



COUGAR CREEK DEBRIS FLOOD RETENTION STRUCTURE

Project Update

SUBMITTED TO:
Alberta Environment and Parks
and Natural Resources Conservation Board

SUBMITTED BY:
Town of Canmore

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TABLE OF ABBREVIATIONS

AEP	Alberta Environment and Parks
EIA	Environmental impact assessment
NRCB	Natural Resources Conservation Board
SIR	Supplemental information requests

1 INTRODUCTION

The Town of Canmore submitted an environmental impact assessment (EIA) report and Natural Resources Conservation Board (NRCB) application summary for the Cougar Creek Debris Flood Retention Structure (the Structure) and Access Road (together, the Project) in July 2016 (NRCB Application No. 1601). The Town of Canmore has also submitted a *Water Act* application to the Dam Safety division of Alberta Environment and Parks (AEP) to obtain authorization to construct and operate the Project (*Water Act* File No. 00384210). A first round of supplemental information requests (SIRs) was received from AEP and the NRCB in December 2016 and a response was submitted in June 2017. A second round of SIRs was received from AEP on October 2, 2017 and responses were submitted in December 2017.

This Project Update describes changes to the Project since the EIA was submitted that have arisen from ongoing Project development and from discussions with the Dam Safety reviewers at AEP. The following two updates are described herein:

- **Flow Control:** Regulatory submissions included two options for flow control; a bottom outlet structure located at the centerline of the Structure and a diversion tunnel located around the eastern side of the Structure. Both of these options were described in Section 4.4 of the EIA report and were included in the assessment. A decision has been made to progress a diversion tunnel located around the eastern side of the Structure as the selected flow control option rather than the bottom outlet structure located at the centreline of the Structure (Section 1.1).
- **Spillway Design Changes:** The spillway design has been altered to incorporate input from the Dam Safety reviewers (Section 1.2).

1.1 Flow Control

The final Project design will include the tunnel option for flow control. This decision will result in the following changes:

- **Economics:** Construction costs are slightly higher for the tunnel option in comparison to a bottom outlet structure at the centerline of the Structure; however, maintenance costs are expected to be lower so the overall operating cost of the Project will be reduced. The magnitude of the changes are within the bounds of the original cost estimate and do not constitute a material change in the Project costs.
- **Construction:** The tunnel will be used for water diversion during construction of the Structure. This will eliminate the need to construct bypasses or a temporary channel to divert water from the work site. This change may result in a marginally shorter construction period; however, the magnitude of this change is not material to the overall construction schedule.
- **EIA:** As stated above, the tunnel option was contemplated in the original EIA and as such this design decision does not require any further environmental or social impact analysis; the conclusions of the EIA remain unchanged. Water will exit the structure with a different orientation than with the bottom outlet structure but the orientation does not change the

results of the hydrological or hydrogeological assessment. The final No Man's Land reclamation plan will account for the location of the tunnel outflow but the reclamation strategy does not change.

1.2 Spillway Design Changes

As described in the EIA report, the Structure is fully overtoppable and includes a spillway to release water during a major event that is beyond retention design parameters. While the Town of Canmore is confident that the original design would have been appropriate, changes have been made to the spillway to incorporate input from Dam Safety reviewers. The training walls of the original design followed the natural rock walls of the creek to direct the flow into the stilling basin during an overtopping event. As the rock walls are asymmetric, the resultant flow behaviour on the spillway and the stilling basin is complicated to predict. Moreover, the flow path and flow behaviour in the natural channel, downstream of the stilling basin, are also very complex to forecast with a high degree of certainty. In the revised spillway design, two symmetrical training walls are used to redirect flow rather than relying on the natural rock walls. The revised spillway design will increase Structure resiliency during an overtopping event. The revised design will provide better control of the flow on the spillway and entering the stilling basin, better energy reduction in the stilling basin, and better control of the flow entering the natural channel downstream of the stilling basin. The proposed spillway changes are based on existing dam designs in Alberta (e.g., Oldman River Dam) and Iceland that have been operating safely for many years.

From a visual perspective, there will be minimal difference between the original and revised spillway designs. Because the spillway will only be used in extreme events, notionally for events of 1:1000 year return period and above, the design basis for the original design was to cover the spillway with topsoil and vegetation to enhance the look of the Structure and allow animals to move over and across it. The revised spillway design also includes topsoil and vegetation cover and there is no substantive change to the look or function of the spillway. Renderings of the original and revised spillway designs are presented on Figures 1 and 2.

The revised spillway maintains the original concept of a fully overtoppable Structure and is expected to improve Structure performance during an overtopping event. The revised spillway design will not result in changes to the Structure's height or footprint. The vegetated surface finish of the spillway will be graded to ensure that the maximum slope is 30 degrees and that no walls are taller than 50 cm so that wildlife can cross the Structure. The EIA results were reviewed for each discipline to determine if there were any potential changes to the assessment resulting from the revised spillway design (Table 1). The revised spillway design does not change the assessment approach, assessment findings, or the information provided in the responses to SIR Round 1 for any discipline.

Table 1 Environmental Impact Assessment Update by Technical Discipline

TOR Component	EIA Sections	Confirmation of Assessment Findings (No Change for All Disciplines)
Project Description		
Conservation and Reclamation	Section 4.9: Conservation and Reclamation	The visible surface of the spillway will be vegetated as proposed in the original design.
Environmental Assessment		
Air Quality, Climate and Noise	Section 8.2: Human Environment, Air Quality and Climate Section 8.3 : Human Environment, Noise	The revised spillway design does not result in a change in the number of vehicles accessing the site or the equipment required for construction; therefore, there are no changes to the air quality, climate, or noise assessments.
Hydrogeology	Section 6: Aquatic Environment	The revised spillway design does not alter groundwater levels or quality and the findings of the hydrogeology assessment do not change.
Hydrology	Section 6: Aquatic Environment	The revised spillway design does not alter peak flow; level, geomorphology, or river hydraulics; or surface water/groundwater interactions and the findings of the hydrology assessment do not change.
Surface Water Quality	Section 6: Aquatic Environment	The revised spillway design does not alter any water quality parameters and the findings of the surface water quality assessment do not change.
Aquatic Ecology	Section 6: Aquatic Environment	The revised spillway design does not alter downstream sport fish habitat, sediment load, or woody debris contribution and the findings of the aquatic ecology assessment do not change.
Vegetation	Section 7: Terrestrial Environment	The revised spillway design does not result in a change in the Project footprint and the visible surface of the spillway will be vegetated as proposed in the original design. No additional loss of vegetation resources will occur as compared to the original design and the findings of the vegetation assessment do not change.
Wildlife	Section 7: Terrestrial Environment	The visible surface of the spillway will be vegetated to allow wildlife movement over the Structure and no changes to the Project footprint are proposed. The design change does not alter habitat availability, habitat connectivity, or wildlife mortality risk as compared to the original design and the findings of the wildlife assessment do not change.

TOR Component	EIA Sections	Confirmation of Assessment Findings (No Change for All Disciplines)
Terrain and Soils	Section 7: Terrestrial Environment	The revised spillway design does not result in a change in the Project footprint and the visible surface of the spillway will be vegetated as proposed in the original design. No additional soil disturbance, redistribution, or any additional erosion risks are anticipated and the findings of the terrain and soils assessment do not change.
Biodiversity	Section 7: Terrestrial Environment	The revised spillway design does not change the potential effects on terrain and soils, vegetation, or wildlife; therefore, no changes to habitat loss, habitat fragmentation, or reductions in species richness will occur and the findings of the biodiversity assessment do not change.
Land Use Management	Section 8.4: Human Environment, Land Use and Management	The design change does not alter the Project land use.
Historic Resources	Section 8.6: Human Environment, Historical Resources	No footprint changes are proposed so the assessment of potential effects on historical resources remains unchanged.
Traditional Ecological Land Use and Knowledge	Section 8.7: Human Environment, Traditional Knowledge and Land use	No footprint changes are proposed so the assessment of potential effects on traditional land use remains unchanged.
Public Health and Safety	Section 9: Public Health and Safety	The revised spillway will improve Structure performance but does not change any of the safety considerations during construction or operation. There are no changes to air emissions and the human health risk assessment remains unchanged.
Incidents and Malfunctions	Section 10: Incidents, Malfunctions and Retention Structure Safety	The revised spillway maintains the original design concept of an overtoppable Structure and is expected to improve the Structure performance during an overtopping event.
Socio-Economic Assessment	Section 8.5: Human Environment, Socio-Economics	The spillway design changes will result in a subtle change in the shape of the slope on the front face of the Structure. The shape of the training walls will be visible as the topsoil and vegetation will conform the general shape of the concrete Structure under the reclaimed surface. While the silhouette of the training walls may be visually discernible, they will not change the overall visual aesthetics of the Structure. There are no material changes to the economics of the Project as a result of this change.



Original vegetated spillway design – no water impoundment



Original vegetated spillway design – maximum water impoundment



Cougar Creek Debris Flood Retention Structure

**ORIGINAL VEGETATED
SPILLWAY DESIGN
RENDERING**

Date: November 2017	Project: 20746-514
Technical: TA	Reviewer: Reviewer

Disclaimer: Prepared solely for the use of Town of Canmore as specified in the accompanying report. No representation of any kind is made to the other parties with which Town of Canmore has not entered into contract.

Figure
1



Revised vegetated spillway design – no water impoundment



Revised vegetated spillway design – maximum water impoundment



Cougar Creek Debris Flood Retention Structure

**REVISED VEGETATED
SPILLWAY DESIGN
RENDERING**

Date:	November 2017	Project:	20746-514
Technical:	TA	Reviewer:	Reviewer

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Figure
2