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MSES
Management and Solutions in Environmental Science

Technical Review of the Environmental Impact Statement: Three Sisters Village Area Structure Plan

Prepared for Town of Canmore

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Image: Wikimedia Commons 2007

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Acronyms

AEP	Alberta Environment and Parks
ASP	Area Structure Plan
BCEAG	Bow Corridor Ecosystem Advisory Group
CEA	Cumulative Effect Assessment
EIS	Environmental Impact Statement
ERP	Emergency Response Plan
GPS	Global Positioning System
LSA	Local Study Area
MDP	Municipal Development Plan
MSES	Management and Solutions in Environmental Science Inc.
NSERC	Natural Sciences and Engineering Research Council
QPD	QuantumPlace Developments Ltd.
RFD	Reasonably foreseeable developments
RSA	Regional Study Area
RSF	Resource Selection Function
ToR	Terms of Reference
TPR	Third-Party Consultant
TSMV	Three Sisters Mountain Village
TSMVP	Three Sisters Mountain Village Properties Ltd.
TSV	Three Sisters Village
VEC	Valued Ecosystem Component

Executive Summary

Management and Solutions in Environmental Science (MSES), as third-party technical reviewers on behalf of the Town of Canmore (the Town), was requested to review the Environmental Impact Statement (EIS) developed for the Area Structure Plan (ASP) for the Three Sisters Village (TSV) Project. Three Sisters Mountain Village Properties Ltd. (TSMVP) are the current owners of the property which is located within the eastern boundary of the Town of Canmore. On behalf of TSMVP, QuantumPlace Developments Ltd (QPD) is working to develop a new Three Sisters Village ASP to replace the existing 2004 Resort Centre ASP. The new ASP depicts a residential area in conjunction with a mixed-use village that includes resort accommodation, a health and wellness hub, employee housing, recreation, and enhanced transportation to other areas of Canmore.

As per the Town's EIS Policy (2018), the Terms of Reference (ToR) and the resulting EIS are to be reviewed by an independent qualified third-party reviewer (TPR) who reports directly to the Town. MSES was hired by the Town in March 2019 and was brought on to this project as the TPR. Our role in this process is to assist the Town of Canmore to ensure they have the necessary tools and knowledge at hand to inform the decision-making process. This includes consideration of the management and mitigation of future risks, and identification of any uncertainty surrounding potential impacts of the proposed development and associated mitigation measures.

The ToR directs the following three questions to be addressed as part of our review:

1) **Does the EIS include the required information, as outlined in the ToR?**

To address this question, we conducted a high-level conformity review which examined whether information has been included in the EIS to a level of detail that is sufficient to proceed to the next phase of the regulatory process. Overall, we concluded that the information provided in the final EIS met the ToR. This conclusion does not necessarily represent our agreement with the conclusions or approaches outlined the EIS (see Section 2.3 of this report for further discussion).

In Table 1, we provide the details of the conformity review with comments highlighting areas that will require future development in later stages of the municipal approval process. As outlined in the EIS, development details are considered conceptual at the ASP stage and that details such as the development footprint and details for follow up programs will be provided at these future stages. The EIS presents a discussion on uncertainty surrounding the assessment predictions, a broad outline of potential steps for the follow up program, and various mitigation commitments (EIS, Table 50), including a commitment to provide further details of the Monitoring and Adaptive Management Plan prior to the Conceptual Scheme approval. We agree that developing these details as early in the process as possible will help to manage some of the uncertainty raised in the EIS and in our review report. Yet we do note that significant detailed development of the Plan will be needed and should involve a multi-jurisdictional and integrated approach, with clear, agreed upon decision-making processes outlined. As noted in the EIS and our review report, follow up programs will need to consider the collection of additional baseline wildlife data prior to or within the early stages of construction; this may include camera data using fixed camera locations (EIS pg. 187), and/or collection of other types of wildlife data (i.e. current wildlife movement rates through the corridors). Furthermore, specific metrics, targets and thresholds for verifying impact predictions and

mitigation success will need to be identified, as well as, potential adaptive measures that could be implemented if monitoring results indicate that predictions or mitigations are not working as they should. Although there are commitments to complete these next steps, it is clear that these are not trivial tasks and will need to be discussed and explored in depth with all jurisdictions involved prior to the Conceptual Scheme approval.

2) Does the EIS follow agreed upon methods and analysis, as outlined in the ToR?

Overall, the methods and analysis followed the agreed upon approaches, but we do provide further discussion as to potential limitations surrounding approaches used in the assessment or overall knowledge gaps in environmental data. These sources of uncertainty can reduce our understanding of the Project impacts and proposed efficacy of mitigations and are important to highlight so that the Town can make informed decisions.

The 'Alternative Development Scenario' does not evaluate impacts to wildlife from changes in density of people directly. We note that a phased approach is recommended in the EIS to facilitate adaptive management and a figure illustrating how the footprint will be developed (EIS, Figure 8) with estimates of potential density of people by each phase (EIS, Table 7) is provided. Details of the development footprints and the Monitoring and Adaptive Management Plan will not be defined until later planning stages. Therefore, it will be important to review details of how the phased development approach will tie into the Monitoring and Adaptive Management Plan to ensure that there are options available to mitigate any potential impacts to wildlife if monitoring results indicate EIS predictions were incorrect. For example, this could include tying development of project phases to the outcome of testing impact predictions or mitigation effectiveness using monitoring data (as noted in the EIS, pg. 187).

Golder's wildlife assessment uses a weighted evidence approach and data from a variety of monitoring programs, some more recent than others. It is evident that the spatial data is quite dated, but it is our understanding that there have been no further collaring studies conducted by developers, the province or other research organizations for this area that would provide insight into wildlife movement in the Canmore area. This is an information gap overall for the Canmore area that future multi-stakeholder regional monitoring programs will need to consider if impact predictions or mitigation effectiveness are to be evaluated appropriately. Previous reviews (MSES 2013) have identified that further research into movement within corridors would be important for understanding how Project specific and cumulative effects may impact wildlife movement through these corridors. To address this gap from previous EIS analyses, Golder provided an analysis that examines Resource Selection Function (RSF) output as a proxy measure of movement by examining the habitat quality (i.e., RSF values) along inferred animal 'steps' between consecutive telemetry locations. We are more cautious about how much can be inferred about animal movement through the LSA and RSA because it is possible the animals did not move directly between relocation points and so the habitat values along the straight line path may not reflect the actual habitats chosen as animals traversed the landscape. This does not invalidate the analysis or findings but highlights the importance of considering how changes in wildlife movement through a corridor with a hard boundary (i.e. wildlife exclusion fence) will be integrated into the future Monitoring and Adaptive Management Plan.

In addition to the spatial data, the assessment uses data from remote camera monitoring programs to inform the characterization of baseline wildlife conditions. The data from the camera program (gathered from 2009 to 2016) provides information on wildlife and human use within the TSMV lands and adjacent wildlife corridors. However, cameras were moved to new sites every 3-4 weeks, which makes it difficult to compare data across time. Golder does recognize this limitation and recommends that for future monitoring programs additional baseline data may need to be collected such as fixed camera data and exploring the adequacy of data related to negative human-wildlife interactions in testing EIS predictions. These are not trivial tasks and will need to be discussed and explored in depth with all jurisdictions involved prior to the Conceptual Scheme approval.

We also identify some concerns in the level of confidence surrounding the efficacy of the proposed mitigations and the implications for potential residual impacts. For example, in the RSF modelling, Golder assumes that the fence and increased educational efforts will be 100% effective for reducing human use of undesignated trails. Golder asserts that uncertainty surrounding this assumption was accounted for in the conclusions because the residual effects of the Project were predicted to be neutral relative to existing conditions. Some of the wildlife VECs are already considered at a serious risk at existing conditions. We remain concerned about the consequences of mitigation ineffectiveness, given that human use is already a problem for wildlife attempting to use the corridors, and there remains the potential for human use to double even if mitigations are as effective as predicted. If mitigation does not function as predicted the residual impacts could be higher than the neutral magnitude rating provided in the EIS. This is an example of how a better understanding of changes in wildlife use over time in the corridors in relation to changing levels of human use could inform impact predictions. It will fall to the Monitoring and Adaptive Management Plan to address the uncertainty.

Statements in the EIS commit that environmental management plans will be developed prior to Conceptual Scheme approval and that they will include methods, predictions, metrics, targets and thresholds (EIS, pg. 187). However, it will be important for the Town, and other relevant stakeholders, to be involved in the development and review of these plans.

3) Does the TPR agree with the assessment of un-mitigated risks, the mitigation identified, and the assessment of residual effects?

We found that the assessment of unmitigated risks assigned appropriate environmental consequence rankings. However, in one case (i.e. grizzly bears), we thought the potential consequence prediction was too low, but overall, we do not feel it undermines the EIS conclusions. Rather it just makes it even more critical that follow-up programs are robust and lead to meaningful management action in the future.

- The EIS assumes that because grizzly bears seem to tolerate human use at current, relatively high, levels in corridors now, that they will respond similarly in the future when human use in the corridor is potentially doubled. There is currently no data available on how much grizzly bear use of the corridor has changed over time in relation to increases in human use to substantiate those conclusions. Having this information would provide insight into how grizzly bear behaviour changes with different levels of human use, which would inform the definition of thresholds for management action in the follow-up plans outlined in the EIS.

Golder concludes that cumulative impacts from the Project and other reasonably foreseeable developments (RFD) will contribute to the existing serious risk for grizzly bear, wolves and elk.

- Golder acknowledges that these conclusions are uncertain because it depends on people responding appropriately to the fencing and signs, and their good behaviour once within the corridor. However, we do not have the same confidence in these assumptions given that current compliance with regards to obeying human-wildlife based legislation is already challenging and that current efforts to manage non-compliant behaviour "are limited due to insufficient resources and differences in legislation amongst jurisdictions (Bow Valley Human-Wildlife Coexistence Technical Working Group, 2018, pg. 39).

The EIS proposes a broad suite of mitigations for wildlife VECs, including wildlife exclusion fencing around the ASP. However, we think there is substantial uncertainty about the potential effectiveness of a fence to mitigate the entire range of impacts it is being proposed for. The fence is intended to direct human use in the corridors, lower incursions by wildlife into designated areas, and maintain corridor functionality for wildlife.

- Given that space for wildlife movement in this part of the Bow Valley is already limited, and uncertainty around the effectiveness of the fence is high, our confidence in the predictions made in the EIS are more precautionary. Therefore, a detailed, robust follow-up program will be absolutely necessary to test impact predictions and establish mitigation effectiveness. The kinds of corridor monitoring that occurred previously will not be sufficient. Detailed movement data will be necessary, and is only one part of a broader suite of information that must be gathered for all species, including black bears, to test the predictions and conclusions of the EIS and the follow-up plans proposed by Golder.
- Excluding wildlife from the ASP area could impact unfenced parts of Canmore which could mean Project-related impacts are not reduced just relocated. The EIS notes that this is a possibility for elk but it could also be an issue for black bears since they are already a significant focus of management action and removal in the Canmore area. The redistribution of negative interactions will need to be monitored to understand how the fence is affecting wildlife distribution in the RSA.
- The fence may not reduce overall human use of the corridors associated with the Project. If human use could still double over time, even with mitigations being effective (i.e., directing human use to designated trails), we think this could have a more than negligible effect on use of the corridor for grizzly bears, and severe connectivity for wolves which are already avoiding the corridors. Increased human use in a confined space (i.e., corridor with a hard boundary) also has the potential to increase negative human wildlife interactions in the corridor. It is unclear how the total amount of human use in the adjacent corridors will be managed in the future and what adaptive management tools are available to mitigate this potential impact.

While the EIS has met the ToR requirements, we identified a number of knowledge gaps that lowers our confidence in some of the impact predictions made in the EIS and estimates of mitigation effectiveness. We would prefer the spatial depictions of negative human wildlife interactions to be more clearly described in the EIS, particularly the relationship between the number of negative interactions and 'risk' as depicted in the EIS. There is a lack of information on how wildlife use of the LSA, RSA and adjacent corridors has changed over time. If we had a better understanding if or how wildlife use has changed in the past in relation to increasing levels of human use, we would have more confidence in the impact predictions for wildlife VECs.

The EIS discusses the uncertainty around many of the impact predictions and mitigation effectiveness, and recognizes the need for a detailed, multi-stakeholder approach to mitigation and monitoring activities to limit the effects of the Project. The EIS lays out a conceptual approach to follow-up planning and indicates most details will be developed at subsequent planning stages. Below we make several recommendations for the Town to consider as the planning process for this Project advances. The main theme of our recommendations revolve around the need to create detailed, rigorous follow-up plans that maintain flexibility in Project design and development in order to ensure pathways are in place to allow adaptive management of mitigation to ensure the needs of wildlife are not overwhelmed by urban development and human recreation in the future.

Key Recommendations

- **We re-iterate the recommendation we originally made in 2013 and as recommended in the current EIS, that a multi-stakeholder committee be involved in the development and implementation of a future Monitoring and Adaptive Management Plan.**

- **We support the commitments in the EIS that the Town of Canmore work with the Developer, their consultants and Alberta Environment and Parks (AEP) to develop a Monitoring and Adaptive Management Plan that includes defined monitoring targets, metrics and thresholds for initiating and guiding management action before Conceptual Scheme approval. However, we highlight for the Town that this will involve significant effort by all parties to ensure that the necessary details are in place prior to the Project initiation and that any Plan will incorporate flexibility in the potential options for adaptive measures.**

- **We support the recommendation in the EIS that the phased development approach should be meaningfully tied to the Monitoring and Adaptive Management Plan.**

- In the EIS and through conversations with the proponent during EIS development, fence location is the one non-negotiable element of the as yet to be developed Monitoring and Adaptive Management Plan. However, it is the addition of a hard boundary, in a relatively novel application, which if it does not function as predicted or has unintended consequences in a system that is already on edge, could exacerbate already tenuous conditions for wildlife in the RSA. Some level of adaptability in fence location may be required in the future. **We recommend application and final location of a wildlife exclusion fence be determined by the multi-stakeholder committee based on the findings of the monitoring program. We recommend language in the Monitoring and Adaptive Management Plan link final fence position on agreed upon monitoring metrics (e.g., wildlife movement and use in the corridors, human use in the corridors, trail density, and levels of negative human-wildlife interactions inside and out of the corridors) in order to ensure it is functioning as predicted and the wildlife corridors remain functional as development proceeds.**

- **The distribution of negative interactions in and around Canmore will need to be monitored to understand how the fence is affecting wildlife distribution in the RSA.**

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1.0 Introduction

Management and Solutions in Environmental Science (MSES), as third-party technical reviewers on behalf of the Town of Canmore (the Town), was requested to review the Environmental Impact Statement (EIS) for the Three Sisters Village (TSV) Area Structure Plan (ASP) (the Project). Three Sisters Mountain Village Properties Ltd. (TSMVP) are the current owners of the property which is located within the eastern boundary of the Town of Canmore. On behalf of TSMVP, QuantumPlace Developments Ltd. (QPD) is working to develop the new Three Sisters Village ASP to replace the existing 2004 Resort Centre ASP. The new ASP depicts a residential area in conjunction with a mixed-use village that includes resort accommodation, a health and wellness hub, employee housing, recreation, and enhanced transportation to other areas of Canmore.

The Town's Municipal Development Plan (2016) (MDP) requires that an EIS be prepared for a new or amendment to an existing ASP application. A Terms of Reference (ToR) for the Project was developed in collaboration with the Town's previous third-party reviewer (TPR), Golder Associates Ltd. (Golder), QPD and the Town in September 2018 and reviewed by MSES in 2019 prior to finalization of the ToR. The objective of the ToR was to guide the development of the EIS which was prepared by Golder in 2019/2020. The TSMV lands are adjacent to environmentally sensitive areas, primarily provincially designated wildlife corridors that are meant to facilitate animal movement through the Bow Valley and past Canmore. The EIS examines a wide range of environmental issues and concerns, with a particular focus on the potential impacts of development of the TSV on wildlife habitat availability, human-wildlife conflict and wildlife movement through, along and across (i.e. Tipple and Stewart Creek) wildlife corridors adjacent to TSV. These corridors form critical connections between local and regional habitat patches in the Wind Valley and Bow Flats to habitats west of Canmore in Banff National Park and beyond (Lee et al., 2010).

Our role in this process is to scientifically review the EIS developed for the Three Sisters Village ASP through the drafting process and provide a final opinion on the adequacy of the assessment of environmental risk and proposed mitigation and monitoring in the EIS. Our review will assist the Town of Canmore to ensure they have the necessary tools and knowledge at hand to inform the decision-making process. This includes consideration of the management and mitigation of future risks, and identification of any uncertainty surrounding potential impacts of the proposed development and associated mitigation measures.

1.1 Summary of Review Process

As per the Town's EIS Policy (2018), the ToR and the resulting EIS are to be reviewed by an independent qualified third-party reviewer (TPR) who reports directly to the Town. MSES was hired by the Town in March 2019 and was brought on to this project as the TPR. Discussions and work on the Project specific ToR had been initiated by a previous TPR, the Town, QPD and Golder. For the current review, MSES followed a phased approach wherein the first phase involved reviewing the existing project specific ToR (September 2018). MSES participated in a meeting with the Town, QPD and Golder to discuss and address any concerns with the ToR prior to its finalization. MSES also participated in a meeting with Golder on May 16, 2019 to discuss the details of the approach to the biodiversity assessment, whether the proposed concordance table adequately summarizes the ToR and to follow up on questions regarding the wildlife habitat modelling and interpretation of its results as they relate to wildlife movement.

The second phase involved reviewing a draft EIS (August 2019) and providing comments and questions regarding the methods, analyses, rationale for the impact conclusions and effectiveness of proposed mitigation measures. Specifically, our review of the initial EIS draft:

- evaluated the analysis and the anticipated impacts of the proposal including cumulative impacts,
- evaluated alternative development options,
- evaluated the proposed mitigations including the significance of the residual impacts, and,
- provided EIS recommendations/questions for clarity and considered any potential additional mitigation strategies if appropriate.

No formal report was developed but feedback, questions and edits were provided to Golder and QPD directly within the draft EIS report. MSES participated in a meeting with Golder on September 19, 2019 to discuss the concerns and issues identified in this initial review. On May 1, 2020, we participated in a conference call with the Town, QPD and Golder to further discuss the effectiveness of the proposed mitigations (e.g. fencing) in the Canmore/TSMV context and potential performance standards and expectations surrounding these mitigations. MSES was provided with a revised draft of the EIS on May 27, 2020 and follow up revisions on July 28, 2020. The report below represents our conclusions from our technical review of the Final EIS (dated July 2020) for the Three Sisters Village Area Structure Plan.

1.2 Report Approach and Format

As outlined in the ToR, the TPR will assess whether the EIS meets the requirements of the Town's EIS policy, identify gaps in the EIS, and provide recommendations on additional, mitigation, monitoring, or future studies required. The ToR directs the following three questions to be addressed as part of our review:

1. Does the EIS include the required information, as outlined in this ToR? If any information is missing, the third-party reviewer will identify the deficiency.

2. Does the EIS follow agreed upon methods and analysis, as outlined in this ToR?

3. Does the third-party reviewer agree with the assessment of un-mitigated risks, the mitigation identified, and the assessment of residual effects?

For the conformity review (Question #1), we used the concordance table from the revised EIS (EIS, Section 1.5, Table 2). A ToR concordance table identifies all the key requirements outlined within the ToR and the section in the EIS where that information can be found. Modifications to Table 2 from the EIS include adding columns for comments on whether the EIS met key requirements and our associated rationale in Table 1 below. Section 2.2 (Question #2) discusses whether the methods and approaches in the EIS meet the ToR requirements. In Section 2.3 (Question #3), we identify issues, concerns, and gaps related to the assessment, mitigation and EIS conclusions that the Town of Canmore may wish to consider when considering the proposed TSV ASP. Throughout this report, direct quotes from the EIS are in italics while quotes from other sources and literature remain in plain text.

2.0 Technical Review

2.1 Does the EIS include the required information, as outlined in the Terms of Reference?

The ToR for an EIS provides guidance for an assessment of the potential impacts on the biophysical and human environment that may occur as a result of a proposed development, if it were allowed to proceed. The first question posed for our technical review represents a conformity analysis which determines whether the Developer and their consultant has addressed the requirements of the ToR in the submitted EIS. Overall, we concluded that the information provided in the final EIS met the ToR. However, a designation of "Yes" under the category "Requirement Satisfied" does not necessarily represent our agreement with the conclusions or approaches. While the conformity analysis focuses on the general content of the EIS, Section 2.3 of this report will evaluate the adequacy of the information and the validity of the impact predictions.

Table 1. Conformity Review Based on the ToR summarized in the EIS Concordance Table (re-printed and modified from EIS, 2020, Table 2).

ToR Section	ToR Requirement	Requirement Satisfied?	Reviewer Comments
3.0	Relevant sections of guidelines applied in the EIS ■ *Municipal Development Plan Bylaw 2016-03, Town of Canmore (2016)* ■ *South Saskatchewan Regional Plan 2014-2014: An Alberta Land-use Framework Integrated Plan. Alberta Government* ■ *Town of Canmore. Human Use Management Review. Consultation Summary, Final Recommendation and Implementation Plans (2015)* ■ *Recommendations for Trails and Management of Recreational Use for the Town of Canmore: South Canmore and West Palliser (2012)* ■ *Town of Canmore Wildfire Mitigation Strategy Review. Montane Forest Management Ltd. (2018)* ■ *Town of Canmore Noise Bylaw (1997)* ■ *Alberta Environment Guidelines for Storm Water Management for Province of Alberta (1999)* ■ *Town of Canmore Construction Management Plan Guidelines rev-03-2018* ■ *Engineering Design and Construction Guidelines (2010).*	Yes	

3.0	The EIS should consider *"Human-Wildlife Coexistence – Recommendations for Improving Human-Wildlife Coexistence in the Bow Valley" (2018)*	Yes	
3.0	The scientific principles included in the following documents will be considered in the EIS wildlife assessment: ■ *BCEAG Wildlife Corridor and Habitat Patch Guidelines for the Bow Valley (2012)* ■ *BCEAG Wildlife and Human Use Monitoring Recommendations for the Bow Valley (Banff National Park to Seebe) (2001)* ■ *BCEAG Guidelines for Human Use within Wildlife Corridors and Habitat Patches in the Bow Valley (Banff National Park to Seebe) (1999)*	Yes	
4.6a	A description of existing environmental conditions within the Local Study Area (LSA) and as required, within the Regional Study Area (RSA).	Yes	
2.0, 3.0	2.0 The EIS will outline existing conditions, identify significant natural and ecological features, determine the nature and scale of the potential impacts generated by the proposed Project prior to mitigation, provide recommendations to avoid or mitigate these impacts, and identify residual impacts and their significance after implementation of proposed mitigation. 3.0 In the LSA, describe the cumulative environmental impacts from the Project in combination with baseline effects.	Yes	See comments in Section 2.2.2 of this report.
3.0	A discussion of the potential effects of climate change on the Project and on VECs will be provided	Yes	
3.0	Evaluate alternate development scenarios, including development layouts, to reduce environmental and social (human use and public safety) effects from the Project.	Yes	
3.0	Provide summary tables that address environmental consequences, mitigation and monitoring during both the construction and build-out phases.	Yes	See comments in Section 2.3.6. The concepts associated with the Monitoring and Adaptive Management Plan in the EIS is conceptual at this stage. Commitment to develop details prior to Conceptual Scheme approval is provided in EIS. Significant detailed development will be required including collection of additional baseline data prior to Project initiation.

3.0	Provide summary tables of all commitments related to mitigation, compensation, studies, and monitoring	Yes	
3.0	Include a table of commitments that will need to be met by the developer, under municipal, provincial and federal legislation when more detailed, site-specific plans for development in the ASPs are completed. i.e., construction outside of sensitive wildlife windows, protection of environmentally sensitive areas, requirements under the federal Fisheries Act and Species at Risk Act, and Alberta Water Act and Wetland Policy.	Yes	
3.0	Pre-construction baseline surveys will be conducted for fish, amphibians, reptiles, and wetland should be identified.	Yes	
4.1a	Describe the development context for the Project, including previous approvals and ASPs.	Yes	
4.1b	Map the Project in relation to existing conditions within the Project, Local and Regional Study Areas.	Yes	
4.1c	Provide an overview of the Canmore municipal planning policy context.	Yes	
4.2a	Summarize Project details from the ASP. Describe conceptual layout, development nodes, densities and units and temporal development phasing. Include a detailed description of Project-associated infrastructure i.e., road systems and utilities including municipal water, storm water, waste water (e.g., sanitary water) and waste management.	Yes	Figure 8 in the EIS provides a diagram of how the footprint will be developed as a phased approach. See discussion in Section 2.3.6 Details of the development footprints and the Monitoring and Adaptive Management Plan will not be defined until later planning stages. It will be important to review details of how the phased development approach will tie into the Monitoring and Adaptive Management Plan to ensure that there are options available to mitigate any potential impacts to wildlife if monitoring results are not following the EIS predictions.
4.2b	Qualitatively compare the differences in the infrastructure, people and traffic and mitigation between the approved 2004 Resort Centre ASP, and the proposed Project.	Yes	
4.2c	Provide a land use map that includes and accounts for density of people, buildings, and infrastructure in the Project Area.	Yes	

4.2d	To account for the specific and separate set of impacts associated with the construction phase and build-out phases of the project, estimate the maximum number of people and traffic for each phase.	Yes	Details of how the phased approach will tie into the Monitoring and Adaptive Management Plan will need to be reviewed. See discussion in Section 2.3.6
4.3a	Identify the approach used to consult with the public to identify their concerns about the Project, how the issues have been addressed, and where information to address the concerns is presented in the EIS.	Yes	
4.4 a-I	Project Study Area boundary should include all the residential, resort and supporting commercial structures, and recreational uses and infrastructure within the ASP.	Yes	
4.4 a-ii	Local Study Area should include the proposed Project, as well as previously approved development lands in the TSMV (i.e., Stewart Creek ASP) and adjacent movement corridors.	Yes	
4.4 a-iii	Regional Study Area boundary should include future developments whose impacts overlap with those of the Project.	Yes	
4.4 a-iv.	The Project, Local and Regional Study Areas are illustrated on Maps A and B.	Yes	
4.4b	Temporal boundaries should extend from the time of project approval to full build-out of the facilities, including the construction and build-out phases (e.g., 5 to 20 years).	Yes	
4.5a	The level of assessment detail for each VEC will reflect the potential effects from the Project. More detailed assessments should be provided for those VECs for which potential effects are greater.	Yes	
4.6b	A literature review of relevant studies, including background environmental effects studies, and the most current monitoring data from remote cameras, telemetry from collared wildlife, and wildlife-human interactions, and the effects of wildlife enhancement and fire reduction sites	Yes	See comments in Section 2.3.5 regarding presentation of data on negative human-wildlife interactions.
3.0, 4.6c	Conduct field programs where data gaps exist in baseline conditions. Based on discussion with the third-party reviewer, the additional site-specific field surveys should include rare plant surveys; and wildlife corridor surveys for constraints and sites for mitigation to improve functionality.	Yes	Non-vascular and lichen plant species were not included in the baseline rare-plant surveys as agreed to by the previous third-party reviewer. Rationale for the exclusion is based on no known occurrences of federally listed non-vascular plants within the ASP area and only a single occurrence within the RSA (EIS, Section 5.11.3).

4.6d	Discuss effects from the existing developments/footprints, including existing mitigation.	Yes	See Section 2.3 for comments about uncertainty around the effectiveness of some human use management mitigations.
3.0, 4.7	For each VEC, identify federal or provincial requirements or restrictions relevant to the VEC or Project, and how the proposal will meet the intent of legislative requirements.	Yes	
4.8a	Identify the benefits of the Project	Yes	
4.8b	Evaluate how the Project has been designed to address environmental sensitivities or constraints.	Yes	
4.8c	Outline alternatives and modifications to the Project to limit or remove environmental impacts. Where feasible reduce existing effects from the currently developed TSMV lands. Discuss how the Project has addressed concerns of the public.	Yes	Please see discussion in Section 2.3.6 of this report, where we identify the need for incorporating additional flexibility in the future Monitoring and Adaptive Management Plan including with regards to fence location.
4.8d	Identify anticipated impacts from activities of future residents associated with the Project on VECs.	Yes	
4.8e	Identify cumulative impacts from the Project and the existing conditions, on VECs.	Yes	
4.8f	Address impacts from both the construction and build-out phases of the Project.	Yes	
2.0, 4.8 g-i	Identify the pre-mitigated nature and scale of environmental risks and the significance of the residual (or post-mitigated) effects from the Project, and the Environmental Consequence of the residual effects (positive, negligible, low, moderate and high).	Yes	
4.8g-ii	Significance terms to be used in defining the impacts will include: 1. Context; 2. Direction; 3. Magnitude; 4. Frequency; 5. Duration; 6. Reversibility; 7. Geographic Extent; and 8. Probability.	Yes	
2.0, 4.8h-i	Define Mitigation and Environmental Management Plans: Provide recommendations on how to avoid, reduce or mitigate negative effects, and build on positive effects from the Project.	Yes	See Section 2.3.3 and 2.3.6 for further comments.

2.0, 4.8h-ii	Define Mitigation and Environmental Management Plans: Provide specific recommendations on how to mitigate long-term human use effects.	Yes	
4.8h-iii	Where applicable, provide more detailed environmental management plans for effects on wildlife, habitat and the wildlife movement corridors, and to reduce human-wildlife interactions.	Yes	Section 5.8 in the EIS recommends some broad hypotheses for testing accuracy of predictions and possible design considerations for the future monitoring program. The EIS states that methods, predictions, metrics, targets and thresholds will be developed prior to the first Conceptual Scheme approval in the ASP area (EIS, pg. 183).
4.8h-iv	Discuss regional and cooperative efforts that have been initiated, or participated in, by the Developer to address regional environmental issues.	Yes	
4.8i	Identify and describe the uncertainty of the data, models, mitigation and projected effects, and the confidence in the predictions of residual impacts. Identify how uncertainty has been managed in the EIS.	Yes	See Section 2.3 for comments.
2.0, 3.0, 4.9a	Conduct a meaningful cumulative effect assessment (CEA) within the RSA that includes proposed and probable projects that could occur in the next 5 years and impact the same environmental resources (e.g., grizzly bears, elk, groundwater) as those affected by the Project.	Yes	See Section 2.3 for comments.
4.9b	In the broader CEA, include residual impacts from the Project with an Environmental Consequence greater than negligible.	Yes	
4.9c	Issues that may need to be addressed in the cumulative effects assessment include: i. Incremental effects on the wildlife movement corridors, ii. Increased human-wildlife interactions, and iii. Increased traffic on wildlife mortality.	Yes	
2.0, 4.10a-i	Identify potential monitoring programs, for the Project. The programs need to have linkage to potential thresholds defined for effects (e.g., water quality objectives, air quality objectives).	Yes	The EIS states that monitoring programs will include linkages to metrics and thresholds and will be developed prior to Conceptual Scheme approval (EIS, pg. 187).
2.0, 4.10a-ii	Identify whether additional environmental studies are required.	Yes	

4.10b	Identify and participate in comprehensive valley-wide regional monitoring programs, involving and funded by all stakeholders, to monitor the status and mortality of wildlife populations, and to determine the effectiveness (i.e., functionality, connectivity) of wildlife movement corridors near the TSMV lands.	Yes	
4.10c	Provide all data from monitoring programs and future studies to the Town of Canmore or regional bodies assisting in the management of wildlife in the Bow Valley.	Yes	Results will be shared annually to member agencies of the Human-Wildlife Coexistence Technical Working Group.
4.11a	Specific analyses to be completed: Environmental impacts due to undermining, including effects on ground and surface water.	Yes	It is stated within the EIS that the results of a previous Phase I Environmental Site Investigation (Stantec, 2004) did not identify any risks related to either soil or groundwater contamination within the TSMV site, and thus no further investigations were recommended. Golder further states that the previous coal mine operation within the site has been issued a reclamation certificate by Alberta Environment.
4.11b-i	Specific analyses to be completed: <u>Related to Wildlife</u> Use meaningful and well justified Alternative Development Scenarios that will lead to the selection of development plans that will have acceptable impacts on wildlife. Scenario assessments could reflect a range in development densities and layouts, and hence different development footprints, different numbers of people who could reside in the development, and different pressures on wildlife from increased human use of wildlife corridors, from increased traffic and from indirect effects of noise and light.	Yes	

4.11b-ii	Specific analyses to be completed: Related to Wildlife Assess Project effects on existing wildlife corridor movement patterns related to change in habitat use and increased human use. Use validated habitat selection models (e.g., resource selection functions developed and validated using telemetry data collected in the RSA). Use approaches that recognize existing movement constraints and propose mitigations to improve those constraints. Include the Along Valley, Tipple Across Valley, and Steward Creek Across Valley wildlife corridors in the analysis.	Yes	
4.11b-iii	Specific analyses to be completed: Related to Wildlife Identify impacts from the wildfire mitigation strategy that will be required for development, including changes to vegetation, habitat and effects on wildlife.	Yes	
4.11b-iv	Specific analyses to be completed: Related to Wildlife Evaluate the mitigation used to reduce effects on wildlife, including fencing, if this is proposed to manage Project effects.	Yes	See comments in Section 2.3.3 regarding uncertainty on effectiveness of proposed mitigation.
4.11b-v	Specific analyses to be completed: Related to Wildlife Address human-use impacts on wildlife populations (e.g., corridor functionality, vehicle collisions), as well as the potential effects on human safety from wildlife conflicts.	Yes	
4.11b-vi	Specific analyses to be completed: Related to Wildlife Update the *2004 Wildlife Human Interface Prevention Plan* (previously prepared in 2004 for the TSMV) to reflect current legislation, and potential wildlife – human effects, and mitigation and monitoring required for the Project.	N/A	Status to be addressed by Town of Canmore and QPD

2.2 Does the EIS follow agreed upon methods and analysis, as outlined in the Terms of Reference?

In Section 2.1 of this report, we identified whether the assessment met the requirements of the ToR. Although the EIS follows the agreed upon methods and analysis as outlined in the ToR, we provide some further discussion as to potential limitations surrounding approaches used in the assessment or overall knowledge gaps in environmental data. These sources of uncertainty can reduce our understanding of the Project impacts and proposed efficacy of mitigations and were used to inform our conclusions in Section 2.3.

2.2.1 Alternative Development Scenarios

Golder provided an analysis that examined how sensory disturbance from two different development scenarios (hard edge and soft edge) might change the probability of wildlife habitat selection within the approved wildlife corridors. The hard edge scenario involves higher density development closer to the wildlife corridors with lower density developments in the rest of the ASP footprint. The idea is that the higher density development will act as a deterrent for wildlife entering into the development area. The soft edge scenario involves lower density development and green spaces closer to the wildlife corridors to reduce sensory disturbance and effectively increase the width of the corridor. Golder concludes that both scenarios did not change habitat selection patterns in the wildlife corridors but that both scenarios would increase the likelihood of negative human-wildlife interactions. Therefore, they purport that a physical barrier such as a fence is the "*only means of avoiding the increased risk of negative human-bear interactions relative to existing conditions*" in both scenarios (EIS, pg. 33).

Although the alternative scenario analysis follows the ToR conditions (3.0, 4.11 b-i), the analysis does not evaluate impacts to wildlife from changes in density of people directly. Golder states that the "*Variation in the number of people associated with the Three Sisters ASP was excluded from the alternatives analysis because TSMV is an approved development and has an approved ASP (2004) with an approved unit count and subsequent land use districts aligned allowing development to proceed.*" (EIS, pg. 26). We note that a phased approach is recommended in the EIS to facilitate adaptive management and a figure illustrating how the footprint will be developed (EIS, Figure 8) with estimates of potential density of people by each phase (EIS, Table 7) is provided. Details of the development footprints and the Monitoring and Adaptive Management Plan will not be defined until later planning stages. Therefore, it will be important to review details of how the phased development approach will tie into the Monitoring and Adaptive Management Plan to ensure that there are options available to mitigate any potential impacts to wildlife if monitoring results indicate EIS predictions were incorrect. For example, this could include tying development of project phases to the outcome of testing impact predictions or mitigation effectiveness using monitoring data (e.g. EIS, pg. 187).

Developing details and incorporating the phased approach in the Monitoring and Adaptive Management Plan will be essential. Particularly given predictions in the EIS that human use could double (EIS, pg. 188) and uncertainty around the effectiveness of mitigations to concentrate and reduce human use in the wildlife corridors. **This is a key concern that the Town should keep in mind because the overall responsibility of managing human use "*within wildlife corridors is a problem that is broader than this Project*" (EIS, pg. 149) and will require Town to play a vital role.** Please see Section 2.3 in this report for further discussion.

2.2.2 Level of Assessment Detail to Address Uncertainty

The ToR (4.6b) states that the EIS will use a variety of sources to support the understanding of existing environmental conditions for the ASP area. For wildlife, this includes monitoring data from remote cameras, telemetry from collared wildlife, wildlife-human interaction data and a wildlife corridor constraints study. We concur that information from these programs was provided in the EIS to inform the wildlife assessment. For other disciplines, (e.g. surface and groundwater), the scope of the baseline and cumulative effects assessments were more limited. Although the depth of the information is consistent with the ToR (4.5b), which states that more detailed assessments should be conducted for Valued Ecosystem Components (VECs) where potential effects are greater, we highlight that for some of these

disciplines, the limited data or approach will result in a degree of uncertainty that should be identified for any decision-making process. For example, Golder concludes that the probability of negative environmental effects to the local groundwater regime resulting from a contaminant spill incident will be "*unlikely*" (and thus possible), while also characterizing the expected frequency of such events as periodic, and irreversible (Section 6.2.6). Golder's confidence is high in these impact predictions but since there are no proposed Project specific groundwater monitoring programs, there is no way of testing whether these predictions are accurate. We highlight this for the Town because the surficial aquifers daylighting within the TSV site are highly permeable, with generally shallow water table conditions, and they could be vulnerable to any contaminant spills or leaks occurring on the site.

Some uncertainty could be addressed in follow up and monitoring programs that are designed to measure mitigation efficacy and rigorously test EIS impact predictions. As per ToR 4.10 "Monitoring programs are required both to verify the predicted effects, and to track uncertain effects of the Project. The programs need to have linkages to potential thresholds defined for effects (e.g. water quality objectives)". As noted above, there are no commitments for any Project-specific monitoring programs for surface water or groundwater. The lack of a groundwater monitoring plan is not necessarily an identified deficiency of the EIS in the sense that there is no specific regulatory mandate for such monitoring. However, the rationale for such a monitoring plan, apart from satisfying the ToR 4.10 mandate, would be the early detection of any potential hydrocarbon/pesticide/herbicide plume migrating across the site to a local stream and/or the Bow River. Overall, it is unclear how the predicted and uncertain effects of the Project on surface water, groundwater and aquatic ecology will be evaluated other than vague statements that the Developer will conduct environmental monitoring of construction activities to confirm compliance with Construction Management guidelines and plans (EIS, pg. 262) or that an environmental monitor will be on-site for in-stream watercourse crossing construction activities (EIS, pg. 266). Compliance to regulatory standards and guidelines does not necessarily equate to a program designed to verify the predicted effects and track uncertain effects of the Project.

For vegetation, the EIS states that the Developer will follow the Town's Weed Control Bylaw (EIS, Table 50). There is no description of how this bylaw will be applied, such as, how many areas will be monitored, how monitoring will be conducted, under what conditions will herbicide be applied, etc. As well, "*A site-specific Construction Management Plan will be prepared to include environmental protection measures including, but not limited to vegetation and ESA protection, and monitoring measures, and reclamation and revegetation plans.*" (EIS, Section 5.15, pg. 229). No details or linkages to potential thresholds (ToR 4.10 a-i) have been provided because we have been told that these details will be developed at a later planning stage. Statements in the EIS commit that environmental management plans will be developed prior to Conceptual Scheme approval and that they will include methods, predictions, metrics, targets and thresholds (EIS, pg. 187). However, it will be important for the Town to review these plans to ensure that they provide the necessary details to "verify the predicted effects, and to track uncertain effects of the Project" as per ToR 4.10.

2.2.3 Data Quality

Uncertainty in the baseline data can lead to inaccurate predicted outcomes and increase the risk that the effects of the Project leads to undesirable and irreversible outcomes. Furthermore, baseline data collected for the assessment should be used as a foundation for developing and guiding follow-up mitigation and monitoring programs against which future comparisons can be evaluated.

Golder's wildlife assessment uses a weighted evidence approach and data from a variety of monitoring programs, some more recent than others. As per ToR Condition 4.11b-ii, resource selection function (RSF) models were used to estimate the relative probability of a habitat type being selected or used by one of the key wildlife VECs; grizzly bears, wolves, cougars or elk. Selection or use was based on spatial telemetry data that ranges from 1988 to 2009. Grizzly bear data came from 5 individuals during 2000-2008, wolf data from 22 wolves during 1988-2003, elk data from 11 elk during 2000-2003 and 4 elk during 2009, and cougar data from 5 cougar individuals during 2000-2004 (EIS, Appendix B, pg. 3). It is evident that the spatial data is quite dated, but it is our understanding that there have been no further collaring studies conducted by developers, the province or other research organizations for this area that would provide insight into wildlife movement in the Canmore area. **This is an information gap overall for the Canmore area that future multi-stakeholder regional monitoring programs will need to consider if impact predictions or mitigation effectiveness are to be evaluated appropriately.**

In addition to the spatial data, the assessment uses data from remote camera monitoring programs to inform the characterization of baseline wildlife conditions. The data from the camera program (gathered from 2009 to 2016) provides information on wildlife and human use within the TSMV lands and adjacent wildlife corridors. However, cameras were moved to new sites every 3-4 weeks, which makes it difficult to compare data across time. Therefore, although the data may indicate that certain species are present in the ASP footprint, the results from the camera data presented in the EIS does not provide information as to whether wildlife presence has declined or increased over the years. Although using camera monitoring is an agreed upon sampling approach in the ToR, the study design limits the insights that can be made with the data. The lack of information on how use changes over time has implications for future follow up and monitoring programs. Golder does recognize this limitation and recommends that for future monitoring programs additional baseline data may need to be collected such as fixed camera data and exploring the adequacy of data related to negative human-wildlife interactions in testing EIS predictions (EIS, pg. 187). These are not trivial tasks and will need to be discussed and explored in depth with all jurisdictions involved prior to the Conceptual Scheme approval, as per the commitment outlined in the EIS.

2.2.4 Resource Selection Functions

The resource selection functions for grizzly bears, wolves, elk and cougars have been used in previous EIS submissions for TSMV lands (e.g., Golder, 2013). In order to incorporate new development and new trails on the landscape, the models in the 2019 EIS were run using landscape conditions from 2016. Wildlife location data were integrated with land cover layers depicting development pre-2004 and post 2004. Golder used the modelled relationships between wildlife species spatial data and habitat based on earlier landscape conditions (pre-2004 was primarily disturbance data from 2001, while post-2004 was primarily disturbance data from 2008) and then applied those modelled relationships to updated development and land cover surfaces from 2016. MSES had questions surrounding how temporal differences in the landscape disturbance spatial data (2016) and whether model predictions may not consider changes in wildlife responses due to increases in human use and disturbance over the last several years. Although the EIS does follow the approach outlined in the ToR, we discuss how these temporal gaps may affect our confidence in the assessment conclusions (see Section 2.3.5).

Human use of recreational trails, which can reduce wildlife use and movement, was considered in the models by identifying flight initiation distances from literature for each species to define a disturbance coefficient. These disturbance coefficients were applied under existing and future scenarios to represent

changes in the intensity of human use (Appendix B). Table B15 in Appendix B shows disturbance coefficients for undesignated trails under future scenarios. However, in the text, the analysis assumes that fencing and signage will reduce human use on undesignated trails in wildlife corridors, so a disturbance coefficient was not applied to undesignated trails in corridors for the future conditions (EIS, Appendix B, pg. 31). This modelling technique is the only way changes in human use are quantitatively examined in the EIS. Golder assumes that the fence and increased education will be 100% effective for reducing human use of undesignated trails and as a result, habitat quality around undesignated trails will improve relative to existing conditions. Golder asserts that uncertainty surrounding this assumption was accounted for in the conclusions because the residual effects of the Project were predicted to be neutral relative to existing conditions. Some of the wildlife VECs are already considered at a serious risk at existing conditions. We remain concerned about the consequences of mitigation failure, given that human use is already a problem for wildlife attempting to use the corridors, and there remains the potential for human use to double even if mitigations are effective as predicted. If mitigation does not function as predicted the residual impacts could be higher than the neutral magnitude rating provided in the EIS. This is an example of how a better understanding of changes in wildlife use over time in the corridors in relation to changing levels of human use could inform impact predictions. Instead, it will fall to the Monitoring and Adaptive Management Plan to address the uncertainty.

2.2.5 Resource Selection Function Models and Movement

Previous reviews (MSES 2013) have identified that further research into movement within corridors would be important for understanding how Project specific and cumulative effects may impact wildlife movement through these corridors. To address this gap from previous EIS analyses, Golder provided an analysis that examines RSF output as a proxy measure of movement by examining the habitat quality (i.e., RSF values) along inferred animal 'steps' between consecutive telemetry locations. For example, fewer, shorter, steps between relocations might indicate animals are foraging or resting within a given area. Golder assessed habitat quality along straight-line movement steps of ≥500 m, ≥1,000 m and ≥5,000 m between consecutive Global Positioning System (GPS) collar location points. Golder concludes that the RSF is a good reflection of grizzly bear, cougar and elk movement particularly considering steps of ≥500 m, ≥1,000 m and less so for ≥5,000 m. This approach meets the ToR requirement (4.1.b): "Assess the effects of the Project on existing wildlife corridor movement patterns related to change in habitat use and increased human use. Use validated habitat selection models (e.g., resource selection functions developed and validated using telemetry data collected in the RSA)." But given the time between relocations for each species (e.g., 1-2 hrs for grizzly bears, 1-4 hrs for cougars), it is possible the animals did not move directly between relocation points and so the habitat values along the straight line path may not reflect the actual habitats chosen as animals traversed the landscape. This does not invalidate the analysis or findings but is reason to be cautious about how much can be inferred about animal movement through the LSA and RSA. It also highlights the importance of considering how changes in wildlife movement through a corridor with a hard boundary (i.e. wildlife exclusion fence) will be integrated into the future Monitoring and Adaptive Management Plan.

2.3 Does the TPR agree with the assessment of un-mitigated risks, the mitigation identified, and the assessment of residual effects?

In this section, we present our opinion on the assessment of unmitigated risks associated with the proposed Project (Section 2.3.1 and 2.3.2) as presented in the EIS. We also discuss the mitigations

proposed in the EIS, our thoughts on their potential effectiveness (Section 2.3.3) and how that relates to the assessment of residual effects (Section 2.3.4). In addition, the TSV ToR requested the TPR to identify gaps in the EIS (Section 2.3.5) "and provide recommendations on additional, mitigation, monitoring, or future studies required" (TSV ToR, pg. 10) (Section 2.3.6). We were also asked to identify appropriate timing for future studies as necessary.

The TSV EIS contains a comprehensive discussion of the existing risks to VECs, potential impacts of the Project and acknowledges the uncertainty in the impact predictions or assumptions of mitigation effectiveness compared to previous iterations of environmental assessments for this property (e.g., 2012 TSMV EIS; MSES 2013). However, we still have concerns about the effectiveness of the proposed mitigations and the implications for wildlife if mitigations are not as effective as predicted. We agree with the EIS conclusion that existing conditions present a serious risk for 3 of the 4 wildlife VECs (i.e., grizzly bears (EIS, pg. 87), wolves (EIS, pg. 102), elk (EIS, pg. 108)) and that wildlife corridors around the Project are already not functional for wolves. The EIS states that "[u]*nder existing conditions, few wolves use habitat patches and wildlife corridors south of the Bow River and no wolves were documented using the G8 or Stewart Creek wildlife underpasses during 2007 to 2012*." (EIS, pg. 103) This suggests the Along Valley Corridor adjacent to TSV is not 100% functional under existing conditions.

To limit impacts of the Project while ensuring a functional landscape for wildlife movement and urban development, will require a sustained effort among all stakeholders, including intensive monitoring and meaningful adaptive management, the likes of which has not occurred in the Bow Valley to date. This is in part because multiple species will need to be studied simultaneously, with sufficiently detailed data to test impact predictions and mitigation effectiveness to support management action. While the EIS and DRAFT ASP identify the need to develop a comprehensive, scientifically rigorous, Monitoring and Adaptive Management Plan for the Project, no detail is provided on the plan in the EIS. The EIS argues that at the ASP stage only a conceptual level of detail is required for assessment purposes. In our opinion, even if detailed follow-up plans are not required at the ASP stage of planning, at minimum, and as recommended in the EIS they should be developed, in collaboration with stakeholders before Conceptual Scheme approval, and must be implemented before construction, if this ASP is approved by the Town. The EIS does include commitments for providing monitoring details prior to Conceptual Scheme approval but cautions that the development of these details including thresholds to trigger adaptive management measures, is no easy task and will require collaboration from multiple stakeholder groups. This is necessary because if the EIS's predictions are incorrect or mitigation is not as effective as predicted, decisive management action will be required to limit Project-related impacts, which if proven to be larger than predicted are likely to exacerbate already tenuous conditions for wildlife VECs in the RSA.

While it is our opinion that Golder has generally met the requirements set out in the Terms of Reference (See Section 2.1 & 2.2), there remain gaps in our collective understanding of wildlife distribution, abundance and movement in and around Canmore that need to be kept in mind as the predictions and conclusions of the EIS are considered by the Town. Some of the gaps are relatively small, but additional information would provide useful contextual information for understanding the potential impacts of the Project (e.g., what are a 'very high' number of human-wildlife conflict interactions), while other chronic gaps are historical and not able to be remedied by TSMV or Golder for the purposes of this assessment. For example, we made recommendations for the collection of focused movement data to inform impact assessments in Canmore the last time we reviewed a TSMV related EIS for the Town of Canmore over 7 years ago (MSES, 2013). In our 2013 review, we recommended "greater volumes of higher resolution

movement data would improve the analysis" (MSES 2013, pg. 6). Since that time, to our knowledge, no such data was gathered by any of the regional stakeholders and so Golder are left to infer animal movement using ~10+ year old data on key VECs (e.g., grizzly bears and wolves). As well as, using indirect analyses of movement patterns using habitat quality along steps between animal locations to assess potential impacts of the Project on wildlife movement and use of the adjacent corridors. Further, there is a general lack of quantifiable information on how wildlife use of the LSA has changed over time in relationship to increasing levels of human use. While not available to inform the current assessment, these issues will have to be remedied as part of any future monitoring plan, should the ASP be approved and as planning proceeds.

2.3.1 Assessment of Unmitigated Risks Associated with the Project

For the most part, we found that the assessment of unmitigated risks assigned appropriate environmental consequence rankings. However, in one case we thought the potential consequence prediction was too low, but overall, we do not feel it undermines the EIS conclusions. Rather it just makes it even more critical that follow-up programs are robust and can lead to meaningful management action in the future (See Section 2.3.6 below). With respect to 'Grizzly Bear Use of Approved Corridors', we would have preferred to see an even more precautionary assessment of 'moderate' (instead of 'low') environmental consequence of the Project (Table 2 below). The EIS assumes that because grizzly bears seem to tolerate human use at current, relatively high, levels in corridors now, that they will respond similarly in the future when human use in the corridor is potentially doubled.

It is possible that grizzly bears may behave differently than they do now if human use in corridors doubles from current levels. While not all potential future human use can be directly attributed to the Project, we believe a 'moderate' ranking would be a more precautionary assessment of potential impacts on 'Grizzly Bear Use of Approved Corridors'. Without understanding how grizzly bear use has changed over time in response to human use increasing 6% per year from 2003 to 2012 (EIS, pg. 77), it is difficult to clearly understand how additional human use inside the corridors will impact grizzly bear movement.

The EIS does provide an analysis that accounts for human related disturbance on habitat quality in the corridor which predicts a relatively small loss (5 ha) of selected habitats in modelling scenarios meant to represent future human use of the corridor. The EIS assumes the fence and education mitigations will be 100% effective in directing human use to designated trails (see our concerns regarding disturbance coefficients and undesignated trails for future scenarios in Section 2.2.4). Because the mitigations are assumed to be 100% effective, this means that the EIS assumes habitat quality around undesignated trails will improve relative to existing conditions. What if mitigations are less than 100% effective? The models alone would likely indicate only small changes in habitat quality, but as we noted previously, there is insufficient available data on the relationship between wildlife use and human use of the corridors. Its possible the serious existing risks faced by most wildlife VECs would be exacerbated by unmitigated increases in human use, further compromising corridor functionality. We recommend precaution in assuming that how grizzly bears behave now is reflective of how they may behave at higher levels of human use, and that mitigations will be 100% effective. It is possible that future levels of human use resulting from the Project could cross a threshold where grizzly bears begin avoiding the corridor altogether. This is where information on changes in grizzly bear, or any wildlife VECs, use of the corridor has changed over time would be helpful for both impact assessment and mitigation planning purposes.

There is currently no data available on how much grizzly bear use of the corridor has changed over time in relation to increases in human use. Having this information would provide insight into how grizzly bear behaviour changes with different levels of human use, which would inform the environmental consequence prediction and would be useful baseline information to inform the definition of thresholds for management action in the follow-up plans outlined in the EIS. Since this information is not available, we would be more precautionary in our prediction of unmitigated risk on grizzly bear use of the approved corridors. However, we also recognize that changing the consequence prediction does not fundamentally change the overall assessment or mitigation proposals for grizzly bears. It simply highlights a gap in our understanding of corridor functionality and the need for robust follow-up plans based on testable hypotheses and actionable management measures. We have no further comments on the remainder of the environmental consequence designations for each of the wildlife VECs (Table 2).

Table 2. Summary of Golder's analysis of unmitigated risks of the project with and without mitigation applied on wildlife VECs. (adapted from EIS, 2020, Sections 5.4.5 & 5.7.2.4)

VEC	Impact Pathway	Environmental Consequence of the Project (i.e. Unmitigated Risks)	Environmental Consequence of the Project with Mitigation (i.e. Residual Effects)
Grizzly Bear	**Quantity and Quality of Wildlife Habitat**	MODERATE	MODERATE
	Wildlife Use of Approved Corridors	LOW	NEGLIGIBLE
	Negative Human-Wildlife Interactions	HIGH	NEGLIGIBLE
Cougar	**Quantity and Quality of Wildlife Habitat**	LOW	LOW
	Wildlife Use of Approved Corridors	LOW	NEGLIGIBLE
	Negative Human-Wildlife Interactions	HIGH	NEGLIGIBLE
Wolves	**Quantity and Quality of Wildlife Habitat**	HIGH	LOW
	Wildlife Use of Approved Corridors	HIGH	LOW
	Negative Human-Wildlife Interactions	HIGH	NEGLIGIBLE

Elk	**Quantity and Quality of Wildlife Habitat**	NEGLIGIBLE	LOW
	Wildlife Use of Approved Corridors	NEGLIGIBLE	NEGLIGIBLE
	Negative Human-Wildlife Interactions	HIGH	NEGLIGIBLE

2.3.2 Assessment of Unmitigated Risks Associated with Cumulative Effects

The Bow Valley includes a wide range of jurisdictions such as federal and provincial parks and protected areas, public lands, towns and hamlets within the Municipal District of Bighorn. This area is under constant stressors from the TransCanada Highway, continued development and human use which is often in conflict to wildlife use and movement through the valley. A network of corridors and habitat patches were identified to help support wildlife passage through the valley which is fundamental for supporting the health and populations of wide-ranging species such as wolves and grizzly bears. Canmore plays a key role in the movement of wildlife to other areas in Kananaskis country but increases in human use via recreational activities or development that impedes movement can lead to habitat within and around Canmore becoming an ecological trap for many species. Therefore, it is essential that the EIS presents a rigorous and meaningful cumulative effect assessment (CEA) to inform our understanding of the potential risk to the ecological integrity of this regional corridor network. In the predicted effects conclusions for wildlife VECS, it was clear that the ecological integrity of this network for grizzly bears, wolves and elk has been comprised already based on lack of use of corridors to increased use of anthropogenic disturbed areas leading to increases in conflicts with humans. It is clear that some threshold, although no concrete thresholds are defined in the EIS, has been surpassed for these species leading to conclusions that cumulative impacts from the Project and other reasonably foreseeable developments (RFD) will contribute to the existing serious risk for grizzly bear, wolves and elk (Table 3 below).

Golder concludes in the EIS that grizzly bear movement will be maintained at the regional scale because habitat selected by grizzly bears will exist in the corridors even with the Project and other RFDs added to the landscape. The Project will also result in a positive outcome for "*wildlife corridors adjacent to these developments relative to a future condition without fences and education signs* (EIS, pg. 195)". The reliance of these conclusions depends on the fence and other mitigations all working together to successfully mitigate the impacts from increases in human use of this area. Golder acknowledges that these conclusions are uncertain because it depends on people responding appropriately to the fencing and signs, and their good behaviour once within the corridor. However, we do not have the same confidence in these assumptions given that current compliance with regards to obeying human-wildlife based legislation is already challenging and that current efforts to manage non-compliant behaviour "are limited due to insufficient resources and differences in legislation amongst jurisdictions (Bow Valley Human-Wildlife Coexistence Technical Working Group, 2018, pg. 39). Understanding the drivers behind non-compliance in human behavior could help in the design of effective conservation measures.

Table 3. Summary of Golder's conclusions and environmental consequences of cumulative effects on wildlife VECs. (adapted from TSV EIS, 2020, Section 5.9)

VEC	EIS Conclusion Summary	Environmental Consequence of Cumulative Effects
Grizzly Bear	The environmental consequence of RFDs and other activities is predicted to be High because they will contribute to existing serious risks for grizzly bears in the vicinity of Canmore. Because of the fencing mitigation, the Project is expected to result in a positive effect on bear use of wildlife corridors and negative human-bear interactions. QPD/Golder note the uncertainty surrounding this prediction.	HIGH
Cougar	Regional populations are self-sustaining and ecologically effective under existing conditions. The Project and other RFDs are not expected to significantly reduce habitat quality or quantity. With increases in human use, the EIS discusses the potential for increased numbers of negative human-cougar interactions, which could have a negative impact on cougar mortality. Overall, the environmental consequence of the Project and other RFDs is predicted to be low.	LOW
Wolves	Environmental consequences of cumulative effects on wolves in the RSA is predicted to be High because there are already existing serious risks to regional wolf populations. This includes reduced wolf use of wildlife corridors, which is already rare, and habitat quality inside the corridor is expected to decline further with the Project and RFDs.	HIGH
Elk	EIS concludes high environmental consequence of cumulative effects on elk because there is existing serious risk for this species. Elk are predicted to continue concentrating use in anthropogenic habitats in Canmore with the addition of the Project and other RFDs, but that the Project will not contribute significantly to that existing impact. If elk are fenced out of the TSV development its possible other, unfenced parts of Canmore could see rapid rises in elk abundance and negative human-elk interactions. While this may not have a significant impact on regional elk populations, the cost of management associated with rapid increases in elk in other parts of Town could lead to increasing costs to be incurred by the Town of Canmore and Alberta Environment and Parks (AEP) in addressing elk related issues outside of the TSV development.	HIGH

Lastly, although a CEA was required for disciplines that had residual impacts greater than negligible (ToR 2.0, 3.0, and 4.9a), for some disciplines (e.g. surface and groundwater), the assessment was qualitative. Golder concludes that given existing conditions and industry standard mitigation which other RFDs would likely implement, the cumulative effects on surface and groundwater are expected to result in a low environmental consequence. It is assumed that mitigations "*are expected to have a high probability of success*" (EIS, pg. 245) reducing erosion, sedimentation and contamination events. However, there are no Project specific monitoring plans for surface and groundwater provided at this time, so it is difficult to substantiate these conclusions.

2.3.3 Adequacy of Proposed Mitigation

The EIS proposes a broad suite of mitigations for wildlife VECs, including education programs (e.g., signage, homeowner information packages), attractant control, habitat alteration, placement of recreational trails, off leash dog parks and fencing around the ASP:

> "*By combining wildlife fencing with alternative options for recreation, especially off-leash dog parks and designated trails that are fun to use, the potential effects of increased human use in the wildlife corridor are predicted to be substantially reduced relative to building the Project without recommended mitigation. Developing the Project with a wildlife fence and educational signs is predicted to result in a substantial reduction in human use of undesignated trails in adjacent wildlife corridors relative to developing the Project according to the approved 2004 Resort Centre ASP."* (EIS, pg. 148)

Fencing is the key mitigation proposed in the EIS, but as with all proposed mitigations more detailed information will be developed following approval of the ASP and prior to the Conceptual Scheme approval. We agree in concept that a wildlife exclusion fence may mitigate some of the impacts associated with the proposed development. However, we think there is substantial uncertainty about the potential effectiveness of a fence to mitigate the entire range of impacts it is being proposed for. The EIS predicts the presence of a fence will limit negative human-wildlife interactions both inside and out of the ASP area. Wildlife will be excluded from within the development, and the fence is predicted to direct and lower human use in the corridors outside the ASP area leading to a reduction in potential negative interactions. The EIS presents a number of examples of the use of wildlife fencing being effective for keeping wildlife off highways, directing human use to specific trailheads, reducing negative interactions at campgrounds and keeping ungulates out of urban areas. While these examples show different ways wildlife fencing can be successfully implemented, none of them are analogues to the situation being proposed for the TSV development. In this case, the presence of a fence is predicted to simultaneously limit negative interactions and reduce human use in a natural area, and the failure of the mitigation to be effective could have significant consequences for wildlife corridor functionality.

As noted in our previous review (MSES, 2013), and as outlined in the EIS, fencing has a place in the discussion around how to manage and maintain wildlife corridor functionality. Given that space for wildlife movement in this part of the Bow Valley is already limited, and uncertainty around the effectiveness of the fence is high, our confidence in the predictions made in the EIS are more precautionary. Therefore, a detailed, robust follow-up program will be absolutely necessary to test impact predictions and establish mitigation effectiveness. The kinds of corridor monitoring that occurred previously will not be sufficient.

Detailed movement data will be necessary, and is only one part of a broader suite of information that must be gathered for all species, including black bears, to test the predictions and conclusions of the EIS and the follow-up plans proposed by Golder.

Another concern is how excluding wildlife from the ASP area could impact unfenced parts of Canmore which could mean Project-related impacts are not reduced just relocated. As noted in the EIS, elk may concentrate elsewhere in Canmore:

> *"In general, application of fencing as mitigation will exclude large mammals from areas of natural habitat or anthropogenic open spaces within the ASP footprint, resulting in a complete loss of access to habitat that otherwise might be used and funnelling these animals into provincially designated wildlife corridors. Adjacent to the Project, fencing will maintain movement through the corridors. There is potential for elk to concentrate elsewhere in Canmore, potentially creating negative interactions between elk and people (Section 5.7.5.3). Other species of wildlife, such as birds, amphibians, and small mammals will continue to be able to access habitats inside the fence."* (EIS, pg. 145)

However, the EIS makes no predictions about how black bears may or may not concentrate elsewhere in Canmore if the fence is built. We understand that black bears were not designated as a VEC but it is stated in the EIS that some information "*about black bears is also included in the grizzly bear section because of similarities of the environmental risks faced by both species and in the mitigation used to address environmental risks.*" (pg. 66). Since negative human-wildlife incidents appear to be higher for black bears than grizzly bears, it would be helpful to the Town if some context was provided as to whether impacts on black bears would be similar, lower or higher than grizzly bears.

While the fence mitigation measure may reduce conflict inside the TSV ASP footprint, we remain concerned about the displacement of negative interactions into other, unfenced areas of Canmore. While negative interactions inside the ASP footprint (i.e. fenced area) could be low, initially indicating the Project and its mitigation has a negligible effect on negative human-wildlife interactions, the displacement of wildlife, particularly black bears and elk, into other parts of Canmore could lead to an increase in negative effects elsewhere. The EIS notes that this is a possibility for elk, but it could also be an issue for black bears since they are a significant focus of management action and removal in the area (EIS, Figure 25).

Furthermore, the EIS also identifies that increased traffic within the Project area and along connecting roadways, associated with Project construction and operation could increase wildlife mortality via vehicular collisions (EIS, Section 5.4.4). Golder concludes that fencing associated with the Project will exclude larger animals from areas where traffic may increase the risk of collisions. Yet questions remain as to the possibility of Project fencing leading to increased wildlife use into areas where the risk of vehicular collisions could be high. For example, one area of concern may be the Three Sisters Boulevard which crosses the Tipple corridor and would be outside of the fenced area. This potential Project impact was not evaluated or addressed in any detail in the EIS. **Overall, the redistribution of negative interactions will need to be monitored to understand how the fence is affecting wildlife distribution in the RSA** (See comments below in Section 2.3.4 and recommendations in 2.3.5).

The EIS relies on the successful implementation and performance of a multitude of mitigations that require multi-stakeholder cooperation, some of which (e.g., fencing) have not been attempted at this scale, for this range of impacts, in the Bow Valley before. The EIS provides information on the effectiveness of some

proposed mitigations, such as improved education (EIS, pg. 148), designated trail construction (EIS, pg. 149 and exclusionary fencing. However, it is an open question if proposed mitigations such as the wildlife fence can be effective for the range and degree of impacts it is being designed to address. Existing serious risks to wildlife VECs and high levels of human use in the corridors around Canmore currently suggests previously applied mitigations (e.g. education, undesignated trail closures in the Lower Silvertip Corridor) have been generally ineffective elsewhere in Canmore, which lowers our confidence in the predicted mitigation effectiveness. Furthermore, Golder highlights the need for the province, Town and local organizations (e.g. WildSmart) to work together to address human use within the wildlife corridors. It is unclear how successful these multi-jurisdictional collaborations have been in the past given differences in policies and approaches for managing wildlife across jurisdictional boundaries (Bow Valley Human-Wildlife Coexistence Technical Working Group. 2018, pg. 16).

In general, our difference of opinion is in regard to the confidence in mitigation success. The EIS says the suite of mitigations is '<u>most likely</u>' to be successful (EIS, pg. 148), and we would say it '<u>might</u>' be successful. Another example is the assessment of cumulative effects where Golder states "[t]*he contribution of the Project will likely result in a positive outcome for wildlife corridors adjacent to these developments relative to a future condition without fences and educational signs.*" (EIS, pg.195) Again, we would say '<u>might</u>' instead of '*likely*', but Golder does also note the uncertainty around their prediction.

> *In wildlife corridors adjacent to the ASP footprint, the number of negative human-bear interactions is also predicted to decrease from existing conditions if people use recreational amenities envisioned for the Project Amendment, such as the off-leash dog park and trail system, and stay on designated trails when traveling through the wildlife corridor. There is some uncertainty about whether this benefit will be achieved because it would depend on how people access the wildlife corridor and on the good behaviour of people in wildlife corridors (Section 5.7.1). An increase in negative human-bear interactions is possible in wildlife corridors adjacent to the ASP footprint if the new residents and visitors associated with the Project do not respect regulations in wildlife corridors, including ignoring direction provided on signs at entry points.* (EIS, pg. 154)

Successfully limiting the impacts of the development on wildlife movement requires a complex set of mitigations in an area that is already facing considerable pressure from urban development and human use. A recent review of large mammal behaviour found the Zone of Influence (ZOI) (i.e., the effect of human activity or infrastructure projected over space and onto ecological processes) from urban development already impacts the entire Bow Valley around Canmore (Ford et al., 2020). To ensure existing issues are not exacerbated by the proposed development will require the Developer to work closely with the Town of Canmore and AEP to develop, implement and manage mitigation measures in an ongoing manner until impact predictions from the EIS are tested and mitigation effectiveness established. Predicting that all mitigations will be effective is not unreasonable, but it is only a prediction and must be tested as part of the Monitoring and Adaptive Management Plan. There remains uncertainty about just how effective proposed mitigations may be and will require ongoing effort to reduce this uncertainty, particularly because numerous simultaneous mitigations are required. The consequences of failure are significant.

2.3.4 Assessment of Residual Effects

The prediction of residual effects in the EIS are inextricably linked to the effectiveness of the wildlife exclusion fencing to address a number of potential impacts to wildlife VECs. The fence is intended to direct human use of the corridors, lower incursions by wildlife into designated areas, and maintain corridor functionality for wildlife. While it may redirect human use, the fence may not reduce overall human use of the corridors associated with the Project.

> *Because the number of new people likely to occur in the ASP footprint as a result of the Project and increased concentration of existing users on designated trails because of the fence and improved education, use of designated trails in wildlife corridors adjacent to the ASP footprint could more than double from existing conditions, although the amount of increase is uncertain.* (EIS, pg. 149)

Golder does acknowledge the uncertainty around predictions of how proposed mitigations will influence future human use in the wildlife corridor but remain confident in the effectiveness of the fence and other mitigations. We are concerned the EIS residual effects consequence ranking for grizzly bear and wolf use of the corridor is not high enough in light of the fact that even if mitigation is effective, human use in the corridors could double (See Table 2). Without having a better understanding of the relationship between wildlife and total human use of the corridor, we cannot confidently predict how wildlife may react in the future to a doubling of human use. If human use could still double over time, even with mitigations being effective (i.e., directing human use to designated trails), we think this could have a more than a negligible effect on use of the corridor for grizzly bears, and severe connectivity for wolves which are already avoiding the corridors. It is unclear how the total amount of human use in the adjacent corridors will be managed in the future and what adaptive management tools are available to mitigate this potential impact.

Would altering these predictions of residual effects alter the assessment of existing and future serious risks faced by these wildlife VECs (See Table 3), or the mitigation proposals? Likely not, but it reinforces the need for a comprehensive Monitoring and Adaptive Management Plan.

2.3.5 Gaps Identified in Assessment

While we determined that the EIS met the ToR, there remain gaps we identified that, if filled, would provide important contextual information for decision making. These gaps do not invalidate the EIS, but addressing them in future monitoring programs will be critical for testing impact predictions and mitigation effectiveness during build-out to guide management action.

1. **Spatial distribution of negative human wildlife interactions.**

Managing negative human wildlife interactions is a key focus of the EIS. The EIS suggests the fence mitigation is necessary to limit negative interactions, in part because there are currently already unacceptable levels of negative interactions. Through our discussions with QPD and Golder, we were interested in understanding what was an unacceptable level of negative human wildlife interaction for Canmore residents and environmental managers. To demonstrate the high levels of negative interactions in and around the area of the proposed Project, the EIS presents a map of 'risk' developed by AEP (EIS, Figure 24, pg. 86). It is described in the EIS as representing the spatial distribution of negative human-wildlife interactions. We would like to have a better understanding of the data that forms the basis of the negative

interaction risk map and exactly how it relates to the number of negative interactions in those areas. How were the 'risk' categories defined? What is considered a very high risk? Or were the risk categories based on a more subjective classification of bear habitat availability and human use? More information on the details of the depiction of risk, or negative human wildlife interactions would be helpful. In addition, if Figure 24 is based on the number of negative human wildlife interactions in different areas, then there should be some quantitative metrics that can be used in the development of targets and thresholds for management action that could be incorporated into the detailed Monitoring and Adaptive Management plan at the next planning stages.

2. **Lack of information on how wildlife use of the LSA and RSA has changed over time.**

As the EIS notes (EIS, pg. 68), and we comment on in Section 2.2.3, because of the design of the camera monitoring studies, the data collected was not suitable for making inter-annual comparisons. As well, habitat relationships and wildlife use data are based on older collaring datasets that may not capture more recent changes in wildlife use associated with increases in human use. Based on the data presented in the EIS, it is impossible to examine how wildlife VEC use of the study area has changed over time. Furthermore, it is impossible to examine how wildlife use has changed in light of increasing human use of the wildlife corridors. Without understanding how wildlife respond to different levels of human use, it is difficult to accurately predict how they might respond in the future if human use inside corridors doubles as suggested in the EIS. Detailed information on the spatial and temporal variation in wildlife and human use of the wildlife corridors will be necessary to test impact predictions and ensure mitigation effectiveness.

3. **Lack of information on groundwater travel times and discharge/inflows to local creeks.**

There is no assessment of groundwater travel times across the Project site to the Bow River, making it difficult to assess how long it would take for a site contaminant (e.g. a fuel spill reaching a local sand and gravel aquifer water table) to migrate to the Bow River, which would aid in spill response planning, as well as, aid in any groundwater contaminant plume detection, containment and remediation measures implemented.

There is also still no assessment of whether the six drainages crossing the TSMV site (Pigeon Creek, Cairnes Creek, Marsh Creek, Smith Creek, Stewart Creek and Three Sisters Creek) and the Bow River are influent or effluent, namely whether they receive groundwater discharge/inflows from local aquifers (i.e. are influent) or whether they discharge to local aquifers (i.e. are effluent). In this regard, if the streams are influent, then they are much more susceptible to impacts from any contaminants migrating to them via shallow groundwater from the TSMV site.

2.3.6 Recommendations for Follow-up Plans

As we discussed above, the EIS does a reasonable job outlining the existing conditions in the area, including the serious issues currently facing wildlife VECs. The EIS presents a broad suite of general proposals to limit impacts from the Project on the environment, but almost all of the critical details on mitigation application and monitoring activities remain to be worked out at future planning stages (i.e., before Conceptual Scheme approval). It will take sustained focus and effort from all stakeholders to ensure that the EIS predictions and mitigation effectiveness are rigorously tested and that the data and findings are

used to guide meaningful management action. This begins with the development of a detailed TSV Monitoring and Adaptive Management Plan, as proposed in the EIS. Multi-stakeholder (i.e., TSMVP Town of Canmore, AEP) collaboration and input must be utilized in the development of the plan because while the Project itself is located within the Town of Canmore, it also potentially impacts wildlife corridors which are Provincial lands.

We re-iterate the recommendation we originally made in 2013 and as recommended in the current EIS, that a multi stakeholder committee is required to define monitoring targets and thresholds to trigger adaptive management actions. The EIS does not outline future monitoring targets or tie them to thresholds for management action or potential management responses. Golder argues that the purpose of the EIS is to support decision making at the ASP stage, which is conceptual, and that more detail will follow at subsequent planning stages. They have stated that an ASP approval is required before a detailed program can be developed. For example, the EIS suggests a number of potential hypotheses to be evaluated as part of the Monitoring and Adaptive Management Plan, including: "Wildlife (e.g., grizzly bears, cougars, wolves, and elk) will continue to use the wildlife corridors adjacent to the ASP boundary at rates like those detected prior to the Project." (EIS, pg. 186) Information on how wildlife use of the corridors has varied over time would inform the definition of acceptable amounts of change in use in the future. Defining such criteria must be a foundation of follow-up plans.

Because all of the detail around follow-up planning are still to be determined, we think it will be imperative that input from local stakeholders is considered in the development of the Monitoring and Adaptive Management Plan. For example, to test predictions about changes in wildlife use of the corridors around the ASP area will require quantifying existing use levels and defining acceptable levels of change.

As we have previously noted gaps in the data available for the Project assessment will make the definition of some thresholds difficult and as a result will have to be defined based on local knowledge. In some cases, additional data will need to be collected prior to or within the early stages of construction (e.g., current wildlife movement rates through the corridors). This concept is also noted in the EIS (pg. 187), which recommends that the monitoring program may need to evaluate the need to collect additional baselines data using fixed camera locations. This will require allowing adequate time between collection of this data and the start of construction activities (e.g. vegetation clearing). Therefore, **we recommend initiating monitoring activity before construction begins to ensure that data gaps can be addressed to inform the follow-up planning.** The data gathered during monitoring must be rigorous enough to distinguish impacts related to the TSV development from impacts stemming from other existing developments or RFDs and regional growth.

The intricate multi-stakeholder approach required to implement the full suite of proposed mitigations will ultimately dictate the success or failure of TSMVP being able to limit the impact of their development. Successful mitigation of Project-related impacts on the functionality of nearby wildlife corridors and wildlife VECs generally, require all proposed mitigations to be effective. If wildlife corridors with a hard boundary are to remain viable, there is little room, literally and figuratively, for failure of the suite of required mitigations. Additional corridor width (i.e., buffer or setback) may be a useful adaptive management approach in the future if the suite of proposed mitigations do not function exactly as expected.

The EIS puts forward the idea that no additional buffers are necessary to facilitate wildlife movement, Using the recent Smith Creek Corridor decision (AEP, 2020) as justification, the EIS states:

> "[The r]*ecent decision about wildlife corridors in the Bow Valley (AEP 2020) outlines that wildlife corridors have been designated such that "additional management approaches are not needed outside of the delineated corridors including additional buffers, setbacks of layering of uses". Consequently, adaptive management does not include substantive changes to the arrangement of development types within the ASP which were assumed to be fixed for the purposes of this EIS."* (EIS, pg. 178)

It is unclear if AEP's statement is meant to apply to all provincially designated corridors around Canmore or is just applicable to the Smith Creek Corridor, which was the focus of the decision report. We do not agree that additional management approaches like buffers or setbacks may not be needed in the future because we have yet to see research that would support and justify this conclusion, particularly for a wildlife corridor with a hard boundary and other physical limitations. To our knowledge, there have not been any explicit tests of the relationship between corridor width and functionality around Canmore because none of the corridors have 'hard' boundaries, making each corridor functionally wider than its designated width. Therefore, it is unclear exactly what data AEP used to support the claim that no additional buffers will be necessary, and we think there is no way of knowing if buffers will be necessary if human use doubles in the corridors and the proposed mitigations are not as effective as predicted in the EIS.

Alternatively, a recent review suggests multi-species corridors around Canmore are insufficient at their current width for large carnivores to avoid existing impacts of urban development (Ford et al. 2020). The review looked at wildlife responses to residential developments, trails and human use, and introduced the concept of 'effective corridor width' using the Bow Valley as a case study. Effective corridor width is the minimum distance needed to reduce human influence on animal movement through a wildlife corridor (Ford et al., 2020). Based on a review of large carnivore responses to disturbance and using the Bow Valley corridor network as a case study, Ford et al. (2020) concluded that a 350 m wide corridor has no 'effective corridor width' for grizzly bears, black bears, cougars or wolves. This does not mean animals are not using the corridors, it just suggests that they are not sufficiently wide enough for wildlife to escape the impact of existing development as they attempt to move around Canmore. We think the risks faced by wildlife VECs under existing conditions and relative novelty of enclosing a development of this size in a wildlife exclusion fence is sufficient reason to consider moving the fence in the future if necessary to maintain corridor functionality. If monitoring data after 5 or 10 years shows the fence is not as effective as predicted or wildlife no longer use the corridor, relocation or re-design of the fence may be necessary. For example, if monitoring shows that the fence does not reduce human use in the corridor, and wildlife use the corridor less than predicted, but it successfully reduces negative human-wildlife interactions inside the development, what are the management options available to address such a situation with both positive and negative outcomes? Perhaps being able to move the fence location to provide additional space for wildlife to avoid humans in the corridor, while still keeping them out of the development, will be necessary. This is just an example, but a set of options for different approaches to adapt mitigation in light of different monitoring results will need to be considered so that there is some measure of flexibility to maintain corridor functionality and certainty for the developer and planners. Along with relocation of the fence, redesign may also be an option, or in the most extreme case wholesale removal may be necessary if nothing else is shown to work. The EIS does not consider options should the fence prove ineffective or if unintended consequences are observed.

It is the addition of a hard boundary that could have unintended consequences in a system that is already on edge. Some level of adaptability in fence location may be required in the future. Because of this, **we recommend fence location be part of the adaptive management approaches considered for inclusion in the Monitoring and Adaptive Management Plan.** We recommend that discussions about fence location as a potential adaptive management mechanism be taken up by the multi-stakeholder group providing input into the Monitoring and Adaptive Management Plan. Using fence location as a potential adaptive management mechanism would need to be based on agreed upon targets (e.g., quantifiable metrics of wildlife movement and use in the corridors, human use in the corridors, trail density, and levels of negative human-wildlife interactions inside and out of the corridors). While the EIS assumes the proposed mitigations will be 100% effective, we are less certain, given the novel application of some proposed mitigations, the range of potential impacts, and the risks already facing most of the wildlife VECs. It is for this reason that we think adaptive management options should remain as flexible as possible in order to address a range of potential future scenarios where impact predictions were not correct, or mitigations not as effective as expected.

We recommend the phased development approach should be meaningfully tied to the Monitoring and Adaptive Management Plan. Assessments of impact predictions and mitigation effectiveness could be tied to development of different phases to limit impacts on the environment from the Project. For example, in the EIS, Golder describes something along these lines in regards to their proposal for a Phased approach to development, moving from north to south so that within:

> "*the ASP footprint, development can occur up to 200 m from the Along Valley Corridor with ongoing monitoring. Prior to developing within 200 m from the corridor boundary results of the monitoring should be examined to determine if any adaptive management mechanisms (e.g., different lighting, noise attenuation, additional enforcement, changing trails and access points) are required.*" (EIS, pg. 185)

This idea should be explored further during the follow-up planning with stakeholders.

The breadth and depth of monitoring required to rigorously assess mitigation effectiveness and test impact predictions will be considerable. This comes with significant costs for all stakeholders. Perhaps one model that could be explored, in an effort to reduce costs while still gathering independent, credible data is funding graduate student positions to address key questions that will be identified in the follow-up plans. This would be one way to lower personnel costs, while still producing scientifically credible data that could be used to test the many important questions about wildlife corridors and the impacts of urban development on them stemming from this Project. This could also open access to other funding sources (e.g., Natural Sciences and Engineering Research Council (NSERC)) for researchers to purchase necessary equipment for the monitoring program, or cover field costs or salaries for personnel.

An example of this type of program would be the work arising from the Ronald Lake Bison Herd Technical Team in northeastern Alberta. The Ronald Lake Bison Herd is a small subpopulation whose home range is south of Wood Buffalo National Park on the west side of the Athabasca River. Approximately 25% of their home range was going to be impacted by a proposed Oil Sands Mine. There was very little western scientific information on the herd, and it is a culturally important herd to the regions First Nations. To gather baseline data on the herd, the Ronald Lake Bison Herd Technical Team was established in 2014. The Technical Team has representatives from multiple stakeholder groups (e.g., government, industry,

Indigenous groups) and works closely with an academic team from the University of Alberta (http://www.ace-lab.ca/publications.php?tag=Bison) to collaborate and conduct field research on the herd (AEP and ACA 2017). This information is then used to inform the environmental assessment of the proposed project, the development of a herd management plan, and the testing of impact predictions and mitigation effectiveness. The Technical Team helped guide the work of the academic team, and additional funding was secured from NSERC which resulted in lowered costs for the industry partners. Another option would be to establish a third-party Conservation Stewardship Organization to oversee the monitoring work and act as a bridge between conservation and development in and around Canmore.

3.0 Conclusion

Overall, the EIS meets the conditions outlined in the final ToR for this Project. However, as part of our technical audit of the EIS, we identified several gaps or concerns related to the information in the assessment as it relates to un-mitigated risks, efficacy of proposed mitigations and the assessment of residual effects to environmental resources with a focus on wildlife. The EIS proposes a broad suite of mitigations for wildlife VECs, including wildlife exclusion fencing around the ASP. However, we think there is substantial uncertainty about the potential effectiveness of a fence to mitigate the entire range of impacts it is being proposed to address; directing human use in the corridors, lowering incursions by wildlife into designated areas, and maintaining corridor functionality for wildlife. Given that space for wildlife movement in this part of the Bow Valley is already limited, and uncertainty around the effectiveness of the fence is high, our confidence in the predictions made in the EIS are more precautionary.

For any science-based informed decision-making processes, it is essential that uncertainty be identified and discussed so that sound decisions can be made. The EIS does present a discussion on uncertainty surrounding the assessment predictions, a broad outline of potential steps for the follow up program, and various mitigation commitments (EIS, Table 50), including a commitment to provide further details of the Monitoring and Adaptive Management Plan prior to the Conceptual Scheme approval. Although there are commitments to complete these next steps in the EIS, it will be imperative for the Town to play a vital role in the development and review of the Plan. Not only will specific metrics, targets and thresholds for verifying impact predictions and mitigation success need to be identified or developed, the Plan will need to outline potential adaptive measures that could be implemented if monitoring results indicate that predictions or mitigations are not working as they should. Furthermore, as noted in the EIS and our review report, additional baseline wildlife data will need to be collected prior to or within the early stages of construction; including improving our understanding of changes in wildlife use in the corridor over time in relation to increases in human use of the corridor. Having this information will be important for defining thresholds for management action in the follow-up plans outlined in the EIS. In addition, detailed movement data will be necessary as part of future monitoring to better understand the potential risk that by excluding wildlife from the ASP area, it could impact other unfenced parts of Canmore.

The future Monitoring and Adaptive Management Plan will need to also consider how the program will tie into the proposed phased approach to development and integrate flexibility in applying various adaptive management options. In the EIS and conversations with the proponent, fence location is the one non-negotiable element of the as yet to be developed Monitoring and Adaptive Management Plan. However, it is the addition of a hard boundary, in a relatively novel application, which if did not function as predicted or have unintended consequences in a system that is already on edge, could exacerbate already tenuous conditions for wildlife VECs in the RSA. Therefore, some level of adaptability in fence location should be explored as an option.

These are not trivial tasks and will need to be discussed and explored in depth with all jurisdictions involved prior to the Conceptual Scheme approval. Developing these details in the next phase represents a key component in this process that could determine the success or failure in mitigating potential impacts of the Project to wildlife in and around Canmore.

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