



October 13, 2015

Dustin Wolfe  
Consultation Manager  
Piikani Nation  
Box 70 Brocket AB T0K 0H0  
d.wolfe@piikanation.com

Dear Mr. Wolfe:

**Re:** Town of Canmore Cougar Creek Debris Flood Retention Structure Environmental Impact Assessment  
Proposed Terms of Reference

The Town of Canmore would like to invite the Piikani Nation to review and provide comment on the proposed Terms of Reference (TOR) for the Cougar Creek Debris Flood Retention Structure Environmental Impact Assessment. A Project Information Package has been provided to you under separate cover.

The public review period for the proposed TOR will begin on October 15<sup>th</sup>, 2015 when the Public Notice is published in the Alberta Native News, Rocky Mountain Outlook, Calgary Herald and Edmonton Journal. The deadline for submitting written comments is November 30<sup>th</sup>, 2015 and your submissions can be sent to:

Director, Environmental Assessment, Operations Division  
Alberta Environment and Parks  
2nd Floor, Petroleum Plaza, South Tower, 9915 – 108 Street, Edmonton, Alberta T5K 2G8  
Fax: 780-427-9102, E-mail: [environmental.assessment@gov.ab.ca](mailto:environmental.assessment@gov.ab.ca)

Copies of the Public Notice and the proposed TOR are attached for your review.

If you have any questions about the Project or the proposed TOR, please do not hesitate to contact me directly.

Sincerely,

Félix Camiré, E.I.T.  
Town of Canmore Engineering Services  
fcamire@canmore.ca  
403.678.1512

**Public Notice**  
**Town Of Canmore**  
**Cougar Creek Debris Flood Retention Structure**  
**Proposed Terms of Reference for Environmental Impact Assessment**

The proposed Project consists of a debris flood retention structure on Cougar Creek that will be approximately 30 meters high and will span a bedrock confined channel. During normal weather conditions water and sediment will flow unimpeded through the structure. During a flood event the structure will be designed to hold back up to 600,000 cubic meters of water and debris. The structure will not permanently hold water. The proposed Project location (LSD 14-34-24-10W5) is at the site of an existing debris net on Cougar Creek, approximately 2 km northwest of the Trans-Canada Highway in the M.D. of Bighorn.

The Director responsible for Environmental Assessment has directed that an Environmental Impact Assessment Report be prepared for the Cougar Creek Debris Flood Retention Structure. The Town of Canmore has prepared a proposed Terms of Reference for this Environmental Impact Assessment, and through this public notice, invites the public to review this document. **Your comments and personal contact information filed concerning the proposed Terms of Reference will be accessible to the public.**

The proposed Terms of Reference and associated project information can be viewed at the following locations:

- Town of Canmore Civic Centre located at 902 7th Avenue, Canmore, Alberta
- Town of Canmore website at [www.canmore.ca](http://www.canmore.ca)
- Alberta Environment and Parks Register of Environmental Assessment, 2nd Floor, Petroleum Plaza, South Tower, 9915 – 108 Street, Edmonton, Alberta, T5K 2G8, [www.ea.alberta.ca](http://www.ea.alberta.ca) (choose *Summary of Environmental Assessment Activity - Current Projects*)

For further information on the Cougar Creek Debris Flood Retention Structure or copies of the proposed Terms of Reference and associated project information please contact:

Félix Camiré, E.I.T.  
Town of Canmore Engineering Services  
902 7th Avenue, Canmore, AB T1W 3K1  
403.678.1512  
[fcamire@canmore.ca](mailto:fcamire@canmore.ca)

Individuals wishing to provide written comments on the proposed Terms of Reference must submit them by November 30, 2015 to:

Director, Environmental Assessment, Operations Division  
Alberta Environment and Parks  
2nd Floor, Petroleum Plaza, South Tower, 9915 – 108 Street, Edmonton, Alberta T5K 2G8  
Fax: 780-427-9102, E-mail: [environmental.assessment@gov.ab.ca](mailto:environmental.assessment@gov.ab.ca)

**PROPOSED TERMS OF REFERENCE  
ENVIRONMENTAL IMPACT ASSESSMENT REPORT**

**FOR TOWN OF CANMORE'S PROPOSED**

**COUGAR CREEK DEBRIS FLOOD RETENTION STRUCTURE  
PROJECT**

**ISSUED BY:**       **Town of Canmore**

**DATE:**           **September 24, 2015**

## TABLE OF CONTENTS

<b>PURPOSE OF THE TERMS OF REFERENCE .....</b>	<b>3</b>
<b>SCOPE OF THE EIA REPORT .....</b>	<b>3</b>
<b>CONTENT OF THE EIA REPORT.....</b>	<b>4</b>
<b>1 PUBLIC ENGAGEMENT AND ABORIGINAL CONSULTATION.....</b>	<b>4</b>
<b>2 PROJECT DESCRIPTION .....</b>	<b>4</b>
2.1 OVERVIEW .....	4
2.2 CONSTRAINTS .....	5
2.3 REGIONAL AND COOPERATIVE EFFORTS .....	5
2.4 TRANSPORTATION INFRASTRUCTURE .....	5
2.5 AIR EMISSIONS MANAGEMENT .....	6
2.6 DEBRIS FLOOD RETENTION STRUCTURE DESIGN .....	6
2.7 WATER MANAGEMENT .....	7
2.8 WASTE AND DEBRIS MANAGEMENT .....	7
2.9 CONSERVATION AND RECLAMATION .....	8
<b>3 ENVIRONMENTAL ASSESSMENT.....</b>	<b>8</b>
3.1 AIR QUALITY, CLIMATE AND NOISE .....	8
3.2 HYDROGEOLOGY .....	9
3.3 HYDROLOGY .....	9
3.4 SURFACE WATER QUALITY .....	10
3.5 AQUATIC ECOLOGY .....	11
3.6 VEGETATION.....	12
3.7 WILDLIFE.....	13
3.8 TERRAIN AND SOILS .....	13
3.9 BIODIVERSITY.....	14
3.10 LAND USE AND MANAGEMENT .....	14
<b>4 HISTORIC RESOURCES .....</b>	<b>15</b>
4.1 BASELINE INFORMATION .....	15
4.2 IMPACT ASSESSMENT .....	15
<b>5 TRADITIONAL ECOLOGICAL KNOWLEDGE AND LAND USE .....</b>	<b>16</b>
<b>6 PUBLIC HEALTH AND SAFETY.....</b>	<b>16</b>
6.1 PUBLIC HEALTH.....	16
6.2 PUBLIC SAFETY .....	16
<b>7 INCIDENTS, MALFUNCTIONS AND RETENTION STRUCTURE SAFETY .....</b>	<b>17</b>
<b>8 SOCIO-ECONOMIC ASSESSMENT .....</b>	<b>17</b>
8.1 BASELINE INFORMATION .....	17
8.2 IMPACT ASSESSMENT .....	17
<b>9 MITIGATION MEASURES .....</b>	<b>18</b>
<b>10 RESIDUAL IMPACTS .....</b>	<b>18</b>
<b>11 MONITORING .....</b>	<b>18</b>

## **PURPOSE OF THE TERMS OF REFERENCE**

The purpose of this document is to identify for the Town of Canmore (the Town), Aboriginal 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 proposed Cougar Creek Debris Flood Retention Structure Project (the Project).

The proposed Project consists of a debris flood retention structure on Cougar Creek that will be approximately 30 m high and will span a 45 m wide bedrock confined channel. During normal weather conditions water and sediment will flow unimpeded through the structure. During a flood event the structure will be designed to hold back up to 650,000 cubic meters of water and debris. Although the structure will not permanently hold water, as that is not its function, it will be designed to meet the Canadian Dam Safety and the Alberta Dam and Canal Safety Guidelines.

The Project site was identified as part of the 2014 Alpinfra Mountain Creek Hazard Mitigation study. The proposed Project location (LSD 14-34-24-10W5) is at the site of an existing debris net on Cougar Creek, approximately two kilometres northwest of the Trans-Canada Highway.

## **SCOPE OF THE EIA REPORT**

The Town 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, directives and the South Saskatchewan Regional Plan.

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

The Town of Canmore shall refer to the *Guide to Preparing Environmental Impact Assessment Reports in Alberta* published by Alberta Environment and Sustainable Resource Development (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 ABORIGINAL CONSULTATION**

- [A] Describe the concerns and issues expressed by the public. Describe the actions taken to address those concerns and issues, including the process and extent of public consultation used to arrive at the current proposal for flood mitigation and how public input was incorporated into the Project development, impact mitigation and monitoring.
- [B] Describe the concerns and issues expressed by Aboriginal communities and the actions taken to address those concerns and issues, including how Aboriginal community input was incorporated into the Project, EIA development, mitigation, monitoring and reclamation. Describe consultation undertaken with Aboriginal communities and groups with respect to traditional ecological knowledge and traditional use of land and water.
- [C] Describe plans to maintain the public engagement and Aboriginal consultation process following completion of the EIA report to ensure that the public and Aboriginal 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] Provide a brief project description in sufficient detail to provide context for the EIA, including:
  - a) proponent information;
  - b) need for the Project and why this project was chosen over other options or other flood mitigation projects;
  - c) which communities would benefit from the project; and
  - d) development plan and schedule.
- [B] Provide maps and/or drawings of the Project components and activities including:
  - a) project location and local and regional study areas;
  - b) total potential areas to be flooded in extreme flood scenarios;
  - c) existing infrastructure, leases and clearings;
  - d) proposed infrastructure;
  - e) temporary structures;
  - f) transportation and access routes;
  - g) containment structures;
  - h) sources of aggregate resources, borrow material and other construction material and locations of any stockpiles that will be developed; and
  - i) waste and debris storage area and disposal sites.
- [C] Discuss the implications (positive and negative) of a delay in proceeding with the Project, or any phase of the Project, or not going ahead with the Project. Describe the risk and hazard assessments of flood events in the absence of the Project.
- [D] Describe the impacts and benefits of the Project, including jobs created, local training, employment and business opportunities that accrue to:
  - a) local and regional communities, including Aboriginal communities;
  - b) the local authority;

- c) Alberta; and
- d) Canada.

- [E] Describe the impacts and benefits of the Project to the environment and wildlife corridor.
- [F] Provide the adaptive management approach that will be implemented throughout the life of the Project. Include how monitoring, mitigation and evaluation are incorporated.
- [G] Provide a list of commitments the Town has made. This would include any mitigation, monitoring and operational commitments made as part of this assessment.

## **2.2 Constraints**

- [A] Discuss the process and criteria used to identify constraints to development, and how the Project has been designed to accommodate those constraints. Include the following:
  - a) any applicable *Alberta Land Stewardship Act* Regional Plan (South Saskatchewan Regional Plan), sub-regional plan or watershed plan;
  - b) any applicable municipal plan;
  - c) land use policies and resource management initiatives;
  - d) Federal Fisheries Act;
  - e) Provincial Parks Act;
  - f) Aboriginal traditional land and water use;
  - g) the environmental setting;
  - h) cumulative environmental impacts in the region;
  - i) cumulative social impacts in the region; and
  - j) regional monitoring.
- [B] Discuss the selection criteria used, options considered, and rationale for selecting the location of infrastructure.
- [C] Provide a list of Project components for which locations will be determined later. Discuss the selection criteria that will be used to determine the specific location of these.

## **2.3 Regional and Cooperative Efforts**

- [A] Describe opportunities for sharing infrastructure (e.g., access roads, utility corridors, water infrastructure). Provide rationale where these opportunities will not be implemented.
- [B] Describe how the Cougar Creek debris flood retention structure fits within the Bow River Basin Council's recommendations on flood mitigation in the Bow River watershed as described in the "Bow Basin Flood Mitigation and Watershed Management Project" report.

## **2.4 Transportation Infrastructure**

- [A] Describe and map the locations of any new road or intersection construction, or any improvements to existing roads or intersections, related to the development of the Project, from the boundary of the Project Area up to and including the highway access points, and:
  - a) discuss the alternatives and the rationale for selection for the preferred alternative;
  - b) discuss compatibility of the preferred alternative to the Town's immediate and future plans;

- c) discuss the preferred alternative in the context of Alberta Parks' zoning, the Bow Corridor Ecosystem Advisory Group (BCEAG) corridor and Alberta Environment and Parks management plans and habitat patch guidelines;
  - d) describe the impacts to local landowners and communities of the changes in transportation and infrastructure; and
  - e) provide a proposed schedule for the work.
- [B] Describe infrastructure or activities that could have a potential impact on existing roads (e.g., any smoke, dust, noise, light or precipitation generated by the Project that could impact the highway and road users).
- [C] Indicate where Crown land dispositions may be needed for roads or infrastructure required for the Project.

## **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 mitigation measures used to reduce emissions.

## **2.6 Debris Flood Retention Structure Design**

- [A] Describe:
- 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 conclusion; and
  - f) any gaps in knowledge and understanding related to key conclusions, including steps to address these gaps.
- [B] Describe:
- a) the principal dimensions of the debris flood retention structure and ancillary structures;
  - b) the anticipated quantities of material used to construct the structure and ancillary 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.
- [C] Describe the physical characteristics of the area that may be inundated during a flood event, including:
- a) normal operating range;
  - b) spatial extent/overlap into other tributaries during a flood event, if any; and
  - c) surface area at the maximum water and debris level during a flood event.



- [D] Describe the activities for construction of the structure, and other ancillary structures, including:
  - a) site clearing, grubbing and rock blasting;
  - b) construction and operation of the temporary works required for construction, if any;
  - c) excavations, slope stabilization and foundation preparation;
  - d) construction of the structure and its ancillary structures;
  - e) erosion protection;
  - f) installation of instrumentation, mechanical and electrical equipment;
  - g) testing and commissioning the facility;
  - h) removal of temporary construction facilities; and
  - i) reclamation of disturbed areas during construction.
- [E] Describe the excavation and stockpiling of suitable material, including drilling, blasting, sorting and screening in rock quarries.
- [F] Describe the operations phase activities, including:
  - a) operation and maintenance activities needed for the safe operation of the structure and to prolong its operational capacity;
  - b) removal of accumulated debris and sediments behind the structure; and
  - c) water management approach during normal and flood conditions and resulting downstream flows and water levels.
- [G] Describe the preparation of the Operations and Maintenance Manual.
- [H] Describe the decommissioning activities of temporary construction facilities and any associated reclamation.

## **2.7 Water Management**

### **2.7.1 Water Supply**

- [A] Describe water supply for the Project, including:
  - a) the criteria used, options considered and rationale for selection of water sources(s); and
  - b) water requirements and sources for construction (including, but not limited to, road construction and dust suppression), normal and emergency operating situations.

### **2.7.2 Surface Water**

- [A] Describe the surface water management strategy for all stages of the Project, including:
  - a) design factors considered; and
  - b) permanent or temporary alterations or realignments of watercourses or wetlands.

### **2.7.3 Flood Control**

- [A] Describe how the Project will be utilized to manage back-to-back storm events effectively.
- [B] Describe the operations of the Project to achieve the maximum benefit of flood control.

## **2.8 Waste and Debris Management**

- [A] Discuss the selection criteria used, options considered, and rationale for disposal of waste and debris.

- [B] Characterize and quantify the anticipated dangerous goods, and hazardous, non-hazardous, and recyclable wastes generated by the Project, and describe:
- a) plans for pollution prevention, waste minimization, recycling, and management to reduce waste quantities for all stages of the Project.

## **2.9 Conservation and Reclamation**

- [A] Provide a conceptual conservation and reclamation plan for the Project. Describe and map as applicable:
- a) current land use and capability and proposed post-development land use and capability;
  - b) 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;
  - c) constraints to reclamation such as timing of activities, availability of reclamation materials and influence of natural processes and cycles including natural disturbance regimes;
  - d) describe how an adaptive management approach for long term mitigation and reclamation will be integrated into conservation and reclamation plans;
  - e) a revegetation plan for the disturbed terrestrial, riparian and wetland areas;
  - f) a revegetation and bio engineering plan for Cougar Creek channel downstream of the Structure; and
  - g) reclamation material salvage, storage areas and handling procedures.
- [B] 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.
- [C] Describe how the Proponent considered the use of progressive reclamation in project design and reclamation planning.
- [D] Discuss uncertainties related to the conceptual reclamation plan.

## **3 ENVIRONMENTAL ASSESSMENT**

### **3.1 Air Quality, Climate and Noise**

#### **3.1.1 Baseline Information**

- [A] Discuss the baseline climatic and air quality conditions including:
- a) the type and frequency of meteorological conditions that may result in poor air quality; and
  - b) appropriate ambient air quality parameters.

- [B] Discuss the baseline noise conditions.

#### **3.1.2 Impact Assessment**

- [A] Identify components of the Project that will affect air quality, and:
- a) describe the potential for reduced air quality resulting from the Project and discuss any implications of the expected air quality for environmental protection and public health;
  - b) discuss any expected changes to particulate deposition patterns; and

- c) describe air quality impacts resulting from the Project, and their implications for other environmental resources.

[B] Identify stages or 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] Describe the noise effects during construction and operations.

### **3.2 Hydrogeology**

#### **3.2.1 Baseline Information**

- [A] Provide an overview of the existing geologic and hydrogeologic setting for the area, 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 velocities. Include maps and cross sections;
    - ii) the chemistry of groundwater aquifers including baseline concentrations of major ions, metals and hydrocarbon indicators;
    - iii) the potential discharge zones, potential recharge zones and sources, areas of groundwater-surface water interaction and areas of Quaternary aquifer-bedrock groundwater interaction;
    - iv) the recharge potential for Quaternary aquifers; and
    - v) the locations of major structures associated with the Project and describe site-specific aquifer and shallow groundwater conditions beneath the structure. Provide supporting geological information.

#### **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] 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 groundwater and surface 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 implications of seasonal variations; and
  - e) groundwater withdrawal for Project operations, including any expected alterations in the groundwater flow regime during and following project operations.

### **3.3 Hydrology**

#### **3.3.1 Baseline Information**

[A] For the local and regional study area:

- 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) provide maps illustrating boundaries of the local and regional study areas;
  - c) describe and map the surface hydrology;
  - d) describe meteorological conditions; and
  - e) describe sediment yield.
- [B] Discuss the existing flow regime, including:
- a) seasonal variation, low, average and peak flows for watercourses; and
  - b) natural flow contribution of tributaries to Cougar Creek.
- [C] Provide an inventory of all surface water users who have existing approvals, permits or licenses in the local and regional study areas.

### **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 water courses;
  - d) evaporation, transpiration and seepage amounts; sediment transport and yield; and
  - e) open-water surface areas.
- [C] Discuss impacts including cumulative effects of:
- a) returning flow from the structure;
  - b) improving existing creek channel downstream of the outlet structure of the debris flood retention structure;
  - c) changing hydrology (e.g., timing, volume, peak and minimum flow rates, river regime and reservoir levels); and
  - d) sediment transport from Cougar Creek to the Bow River.
- [D] Discuss changes in geomorphic conditions (river bed aggradation, degradation and bank erosion) that could occur as a result of changed flow regimes due to project implementation.
- [E] Identify predicted changes to existing surface and groundwater relationships within the watershed as a result of the construction and operation of the Project.

## **3.4 Surface Water Quality**

### **3.4.1 Baseline Information**

- [A] Describe the current baseline water quality of Cougar Creek, including seasonal variations, temporal and spatial trends. Include water quality for high flow events (1:20-year and 1:100-year) under current conditions. Consider appropriate water quality parameters (e.g., metals, nutrients, pesticides, temperature, BOD/TOC, bacteria, aquatic and benthic invertebrates, aquatic plants, algae, dissolved oxygen, turbidity, total suspended solids (TSS) etc.) Provide a summary of existing information available from literature review(s).

### 3.4.2 Impact Assessment

- [A] Identify project components (during construction, operation and maintenance) that may influence or impact future surface water quality of Cougar Creek, including after a flood event.
- [B] Describe and predict the potential impacts of the Project (during construction, operation, maintenance) on surface water quality of Cougar Creek, 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 or the Water Quality Management Framework included in the South Saskatchewan Regional Plan;
  - b) changes in loading amounts and timing of key water quality parameters including nutrients, dissolved/total organic carbon, metals, sediment, etc. that could impact Cougar Creek, including:
    - i) impacts on their use as a drinking water supply, recreation, agriculture, domestic use, aesthetics, and other water uses;
    - ii) potential implications to water quality
    - iii) changes in seasonal variation,
    - iv) groundwater –surface water interactions;
    - v) changes in surface runoff;
    - vi) implications to the health and extent of riparian lands; and
    - vii) impacts in the event of a catastrophic failure of the Structure.
  - c) describe the level of uncertainty in the previous analysis.
- [C] Describe any potential cumulative effects on the Bow River and the implications to the Water Quality Management Framework.

### 3.5 Aquatic Ecology

#### 3.5.1 Baseline Information

- [A] Describe and map the fish, fish habitat and aquatic resources (e.g., riparian, aquatic and benthic invertebrates) of Cougar Creek, its tributaries (i.e. upstream and downstream of the Structure) and the Bow River at its confluence with Cougar Creek/Policeman Creek affected by the Project and all ancillary structures. Describe the species composition, distribution, relative abundance, movements and general life history parameters of fish resources at appropriate times of year. 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 Sustainable Resource Development);
  - b) listed in Schedule 6 of the provincial *Wildlife Regulation*;
  - c) listed in Schedule 1 of the federal *Species at Risk Act*;
  - d) listed as “at risk” by COSEWIC; and
  - e) traditionally used species.
- [B] Describe and map existing critical or sensitive areas such as spawning, rearing, and overwintering habitats, seasonal habitat use including migration and spawning routes for the Bow River at its confluence with Cougar Creek and Policeman Creek.
- [C] Describe the current and potential use of the fish resources by Aboriginal, sport or commercial fisheries.

### **3.5.2 Impact Assessment**

- [A] Identify the key aquatic indicators that the Town used to assess project impacts. Discuss the rationale for their selection.
- [B] Describe and assess the potential impacts of the Project to fish and fish habitat, and other aquatic resources at the confluence of Cougar Creek, Policeman Creek and the Bow River.
- [C] Identify all aspects of potential serious harm to fish and fish habitat resulting from the construction and ongoing operation of all project components (i.e. sediment supply to the Bow River, etc.)
- [D] 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.

## **3.6 Vegetation**

### **3.6.1 Baseline Information**

- [A] Describe and map the vegetation communities, wetlands, riparian lands, rare plants, 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 Sustainable Resource Development);
  - b) listed in Schedule 1 of the federal *Species at Risk Act*;
  - c) listed as “at risk” by COSEWIC; and
  - d) traditionally used species.
- [B] Describe and quantify the current extent of natural vegetative communities, and identify the risks to those communities.

### **3.6.2 Impact Assessment**

- [A] Identify key vegetation indicators used to assess the Project impacts. Discuss the rationale for the indicator’s selection.
- [B] Describe and assess the potential impacts of the Project on vegetation communities considering:
  - a) both temporary (include timeframe) 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, 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.

### **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) in the Project area. Describe species relative abundance, distribution and their use and potential use of habitats. Also identify any species that are:
- listed as “at Risk, May be at Risk and Sensitive” in the *General Status of Alberta Wild Species* (Alberta Environment and Sustainable Resource Development);
  - listed as “Rare or Endangered” in the Alberta Conservation Information Management System (ACIMS);
  - listed in Schedule 1 of the federal *Species at Risk Act*;
  - listed as “at risk” by COSEWIC;
  - traditionally used species; and
  - migratory bird species listed under the *Migratory Birds Convention Act*.
- [B] Describe and map wildlife use within existing wildlife corridors and habitat patches adjacent and through the Project area, as identified in the *Wildlife Corridor and Habitat Patch Guidelines for the Bow Valley* (Bow Corridor Ecosystem Advisory Group, 2012).
- [C] Describe and map existing wildlife habitat and habitat disturbance. Identify habitat disturbances that are related to existing and approved projects.

#### **3.7.2 Impact Assessment**

- [A] Identify the key wildlife and habitat indicators used to assess project impacts. Discuss the rationale for their selection.
- [B] Describe and assess the potential impacts of the Project to wildlife and wildlife corridor, and wildlife habitats considering:
- how the Project will affect wildlife movement patterns, relative abundance, habitat availability, habitat fragmentation, mortality, and distribution for all stages of the Project, including a prediction of future use due to habitat alteration;
  - how improved or altered access may affect wildlife, including future prediction of wildlife use and movements;
  - how altered habitat conditions (loss, change, fragmentation) may affect wildlife. Consider habitat change, the availability of habitat and the influence of anthropogenic features and infrastructure on wildlife movements and predator-prey relationships and the impact to local and regional ecosystems;
  - potential effects on wildlife resulting from changes to air and water quality, including both acute and chronic effects to animal health; and
  - how the risk to wildlife and habitat can be managed.

### **3.8 Terrain and Soils**

#### **3.8.1 Baseline Information**

- [A] Describe and map the terrain and soils conditions in the Project area.

### **3.8.2 Impact Assessment**

- [A] Describe Project activities 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, aggregate and borrow sites and other infrastructure-related construction and operational activities;
  - b) discuss the relevance of any changes for the local and regional landscapes, productivity, ecological integrity, aesthetics and future use; and
  - c) describe potential sources of soil contamination.

### **3.9 Biodiversity**

#### **3.9.1 Baseline Information**

- [A] Describe the existing biodiversity
- [B] Identify the biodiversity metrics that are used to characterize the baseline biodiversity. Discuss the rationale for their selection.

#### **3.9.2 Impact Assessment**

- [A] Describe and assess the potential impacts of the Project to biodiversity considering:
- a) The biodiversity metrics selected;
  - b) The effects of fragmentation and habitat loss on biodiversity potential; and
  - c) The contribution of the Project during construction and operation to any anticipated changes in regional biodiversity and the potential impact to local and regional ecosystems.

### **3.10 Land Use and Management**

#### **3.10.1 Baseline Information**

- [A] Describe and map the current land uses in the Project Area, including private and Crown land dispositions and Crown Reservations.
- [B] 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 and Internationally Important Bird Areas).
- [C] Describe existing access control measures.
- [D] Describe recreational activities and any other public uses of land in the Project area.

#### **3.10.2 Impact Assessment**

- [A] Identify the potential impacts of the Project on land uses, including:
- a) unique sites or special features;
  - b) changes in public access arising from the development, including Aboriginal land use and recreational access;
  - c) aggregate reserves that may be located on land under the Town's control and reserves in the region;
  - d) compare the baseline and reclaimed percentages and distribution of vegetation communities in the Project Area; and



- e) access control for landowners, public, regional recreational activities, Aboriginal land use and other land uses during and after development activities; and
  - f) anticipated changes (type and extent) to the topography, elevation and drainage patterns within the Project Area.
- [B] Describe how Integrated Land Management has been used.
- [C] Describe and map land clearing activities, showing the timing of the activities.
- [D] Indicate where provincial land dispositions may be needed for roads or other infrastructure for the Project.
- [E] Provide a fire control plan highlighting:
- a) measures taken to ensure continued access for firefighters to adjacent wildland areas; and
  - b) fire prevention, detection, reporting, and suppression measures, including proposed fire equipment.

## 4 HISTORIC RESOURCES

### 4.1 Baseline Information

- [A] Provide a brief overview of the regional historic resources setting, including a discussion of the relevant archaeological, historic and palaeontological records.
- [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] Provide an overview of previous Historic Resources Impact Assessments that have been conducted within the Project Area, including:
- a) a description of the spatial extent of previous assessment relative to the Project Area, noting any assessment gap areas; and
  - b) a summary of *Historical Resources Act* requirements and/or clearances that have been issued for the Project to date.
- [D] Identify locations within the Project Area that are likely to contain previously unrecorded historic resources. Describe the methods used to identify these areas.

### 4.2 Impact Assessment

- [A] A Historic Resources Impact Assessment or a Statement of Justification is required for the Project and a summary of the results of the Historic Resources Impact Assessment or Statement of Justification must be included.
- [B] Describe all project components and activities, including all ancillary activities that have the potential to affect historic resources at all stages of the Project.
- [C] Describe the nature and magnitude of the potential project impacts on historical resources, considering:
- a) effects on historic resource site integrity; and
  - b) implications for the interpretation of the archaeological, historic and palaeontological records.

## **5 TRADITIONAL ECOLOGICAL KNOWLEDGE AND LAND USE**

[A] Provide:

- a) a map and description of traditional land use areas including fishing, hunting, trapping and nutritional, medicinal or cultural plant harvesting in the Project area by affected Aboriginal peoples (if the Aboriginal community or group is willing to have these locations disclosed);
- b) a map of cabin sites, spiritual sites, cultural sites, graves and other traditional use sites, within the Project area, considered historic resources under the *Historical Resources Act* (if the Aboriginal community or group is willing to have these locations disclosed), as well as traditional trails and resource activity patterns; and
- c) a discussion of:
  - i) the availability of vegetation, fish and wildlife species for food, traditional, medicinal and cultural purposes in the Project area portion of the identified traditional land use areas considering all project related impacts; and
  - ii) access to traditional lands in the Project Area during all stages of the Project.

[B] Determine the impacts of the Project on traditional medicinal and cultural purposes and identify 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 whether there may be implications for public health arising from the Project.

[B] Document any health concerns regarding the Project raised by stakeholders during consultation.

[C] Document any health concerns identified by Aboriginal communities or groups regarding the Project, specifically on their traditional lifestyle. Include an Aboriginal receptor type in the assessment.

### **6.2 Public Safety**

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

- a) describe the emergency response plan including public notification protocol and safety procedures to minimize adverse environmental effects, including emergency reporting procedures for spill containment and management;
- b) document any safety concerns raised by stakeholders during consultation on the Project;
- 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;
- e) determine and describe safe access and egress routes including flood events; and
- f) describe any potential safety impacts resulting from higher local traffic volumes.

## **7 INCIDENTS, MALFUNCTIONS AND RETENTION STRUCTURE SAFETY**

- [A] Describe the expected performance and of the Structure and its ancillary structures during and after extreme weather events (e.g., floods, earthquakes, etc.), including their ability to withstand those events, potential challenges and mitigation measures.
- [B] Describe the potential challenges that could impact the safety of the proposed structure and proposed mitigation measures (e.g., during excavations, foundation/treatment, slope stabilization, materials, QA/QC, etc.)
- [C] Describe the potential challenges that could impact the safety of the proposed structure and proposed mitigation measures (e.g., debris management, operations, maintenance and surveillance philosophy, emergency preparedness and response, etc.)
- [D] For all stages of the Project, identify potential incidents and malfunctions that could occur (e.g., cofferdam leakage or failure, sediment control failure).
- [E] Describe the consequence classification of the proposed Structure and its ancillary structures based on the Canadian Dam Association's Dam Classification
- [F] Describe the effects of the Structure being overtopped, by producing inundation maps for different flood scenarios. Provide impact forces on homes and infrastructures.
- [G] Describe the effects of a failure of the debris flood retention structure. Provide impact forces on homes and infrastructures.
- [H] Describe the possibility of a flood during construction, its effects on the structures, and mitigation measures.
- [I] Describe the potential challenges during decommissioning of the temporary works.

## **8 SOCIO-ECONOMIC ASSESSMENT**

### **8.1 Baseline Information**

- [A] Describe the project alternatives considered for flood mitigation.
- [B] Describe the existing socio-economic conditions in the Town of Canmore and in the region.
- [C] 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) Town of Canmore's policies and programs regarding the use of local, regional and Alberta goods and services;
  - e) the project schedule; and
  - f) the overall engineering and contracting plan for the Project.

### **8.2 Impact Assessment**

- [A] Describe the effects of construction and operation of the Project on:

- a) Landowners adjacent to the Project;
  - b) Housing;
  - c) availability and quality of health care services;
  - d) local and regional infrastructure and community services;
  - e) tourism and recreational activities;
  - f) viewshed impacts from various locations throughout the Town;
  - g) hunting, fishing, trapping and gathering; and
  - h) First Nations and Métis (e.g., traditional land use and social and cultural implications).
- [B] Describe the effectiveness of the Project in combination with existing flood mitigation works in Cougar Creek.
- [C] Discuss opportunities to work with Aboriginal communities and groups, other local residents and businesses regarding employment, training needs and other economic development opportunities arising from the Project.
- [D] Describe the financial costs of 1:30, 1:100, 1:1000 and 2013 flood events (roughly 1:300) to the public and local/provincial and federal governments. Indicate the extent to which these financial costs are mitigated by the project.
- [E] Provide the estimated total project cost, including a breakdown for engineering and project management, maintenance, equipment and materials, and labour for both construction and operation stages. Indicate the percentage of expenditures expected to occur in the region, Alberta, Canada outside of Alberta, and outside of Canada.
- [F] Provide a discussion as to which communities within the Town of Canmore will benefit from the proposed Project.
- [G] Describe other potential impacts and benefits of the project (e.g., recreation, open green space, aesthetics).

## **9 MITIGATION MEASURES**

- [A] Discuss mitigation measures planned to avoid, minimize or eliminate 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.

## **10 RESIDUAL IMPACTS**

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

## **11 MONITORING**

- [A] Describe The Town of Canmore current and proposed monitoring programs, including:
- a) how the monitoring programs will assess any project impacts and measure the effectiveness of mitigation plans. Discuss how the Town will address any project impacts identified through the monitoring program;
  - b) how the Town will contribute to current and proposed regional monitoring programs;

- c) monitoring performed in conjunction with other stakeholders, including Aboriginal communities and groups;
- d) new monitoring initiatives that may be required as a result of the Project;
- e) monitoring of wildlife and human use including metrics for monitoring and evaluating change;
- f) regional monitoring that will be undertaken to assist in managing environmental effects and improve environmental protection strategies;
- g) how monitoring data will be disseminated to the public, Aboriginal communities or other interested parties; and
- h) how the results of monitoring programs and publicly available monitoring information will be used by the Town

[B] Identify the surface water quality monitoring program that will be implemented to assess the future impacts of construction and operation (including maintenance) of the Project on Cougar Creek. 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 their seasonal and flow variations.