic hydrocarbons, and fecal coliforms).

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

10.4 Aquatic Environment

[A] Describe the effects of surface water withdrawals and water diversions considered including impacts to the St. Mary and Oldman Rivers, cumulative effects on fish, fish habitat and other aquatic resources.

10.5 Vegetation

[A] Describe the regional relevance of communities that are identified as rare.

[B] Describe the potential effects of the Project on the sustainability of regional populations of rare plants and rare plant communities.

[C] Discuss the regional significance of potential permanent vegetation loss.

[D] Describe the potential effects of the Project on the regional sustainability of wetlands.

[E] Discuss the regional effects of the potential indirect effects of the conversion of grassland pasture to cultivated lands with an increase in water availability.

10.6 Wildlife and Wildlife Habitat

[A] Describe how the Project will affect wildlife relative abundance, movement patterns, distribution and recruitment into regional populations for all stages of the Project; and

[B] Describe the potential effects of the Project on the sustainability of regional populations of species of conservation concern.

10.7 Climate Change

[A] Discuss the benefits of the Project at a regional scale with regards to its ability to counteract climate change impacts and the associated risks.

[B] Explain how drier conditions would affect the long-term viability of agriculture of the region with and without the Project.

11 ACCIDENTS AND MALFUNCTIONS

[A] For all stages of the Project, identify potential accidents and malfunctions that could occur (e.g., cofferdam leakage or failure, sediment control failure, other Dam Safety incidents). 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.).

[B] 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.

12 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

[A] Discuss how climate change may affect the frequency and/or severity of extreme weather events that may affect the expected performance of the Project.

[B] Describe the expected performance of the proposed East Dam and appurtenant structures during and after extreme weather events (e.g., floods, earthquakes, etc.), including the ability of

earth dams, diversion and flow control structures to withstand those events, potential challenges and mitigation measures.

13 MONITORING

[A] Identify the surface water quality monitoring program that will be implemented to assess the future impacts of construction and operation (including maintenance) of the reservoir. Consider appropriate water quality parameters (e.g., physical parameters, nutrients, dissolved metals, total methyl mercury, ultra-low mercury, petroleum hydrocarbons, volatile organic carbon, polycyclic aromatic hydrocarbons, and fecal coliforms), and their seasonal variations.

[B] Describe the monitoring programs proposed to verify the accuracy of the environmental assessment to assess project impacts and measure the effectiveness of proposed mitigation plans.

[C] Discuss the Proponent's regional monitoring activities including:

a) monitoring that will be undertaken to assist in managing environmental effects, confirm performance of mitigation measures and improve environmental protection strategies;
b) monitoring done independently by the Proponent and how these monitoring programs are consistent with other current or proposed regional monitoring programs;
c) monitoring performed in conjunction with other stakeholders; and
d) new monitoring initiatives that may be required as a result of the Project.

[D] Discuss:

a) the Proponent's plans for addressing and mitigating environmental impacts identified in the monitoring program;
b) how monitoring data will be disseminated to the public or other interested parties; and
c) how the results of monitoring programs and publicly available monitoring information will be integrated with the Proponent's environmental management system.