M E M O

Subject:	Red Mountain Underground Gold Project - Responses to the Canadian Environmental Assessment Agency's Supplementary Information Request #1
Prepared for:	Andrea Raska, Project Manager, Pacific and Yukon Region, Canadian Environmental Assessment Agency
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On February 16, 2018, the Canadian Environmental Assessment Agency (the Agency) provided IDM Mining Ltd. (IDM) with Supplementary Information Request #1 (IR1) for the proposed Red Mountain Underground Gold Project (the Project). IR1 is comprised of Annex 1 (Information Requests) and Annex 2 (Technical Review Comments). This memo is intended to respond to Annex 1; a separate submission will be prepared to respond to Annex 2.

Annex 1 is divided into 12 information requests (IR1-16 through IR-27). This memo outlines each supplementary information request and provides IDM's response.

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1 IR1-16: TAILINGS MANAGEMENT FACILITY (TMF) DISCHARGE LOCATION

1.1 Agency Information Request IR1-16

Rationale: *The EIS Guidelines (section 3.1) state that the EIS must describe tailings management including discharge as well as predicted changes to surface water quality (section 6.2.2) and fish and fish habitat (section 6.3.1).*

In section 13.5.3.2 of the EIS, the location of the discharge point from the TMF into Bitter Creek is unclear. At the November 21, 2017 working group meeting, IDM Mining Ltd. (the proponent) confirmed that the effluent from the TMF will be discharged between the TMF and modelling node BC-06, however, a precise location was not provided. The Agency notes that the lower part of Bitter Creek between the TMF and modelling node BC06 is fish bearing, and that the precise TMF discharge location may have implications for effects to fish and fish habitat.

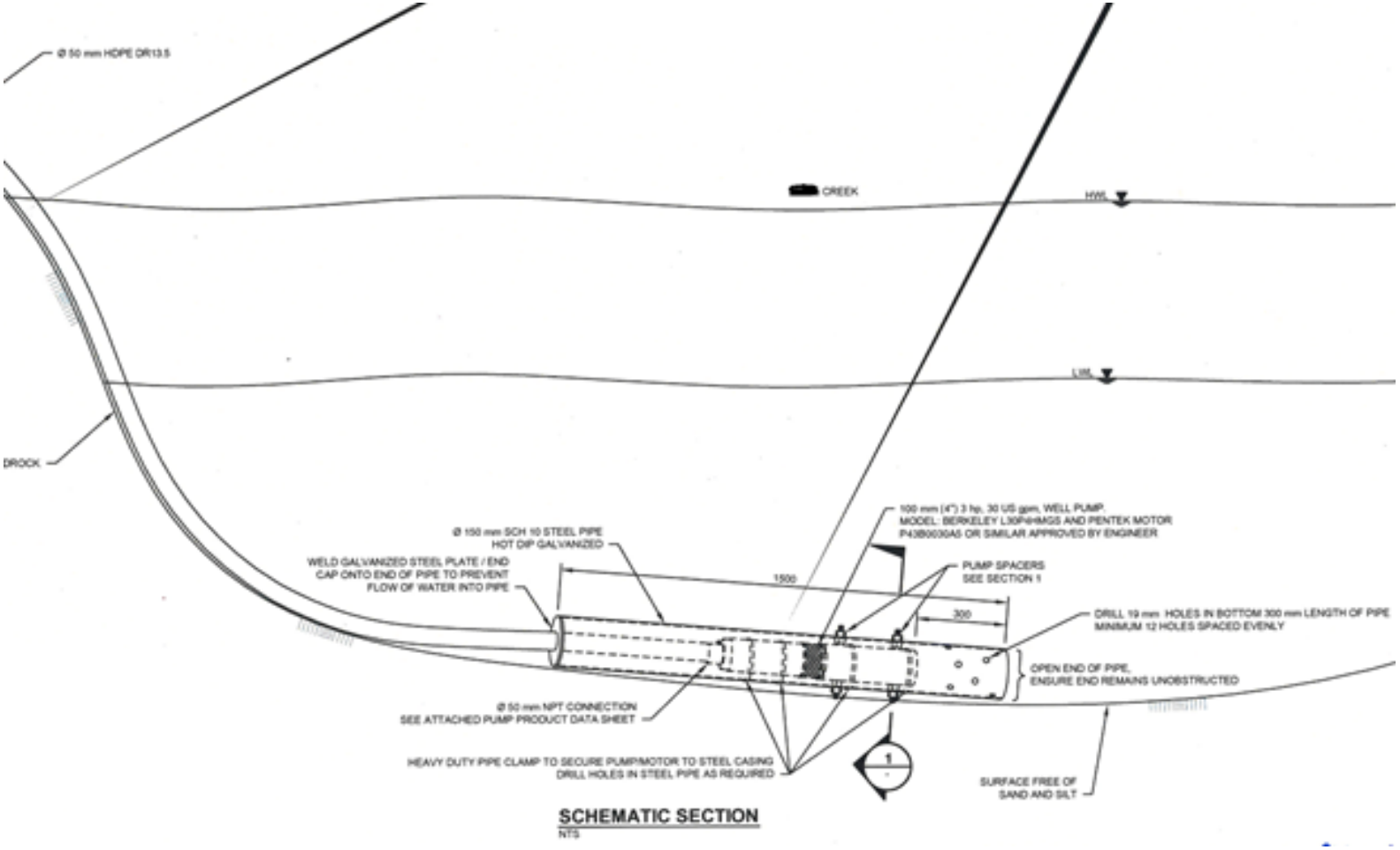
Requested Information: Provide a map and description of the location of the TMF discharge, or the locations under consideration.

1.2 IDM Response to IR1-16

Please refer to the Application/EIS Volume 7, Appendix 1-I Feasibility Study Design Drawings (pdf pages 9 to 29) for details on the water management infrastructure, including the freshwater intake pipe and treated effluent discharge pipe at Bitter Creek.

A schematic for the freshwater intake pipe anticipated to be located below the TMF, upstream of all fish-bearing reaches of Bitter Creek, is provided below, as Figure 1-1.

Figure 1-1 Freshwater Intake Schematic



2 IR1-17: QUARRIES AND BORROWS MITIGATION MEASURES

2.1 Agency Information Request IR1-17

Rationale: *The EIS Guidelines state that the EIS "will consider measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project."* Section 13.5.3.3 describes that quarries and borrow areas have the potential to transport metals and suspended sediments into nearby watercourses, as well as having the potential for metal leaching under acidic pH conditions. However, Table 13.6-3 does not describe any mitigation options for addressing metals, total suspended solids (TSS) and metal leaching / acid rock drainage (ML/ARD) from quarries and borrow areas and section 13.7.3 does not describe associated residual effects, including those potentially affecting fish and fish habitat.

Requested Information: Identify and describe mitigation measures to address the transportation of metals, TSS and ML/ARD from quarries and borrow areas, or provide a rationale as to why such measures are not needed. In addition, describe any predicted residual effects to fish and fish habitat.

2.2 IDM Response to IR1-17

Mitigation measures to address potential transportation of metals, TSS and ML/ARD from quarries and borrow areas are outlined in the Material Handling & ML/ARD Management Plan (Chapter 29 of the Application/EIS, Section 29.15). Key measures include:

- Siting quarries and borrow pits a minimum of 31 m from local watercourses and preserving vegetated buffers between a quarry site and local watercourse;
- Implementing sediment and erosion control measures, as described in the Erosion and Sediment Control Plan (Chapter 29, Section 29.9);
- Select geochemically favourable quarries/borrows that are not predicted to generate ML/ARD;
- Using ditches to divert catchment water away from the quarry and/or borrows to minimize contact water with the workings. Such diversions would need to be constructed from non-PAG materials; and
- Contact water will report to a collection pond for each quarry/borrow (please refer to Appendix 1I: Feasibility Study Design Drawings, pdf page 15 of 66). This will facilitate settling of sediments, and an opportunity to test water quality prior to discharge to the receiving environment.

Water management measures at quarries and borrow pits will be further described in the Sand & Gravel/Quarry Operation Notice of Work (NoW) Application submitted as IDM seeks a *Mines Act* permit to develop the aggregate sources. It is expected that water management at each quarry and borrow pit will focus primarily on the management of sediment, as geochemical testing will be completed and sources that are not geochemically benign will be avoided where possible.

The effectiveness of the mitigation measures will be verified through the various monitoring programs described in Volume 5, Chapter 29 of the Application/EIS. For example, during operations, surface water quality will be monitored for a full suite of parameters on a regular basis, including: anions, nutrients, TOC, DOC, and total and dissolved metals. It is anticipated that the results would be periodically compared to water quality predictions. If the results show substantial deviations from the predicted values, further investigation of specific sources would be initiated to understand whether further mitigation measures are required.

These measures are expected to effectively mitigate potential effects on Fish and Fish Habitat due to runoff from quarries and borrow areas.

3 IR1-18: UNCERTAINTY IN FRACTION OF UNRECOVERABLE SEEPAGE

3.1 Agency Information Request IR1-18

Rationale: There is uncertainty in the results of the fish and fish habitat effects assessment due to uncertainty in the effectiveness of seepage collection. Key areas of uncertainty include:

- The upper bound seepage loss through the TMF liner during operations was reported as 1 L/sec (section 29.18.5.3 of Appendix 1-H), but a sensitivity analysis or description of performance in similar environments was not provided;
- Faults and fractures have been identified in geotechnical drill holes (BH16-009 and DT-282- Appendix 1-A) near the seepage collection and recycle ponds. These areas may act as pathways for discharge of seepage into the receiving environment;
- Limited site investigation and no monitoring well data for the area downgradient of the northwest and south area of Bromley Humps; and
- While seepage modelling was conducted, fate and transport modelling for seepage was not completed.

Requested Information:

a) Describe why the upper bound seepage loss of 1 L/sec is appropriately conservative using information from similar environments;

b) Discuss each of the above areas of uncertainty, and describe how these uncertainties influence the conclusions of the surface water quality and fish and fish habitat effects assessments; and

c) Describe corrective actions that would be taken in the event that measured seepage flow rate and chemistry differ from model predictions and pose a risk to water quality of Bitter Creek and Bear River.

3.2 IDM Response to IR1-18

A conservative component of the design for the Tailings Management Facility (TMF) included a full basin liner system, consisting of an 80-mil HDPE geomembrane sandwiched between layers of non-woven geotextile. An internal Basin Underdrain, installed on the basin floor above the geomembrane, will promote tailings consolidation while maintaining a low head on the geomembrane. This feature was included in the TMF design to provide the most protective, widely-used technology to minimize the rate of seepage from the TMF. This technology is also widely used in the design of heap leach pads as well. Additional measures to further reduce seepage were not developed, as the most conservative approach was already selected for this stage of the TMF design.

Seepage from the TMF during operations will be limited to leakage from potential defects in the geomembrane liner. The leakage value of 1 L/s is based on an analytical solution for leakage through a geomembrane (Giroud and Bonaparte, 1989). The equation has the form:

$$Q = C_B a\sqrt{2gh_w}$$

Where:

Q =	leakage rate through geomembrane defect
C_B =	dimensionless coefficient related to shape of edges of the aperture (assumes C_B = 0.6 for sharp edges)
a =	area of hole in geomembrane (3.1 mm^2 for 2 mm diameter hole)
g =	acceleration due to gravity, and
h_w =	liquid depth on geomembrane

The values assigned to parameters for the analysis were as follows:

- Defect hole size: The analysis considered a typical diameter hole (defect) size of 2 mm. Giroud and Bonaparte (1989) describe this diameter as a size that might escape detection by construction quality assurance. This hole size is recommended by Giroud and Bonaparte (1989) for calculations conducted to evaluate the performance of a lining system.

- Frequency of defects: The analysis assumed a defect per acre (~4,050 m2) of geomembrane liner. This frequency was assigned based on guidance outlined in Giroud and Bonaparte (1989) for evaluating engineering liner designs.

- Head on liner: A pond level of 15 m was assumed to be acting on the geomembrane liner for the leakage estimate calculated for operations. The 15 m corresponds to the theoretical maximum water level at start-up at the deepest part of the pond assuming the design storm event has occurred.

While the seepage rate from the TMF will decrease once operations commence, a further conservative aspect was included whereby the seepage rate was assumed to remain the same throughout operations (i.e. 1 L/s) by setting the hydraulic head to the maximum (most

conservative) value (i.e. 15 m). The aspects that will lead to a reduced seepage rate from the TMF during operations are as follows:

- Deposition of tailings in the TMF will displace the supernatant pond in contact with the liner, thus reducing the hydraulic head estimate.

- Once deposited, the permeability of the tailings solids will begin to function as a seepage control feature prior to the basin liner system, thereby reducing the hydraulic head estimate.

- The internal Basin Underdrain will promote tailings consolidation (& therefore tailings permeability) and maintain a low head over the geomembrane.

Further details on the HDPE Liner System, and details on the conservative measures factored into the TMF design, are provided in the following memos supplied as responses to similar working group (WG) comments:

- 2018 01 16 Red Mtn-US EPA-Effectiveness of Mitigation-Comment 19

- 2018 01 16 Red Mtn-EMPR-Geotech TMF-Comments 568 572

- 2018 01 16 Red Mtn-NLG EAO AECOM EMPR-GW and Closure Planning-Comment 354 493 758

Engineered liners and covers have been successfully applied in similar situations, as shown in the body of research, technical papers and conference proceedings summarized in a Knight Piésold Memo provided to the WG on November 29, 2017 (20171129_ IDM WG Meeting Action Item Response Complete, Attachment 1). As such, the proposed TMF liner (operations phase) and cover (post-closure phase) meet the rating of high effectiveness and high certainty, as described in Chapter 11, Section 11.6.3 of the Application/EIS, which states "Lining of the TMF is expected to have a high degree of effectiveness in limiting groundwater seepage. Because liners are an engineering control, the effectiveness rating is considered to have a high degree of certainty."

4 IR1-19: WATER AND LOAD BALANCE MODEL

4.1 Agency Information Request IR1-19

Rationale: *The EIS Guidelines (section 4.2) state that "all data, models and studies will be documented such that the analyses are transparent and reproducible. All data collection methods will be specified. The uncertainty, reliability, sensitivity and confidence of assumptions and models used to reach conclusions must be indicated."*

Appendix 14-C indicates that the water and load balance model accounted for the potential seepage from the seepage collection pond, recycling pond, and the TMF, but supporting data is not provided. It is not clear if and how the proponent considered seepage entering Bitter Creek through high permeability fractured bedrock. This information is needed to properly characterize the potential effects of water quality changes from seepage on fish and fish habitat.

Requested Information: Provide a summary of model inputs to the water and load balance model, including seepage chemistry and geochemical source terms for the south and northwest area of Bromley Humps.

4.2 IDM Response to IR1-19

The water and load balance model incorporated seepage from the TMF, seepage collection ponds, and associated infrastructure. The water quality predictions presented in Appendix 14-C were generated assuming that this seepage reports to Bitter Creek at BC06. The seepage was modeled without assuming any delay, dilution, or attenuation along the groundwater pathway, which is the most conservative approach. Instead, the seepage immediately reports to BC06 from Bromley Humps. Groundwater quality between Bromley Humps and BC06 was not predicted.

Seepage flows reporting from Bromley Humps to BC06 are 0.2 L/s (17 m3/day, or 525 m3/month) during operations and 0.13 L/S (11 m3/day, or 340 m3/month) during post-closure.

Information on how the seepage was estimated is provided in responses to other WG comments. These are captured in the Comment Tracking Table as ID #'s 15, 36, 218, 570, 577, 673, 674, and 675. Information on the longevity of the liner used to achieve these seepage rates can be found in the memo titled "2018 01 16 Red Mtn-NLG EAO AECOM EMPR-GW and Closure Planning-Comment 354 493 758".

During operations, the seepage is assumed to have the same chemistry as the water in the TMF pond, which is process water that is variably diluted. During post-closure, the seepage is assumed to be the acidic tailings beaches source term (presented in Appendix D of Appendix

14-C). The seepage concentrations are summarized in Table 4-1 for operations and post-closure for the base case (P50) and the upper case (P90).

Table 4-1 Maximum Seepage Chemistry during Operations and Post-Closure (mg/L)

Seepage Prediction	Operations, P50	Closure, P50	Operations, 950	Closure, P90
Hardness	412.2	1870	422.5	3824
Alkalinity	94.45	8.6	93.28	17
Acidity	16.63	340	16.77	670
Sulphate	1629	2900	1639	5800
Aluminum, dissolved	0.08058	6.8	0.1311	14
Antimony, dissolved	1.919	0.049	1.92	0.098
Arsenic, dissolved	0.01177	0.016	0.0118	0.031
Cadmium, dissolved	0.001116	0.39	0.001186	0.78
Calcium, dissolved	146.7	630	150.3	1300
Chromium, dissolved	0.001622	0.15	0.002775	0.3
Cobalt, dissolved	0.06912	0.16	0.06949	0.32
Copper, dissolved	0.3766	0.4	0.3767	0.8
Iron, dissolved	0.6621	110	0.6849	220
Lead, dissolved	0.003552	0.38	0.006073	0.75
Magnesium, dissolved	11.21	72	11.58	140
Manganese, dissolved	0.2265	99	0.2825	200
Mercury, dissolved	0.00013	0.0013	0.000135	0.0026
Molybdenum, dissolved	0.1335	0.064	0.1337	0.13
Nickel, dissolved	0.004968	3.1	0.00654	6.3
Selenium, dissolved	0.04225	0.13	0.04258	0.26
Silver, dissolved	0.000791	0.036	0.000819	0.073
Zinc, dissolved	0.07253	42	0.07551	84

5 IR1-20: RECHARGE RATES

5.1 Agency Information Request IR1-20

Rationale: *The EIS Guidelines (section 4.2) state that the assumptions of the methodology used in the EIS will be clearly identified and justified.* The uncertainty, reliability, sensitivity and confidence of assumptions and models used to reach conclusions must be indicated.

One of the assumptions of the groundwater model is that recharge to the groundwater system mainly takes place in the form of snowmelt or rain filtration (Appendix 10-A Section 6.3). The groundwater model assumed a spatially constant recharge throughout the model boundary. The groundwater level fluctuations in the areas of existing declines are indications of varying recharge rates.

Requested Information: Describe the sensitivity of the groundwater model to varying recharge rates. Specifically, discuss how varying recharge rates would affect the conclusions of the fish and fish habitat effects assessment.

5.2 IDM Response to IR1-20

The groundwater level fluctuations in the area of the existing decline are indications of the seasonal variations in precipitation and snow melt. The sensitivity of the groundwater model to varying spatially constant recharge rates is discussed in IDM response to the WG Comment Tracking Table ID#221 and is detailed in a memo titled "2018 01 16 Red Mtn-ENV-GW Model Sensitivity-Comment 221".

Table 5-1, Table 5-2, and Table 5-3 below summarizes the predictions of creek baseflow rates and mine contributions to the creek baseflows when low, average or high recharge rates are modeled.

Table 5-1 Low Case Recharge (equivalent to 10% MAP)

Model Output	GSC02	RBC02	BC08
Baseflow (m^3/d) during low flow period and current conditions	1,050	1,350	21,880
Baseflow (m^3/d) during low flow period at EOM	1,050 (no reduction)	1,350 (no reduction)	21,880 (no reduction)
Contribution (m^3/d) from mine to creek baseflow	60 (6% of baseflow)	150 (11% of baseflow)	140 (1% of baseflow)

Table 5-2 Base Case Recharge (equivalent to 29.4% MAP)

Model Output	GSC02	RBC02	BC08
Baseflow (m^3/d) during low flow period and current conditions	6,530	7,550	44,400
Baseflow (m^3/d) during low flow period at EOM	6,400 (2% reduction)	7,475 (1% reduction)	43,956 (1% reduction)
Contribution (m^3/d) from mine to creek baseflow	680 (10% of baseflow)	430 (6% of baseflow)	740 (2% of baseflow)

Table 5-3 Upper Case Recharge (equivalent to 50% MAP)

Model Output	GSC02	RBC02	BC08
Baseflow (m^3/d) during low flow period and current conditions	12,260	14,400	66,980
Baseflow (m^3/d) during low flow period at EOM	11,280 (8% reduction)	13,536 (6% reduction)	65,640 (2% reduction)
Contribution (m^3/d) from mine to creek baseflow	1,330 (11% of baseflow)	750 (5% of baseflow)	1,390 (2% of baseflow)

During the winter low flow months, baseflow is the dominant contributor to surface water flow. However, during the rest of the year, the contribution of baseflow is dwarfed by other flows, such as freshet and glacial meltwater. Consequently, the flow and water quality predictions for the winter are somewhat sensitive to the groundwater recharge assumption, but the predictions for the rest of the year are not.

This very small reduction in winter baseflow at BC08 becomes an even smaller % reduction at BC06, where fish presence may be possible in the winter. Therefore, no effects on fish or fish habitat are anticipated, regardless of the actual recharge rate.

6 IR1-21: PROJECT INTERACTIONS WITH WILDLIFE

6.1 Agency Information Request IR1-21

Rationale: *The EIS Guidelines (section 6.1) state that the EIS will present baseline information in sufficient detail to enable the identification of how the Project, including all components within the scope (section 3), could affect the VCs and an analysis of those effects.* This information is intended to assist the Agency in meeting subsection 79(2) of the *Species At Risk Act* which requires the Agency to identify the adverse effects of the Project on the listed wildlife species and its critical habitat.

The "Project Interactions" tables throughout the wildlife chapters identify interactions between wildlife VCs and Project components. A number of interactions were omitted, even though species may occur in the area.

The Agency identified the following examples where no interactions were identified or discussed:

- Interactions between water management infrastructure in the Construction Phase and bats, migratory breeding birds, migratory bird species at risk, and western toad;
- Interactions between explosives magazine or mine site ancillary buildings in the Construction Phase and bats, migratory birds, or migratory bird species at risk;
- Interactions between water discharge in the construction and operation phases, and bats, migratory breeding birds, or migratory bird species at risk;
- Interactions between temporary stockpiling of ore at the mine site and migratory breeding birds;
- Interactions between sensory disturbance from construction of the TMF and bats;
- Interactions between access and haul roads in the operation phase, and migratory birds and migratory bird species at risk; and
- Interactions between habitat alteration, direct mortality, disruption to movements, sensory disturbance, during the closure spillway construction, and migratory breeding birds, migratory bird species at risk, raptors, or western toad.

Requested Information: Describe the interactions between the Project components and species identified above. Alternatively, provide a rationale for why there is no interaction between these species and project infrastructure.

6.2 IDM Response to IR1-21

Each of the Project component activities was assessed for a specific interaction with each of the VCs dependent on where the activity was located in proximity to the effective habitat identified for the VC. Interactions were identified if an activity was expected to lead to a potential effect on the VC. The potential interactions identified in the interactions table were used to focus the effects assessment on the potential adverse effects of highest likelihood of occurring and with the greatest risk. In all cases, the primary cause of potential adverse effects from the Project was identified and assessed. The effects assessment intentionally avoided secondary causes of potential adverse effects since this would result in over-estimating the effects of the Project on VCs and cause redundancy. For most VCs, the effect of habitat clearing and alteration was considered the primary effect. The construction of project facilities for most VCs was considered negligible or absent since the primary effects mechanism would have already occurred as a result of habitat clearing.

Table 6-1 IDM Responses to IR1-21 Bullets

CEAA Comment	IDM Response
Interactions between water management infrastructure in the Construction Phase and bats, migratory breeding birds, migratory bird species at risk, and western toad.	The highest risk of potential adverse effect on bats, birds and western toad associated with construction of specific infrastructure would occur during vegetation clearing and ground preparation. For example, "clear and prepare TMF basin" was an activity that interacted with each of these VCs. The analysis of effect on habitat availability included the potential effect indirectly and directly associated with water management infrastructure because the entire effective habitat for each VC that overlapped with the Project infrastructure was included in the estimate of habitat reduction. All infrastructure components were included in this analysis. Mortality risk was estimated in a qualitative manner and included the overall building of infrastructure rather than specific components of the Project.
Interactions between explosives magazine or mine site ancillary buildings in the Construction Phase and bats, migratory birds, or migratory bird species at risk.	The highest risk of potential adverse effect on bats and birds associated with construction of specific infrastructure would occur during vegetation clearing and ground preparation. All context related to construction of infrastructure is addressed under the measure of habitat availability and is discussed in the assessment. Mortality risk was estimated in a qualitative manner and included the overall building of infrastructure.

CEAA Comment	IDM Response
Interactions between water discharge in the construction and operation phases, and bats, migratory breeding birds, or migratory bird species at risk.	The risk of interactions related to discharge of water from underground facilities during construction and operations was considered below the threshold to validate an interaction with nearly all VCs. Water discharge from any aspect of the Project will be managed as described in "contact water" section under 16.6.1.8, treated and discharged accordingly to meet water quality guidelines. Operational discharge impoundments such as the TMF will be managed as outlined in 16.6.1.9 "Deterrents (e.g., fencing, noise makers) will be used to discourage wildlife from using on-site settling sumps, holding ponds, or the TMF as stop-over, foraging, or breeding sites."
Interactions between temporary stockpiling of ore at the mine site and migratory breeding birds.	Due to the location and elevation of this activity at the Mine Site, the interaction was limited to those VCs where effective habitat overlaps (mountain goat, grizzly bear, hoary marmot, and non-migratory game birds).
Interactions between sensory disturbance from construction of the TMF and bats.	Sensory disturbance with regards to TMF construction is considered under overall Project-related disturbances discussed in 16.5.3.2 and includes related noise, light, dust, or human presence that could elicit behavioural changes in wildlife. This activity was not considered likely to have a specific interaction with bats, and in the cases of other VCs, the potential for interaction was limited to sensory disturbance. Sensory disturbance is included in the analysis of habitat effects through the use of the Zone of Influence for VCs where appropriate for the species.
Interactions between access and haul roads in the Operation Phase, and migratory birds and migratory bird species at risk.	The use of access roads was considered the highest risk for adverse effects on mortality for all Wildlife VCs. The risk related to maintenance of access roads was focused on species that occur in winter during snow accumulation, and to western toad due to the potential for migrations crossing roads.

CEAA Comment	IDM Response
Interactions between habitat alteration, direct mortality, disruption to movements, sensory disturbance, during the closure spillway construction, and migratory breeding birds, migratory bird species at risk, raptors, or western toad.	It was assumed that vegetation clearing and ground preparation for the closure spillway would be completed preceding the placement of this spillway. Regardless, the habitat alteration and disruption to movements associated with the spillway was accounted for in the assessment of decreased habitat availability using the Project footprint that included the closure spillway component. Mortality risk was estimated in a qualitative manner and included the overall building of infrastructure.

7 IR1-22: WILDLIFE HABITAT IN NON-BREEDING SEASONS

7.1 Agency Information Request IR1-22

Rationale: *The EIS Guidelines (section 6.1.6) state that the EIS must provide an assessment of the year-round migratory bird use of the area (e.g. winter, spring migration, breeding season, fall migration), and potential effects to species at risk (section 6.3.3).* This information is intended to assist the Agency is meeting subsection 79(2) of the *Species At Risk Act* which requires the Agency to identify the adverse effects of the Project on the listed wildlife species and its critical habitat.

Table 16.4-1 of the EIS details baseline data for bats, migratory breeding birds, migratory bird species at risk, western screech-owl and northern goshawk, non-migratory game birds, and western toad; however, information was not collected for non-breeding seasons.

This information is needed to accurately assess year-round migratory bird use of the area, and seasonal movements of species at risk potentially affected by the Project.

Requested Information: For bats, migratory breeding birds, migratory bird species at risk, western screech-owl and northern goshawk, non-migratory game birds, and western toad, provide:

a) A summary of baseline data collected during non-breeding seasons and any data used to inform the effects assessment for this period; and

b) A discussion of how inter-seasonal variation was assessed.

7.2 IDM Response to IR1-22

7.2.1 IDM Response to IR1-22(a)

In the Wildlife and Wildlife Habitat Effects Assessment, the migratory bird breeding window in northern BC is described in general for summer residents from late March to end of August. The specific breeding windows for each migratory bird VC are identified as follows in the EA:

- MacGillivray's warbler: mid-May to late August
- Black swift: mid-May to mid-September
- Common nighthawk: mid-May to mid-September
- Marbled murrelet: core nesting period May 1 to August 5
- Olive-sided flycatcher: early May to end of August

Northern goshawk, western-screech owl, sooty grouse, and white-tailed ptarmigan are non-migratory, year-round residents in northern BC. The specific breeding windows for these species are identified as follows in the EA:

- Northern goshawk – early February/late March to early August/early September
- Western-screech owl – February to July/August
- Sooty grouse – late April to late September
- White-tailed ptarmigan – mid-May to mid-October

All baseline bird surveys for the Project were conducted during the breeding season for each species.

The Project LSA is generally located within the Pacific Flyway.

There are survey squares for the BC Breeding Bird Atlas within the vicinity of the Project LSA (BCBBA 2018). However, point counts were conducted during the bird breeding season (mainly April to August) and do not provide a record of bird species occurrence and abundance outside of the bird breeding season.

There are eight eBird hotspots along Highway 37A (eBird 2018). Most bird species were observed from April to September. A few bird species were observed in October: Canada Goose, Chestnut-backed Chickadee, Hooded Merganser, Iceland Gull, Mountain Chickadee, Pacific Wren, Red-tailed Hawk, and an unidentified grebe.

There are seven eBird hotspots along Highway 37 between Kitwanga to Mount Edziza Provincial Park (eBird 2018). Most bird species were observed from April to September. Several bird species were observed in January, March, October, November, or December: American Dipper, American Pipit, American Wigeon, American Tree Sparrow, Bald Eagle, Barred Owl, Black-capped Chickadee, Black-backed Woodpecker, Bohemian Waxwing, Brown Creeper, Bufflehead, Canada Goose, Chestnut-backed Chickadee, Common Goldeneye, Common Loon, Common Raven, Common Redpoll, Dark-eyed Junco, Golden-crowned Kinglet, Gray Jay, Hairy Woodpecker, Lesser Scaup, Northern Pygmy-owl, Northwestern Crow, Pacific Wren, Pine Grosbeak, Red Crossbill, Ring-necked Duck, Red-necked Grebe, Ruffed Grouse, Trumpeter Swan, Tundra Swan, Varied Thrush, White-winged Crossbill, White-winged Scoter, Yellow-billed Loon, and unidentified finch, goldeneye, loon, and merganser.

The Christmas bird counts in Atlin, BC (approximately 460 km northwest of the Project LSA) and Bella Coola, BC (approximately 450 km southeast of the Project LSA) are the most geographically relevant to the Project. There are five years of bird count data available for both locations (see tables below) (Audubon 2018).

Table 7-1 Atlin Christmas Bird Count

Species	26-Dec-13	28-Dec-14	26-Dec-15	30-Dec-16	27-Dec-17
Atlin Christmas Bird Count – 39 bird species total					
American Crow				1	
American Dipper	2	2	2	5	6
American Robin				1	
American Three-toed Woodpecker	1				
Bald Eagle				1	
Barrow's Goldeneye					9
Black-billed Magpie	3	10	21	31	10
Black-capped Chickadee	3	11	10	22	9
Boreal Chickadee	15	2		11	6
Boreal Owl		1			
Common Goldeneye				10	
Common Goldeneye			3		
Common Raven	36	23	28	46	41
Common Redpoll		15			8
Dark-eyed Junco			2		
Downy Woodpecker			2		
Eurasian Collared-Dove		4	5	12	4
Gray Jay		7	3	24	6
Great Gray Owl					2
Great Horned Owl				3	
Hairy Woodpecker					1
Hoary Redpoll					10
Mallard					1
Mountain Chickadee					5
Northern Goshawk			1	2	
Northern Hawk Owl	1				
Northern Saw-whet Owl				1	
Pine Grosbeak	19	23	34	33	83
Pine Siskin		147			2
Ptarmigan					5
Red Crossbill					10
Red-breasted Nuthatch				2	
Ruffed Grouse		3		7	5
Snow Bunting				8	10
Townsend's Solitaire				1	

Species	26-Dec-13	28-Dec-14	26-Dec-15	30-Dec-16	27-Dec-17
Trumpeter Swan			6	5	
White-crowned Sparrow		1	3	1	
White-winged Crossbill				67	
Willow Ptarmigan				1	

Table 7-2 Bella Coola Christmas Bird Count

Species	28-Dec-13	28-Dec-14	27-Dec-15	18-Dec-16	17-Dec-17
Bella Coola Christmas Bird Count – 64 bird species total					
American Dipper	10	1	1	2	10
American Kestrel	1				
American Robin	5		4	3	
American Wigeon	85				
Bald Eagle	54		25	38	64
Barred Owl				2	
Barrow's Goldeneye				5	10
Belted Kingfisher	9	4	2	2	1
Black-capped Chickadee					3
Black Scoter				60	
Bohemian Waxwing		1			
Brewer's Blackbird	6				
Brown Creeper				1	5
Bufflehead	36	12	18		7
Canada Goose		78	28	60	141
Chestnut-backed Chickadee	72	82	6	28	66
Common Goldeneye		2	6		9
Common Grackle	1	1			
Common Loon					1
Common Merganser	30	29	15	16	10
Common Raven	39	68	29	56	68
Common Redpoll					20
Dark-eyed Junco	90	54	144	158	104
Downy Woodpecker			1	2	1
Eurasian Collared-Dove	25	10	22	7	15
European Starling		6		30	
Fox Sparrow	1	2	3	1	2

Species	28-Dec-13	28-Dec-14	27-Dec-15	18-Dec-16	17-Dec-17
Glaucous-winged Gull	25				22
Golden-crowned Kinglet	1		2	5	7
Great Blue Heron	5	5	4	2	5
Great Gray Owl		1			
Greater Scaup		1			
Hairy Woodpecker	1				
Herring Gull	21	2			23
Hooded Merganser		2	1	11	9
Killdeer				1	
Lesser Scaup	4				
Mallard	3	30	32	57	42
Northern Flicker	3	1	1		1
Northern Harrier				2	
Northern Pygmy-owl		1			
Northern Shrike		1			
Northwestern Crow	350	86	39	140	88
Pacific Loon			2		
Pacific Wren	17	1	6	6	10
Pileated Woodpecker	1	2			
Pine Grosbeak	10		9		
Pine Siskin	400	87	35	65	2
Purple Finch	3	5	10		14
Red-breasted Merganser					2
Red-breasted Nuthatch		1		1	
Red-breasted Sapsucker			1	1	
Red-tailed Hawk					1
Red-throated Loon					1
Red-winged Blackbird	15	3		12	6
Ruffed Grouse	3	1		1	4
Song Sparrow	2		1	6	2
Spotted Sandpiper					1
Spotted Towhee	2	9	9	9	5
Stellar's Jay	2	1	11	12	36
Trumpeter Swan	26	37	16	14	29
Varied Thrush			4		
Western Meadowlark			1		
Wilson's Snipe				2	

Waterbird surveys were conducted for the Brucejack Project during four periods: spring staging (April), spring pairing (May), summer brooding (July), and fall staging (October) (Rescan 2013). Waterbird surveys conducted during fall staging (October 9-10) documented the following species: Green-winged Teal, American Wigeon, Mallard, Northern Pintail, Northern Shoveler, Barrow's Goldeneye, Common Merganser, Greater Scaup, Red-breasted Merganser, Ring-necked Duck, Red-necked Grebe, Herring Gull, Canada Goose, Trumpeter Swan, and Great Blue Heron. The Brucejack Project conducted surveys for raptors and upland birds during the bird breeding season.

The KSM Project conducted surveys for wetland birds during spring breeding (June), summer brood (July), fall migration (September), and spring migration (April) (Rescan 2010). Wetland bird surveys conducted during fall migration (September 27) documented the following species: American Wigeon, Green-winged Teal, Mallard, Barrow's Goldeneye, Common Merganser, Lesser Scaup, Surf Scoter, Canada Goose, Greater Yellowlegs, Trumpeter Swan, Common Loon, and unidentified goldeneye, merganser, scaup, scoter, and loon. The KSM Project conducted surveys for forest and alpine birds and raptors during the bird breeding season.

The Kitsault Project conducted raptors surveys, wetland bird surveys, and terrestrial breeding bird surveys during the bird breeding season (AMEC 2011). Surveys were also conducted for marine birds in winter (March), spring (May), summer (August), and fall (September) (AMEC 2011). The baseline report does not list the species identified during winter or fall surveys.

References

AMEC Earth and Environment (AMEC). 2011. Kitsault Mine Project: Wildlife Environmental Baseline Report. Prepared for Avanti Mining Inc. by AMEC Earth and Environment.

British Columbia Breeding Bird Atlas (BCBBA). 2018. Bird Studies Canada, Pacific Wildlife Research Centre, Delta, British Columbia. Available at: http://www.birdatlas.bc.ca/.

eBird. 2018. The Cornell Lab of Ornithology, Ithaca, New York. Available at: https://ebird.org/home.

National Audubon Society (Audubon). 2018. Christmas Bird Count. New York, New York. Available at: http://www.audubon.org/conservation/science/christmas-bird-count.

Rescan. 2010. KSM Project: 2009 Wildlife Characterization Baseline Report. Vancouver, BC: Prepared for Seabridge Gold Inc. by Rescan Environmental Services Ltd.

Rescan. 2013. Brucejack Gold Mine Project: Wildlife Characterization Baseline Report. Prepared for Pretium Resources Inc. Resources by Rescan Environmental Services Ltd. Vancouver, British Columbia.

7.2.2 IDM Response to IR1-22(b)

Subsequent to comments during screening of the Application/EIS, the assessment addresses inter-seasonal variation in the following ways throughout the document in Section 16.4.

- Year-round patterns are discussed in Section 16.4.6.1 for western toad. Year-round habitat requirements including inter-season variation are summarized leading to a focus on reproducing habitat as the most limiting component year-round for western toad. Habitat was used as a measurement indicator as opposed to population indices and habitat modeling is not vulnerable to inter-season and annual variation.

- Year-round patterns are described for migratory breeding birds in Section 16.4.5.1.1 (page 67). Reproductive habitat was the focus for habitat modelling and effects assessment because it describes the primary and limiting habitat used by migratory breeding birds in this location.

- Section 16.4.5.2.1 (page 70) and 16.4.5.2.2 (page 71) summarizes inter-season habitat and migration for black swift and common nighthawk leading to rationale for focusing habitat modeling on reproducing life requisites.

- Section 16.4.5.2.4 (page 74), 16.4.5.3.1 (page 76), and Section 16.4.5.3.2 (page 78) summarizes inter-season habitat and migration for olive-sided flycatcher, northern goshawk, and western screech owl leading to rationale for focusing habitat modeling on reproducing life requisites.

- Section 16.4.5.4 (page 79 and 82) describes inter-season habitat and migration for sooty grouse and white-tailed ptarmigan. The reproductive season habitat was modelled for sooty grouse because it is the most limiting habitat requirement and the wintering areas overlap the lower elevational range of the reproductive habitat. The winter living habitat was modelled for white-tailed ptarmigan because nesting and winter habitat requirements are similar, and one model was required to predict the location of habitat required for this species.

Data was not collected during non-breeding seasons although the habitat requirements of each species were included in baseline information and considered in the effects assessment analysis. The assessment relied on habitat modelling, which is not solely dependent on field data, but uses a broader base of knowledge relevant to the region to predict the location of the habitat required to maintain conditions that support existing populations of each species.

8 IR1-23: HABITAT SUITABILITY MODELS

8.1 Agency Information Request IR1-23

Rationale: *The EIS Guidelines (section 6.1.7 and 6.3.3) state that the EIS must describe the key habitat areas of species at risk that may occur in the Project area to assess the potential effects of the Project on federally listed species at risk.* This information is intended to assist the Agency in meeting subsection 79(2) of the *Species At Risk Act* which requires the Agency to identify the adverse effects of the Project on the listed wildlife species and its critical habitat.

Appendix 16-A of the EIS describes survey locations and habitat suitability for migratory birds and species at risk. There is a lack of survey locations in high to moderate habitat for certain species, making it difficult to effectively assess potential effects of the Project on the species.

The Agency identified the following examples where there is uncertainty in the potential effects of the Project on the species and their habitat:

- Common nighthawk: Appendix 16-A, figure 3-7 shows baseline survey route locations and automated recording unit (ARU) locations for common nighthawk, and figure 4-38 shows common nighthawk habitat suitability. There does not appear to be much overlap between ARU locations and high habitat suitability within the Project area.

- Western screech-owl: Appendix 16-A, figure 3-7 shows locations where silent listening surveys were used to assess western screech-owl presence, and figure 4-49 shows western screech-owl habitat suitability. Only three survey locations (1237-CONI 14, 1238-CONI 15, and 1293-CONI 9) are near high suitability habitat.

- Black swift: Appendix 16-A states that two black swifts were incidentally detected during point count surveys for breeding birds. However, it is unclear at which point count station these birds were detected, nor if these detections were located near or in high suitability black swift habitat (as identified in the Supplemental Memo and figure 16.7-21 of the EIS).

Requested Information for the Mine Site: For common nighthawk, western screech-owl, and black swift:

a) Provide a map overlaying the location of baseline surveys and/or incidental observations with habitat suitability and project infrastructure. If there are areas where survey locations do not overlap with moderate and high quality habitat, describe why the survey location was selected over higher quality habitat locations.

b) Provide specific mitigation measures for the potential effects in the areas where habitat and project infrastructure overlaps.

8.2 IDM Response to IR1-23

8.2.1 IDM Response to IR1-23(a)

Please see table below for species-specific responses.

Table 8-1 IDM Responses to IR1-23 Bullets

CEAA Comment	IDM Response
Common nighthawk: Appendix 16-A, figure 3-7 shows baseline survey route locations and automated recording unit (ARU) locations for common nighthawk, and figure 4-38 shows common nighthawk habitat suitability. There does not appear to be much overlap between ARU locations and high habitat suitability within the Project area.	Please see Figure 8-1, "Overlap of the Project with Common Nighthawk Baseline Surveys and effective Habitat – Nesting". Both baseline and ARU surveys were located to identify regional populations and to assess for the potential for interactions with project activities. Since Common Nighthawk call on the wing but generally not while on the nest, detections are not necessarily associated with nesting habitat. Thus, locating survey stations within or adjacent to nesting habitat is not critical to identify regional populations or assess for the potential for interactions.
Western screech-owl: Appendix 16-A, figure 3-7 shows locations where silent listening surveys were used to assess western screech-owl presence, and figure 4-49 shows western screech-owl habitat suitability. Only three survey locations (1237-CONI 14, 1238-CONI 15, and 1293-CONI 9) are near high suitability habitat.	Western Screech-owl surveys were opportunistic and included a combination of habitat assessments and silent listening at common nighthawk survey stations. No screech-owls were detected. It is recognized that survey intensity was not sufficient to determine the presence or absence of the species and that not all high suitability habitat was sampled. The effects assessment was primarily driven by an assessment of effects to suitable habitat; thus, determining the presence or absence of a species is not critical. The assessment of mortality risk assumed that Western Screech-owl are present in the LSA and thus is a conservative approach.
Black swift: Appendix 16-A states that two black swifts were incidentally detected during point count surveys for breeding birds. However, it is unclear at which point count station these birds were detected, nor if these detections were located near or in high suitability black swift habitat (as identified in the Supplemental Memo and figure 16.7-21 of the EIS).	As shown in Table 4-79 of Appendix 16-A, a total of 13 Black Swift were detected during baseline surveys in June and July, 2016. Please see Figure 8-2, "Overlap of the Project with Black Swift Baseline Surveys and Effective Habitat – Nesting", which identifies the location of these detections relative to the suitability of Black Swift nesting habitat. Generally, the location of Black Swift detections were independent of habitat quality. This is consistent with Black Swift behaviour since they spend most of the day on wing and are understood to leave nesting sites at dawn and return at dusk.

Figure 8-1 Common Nighthawk

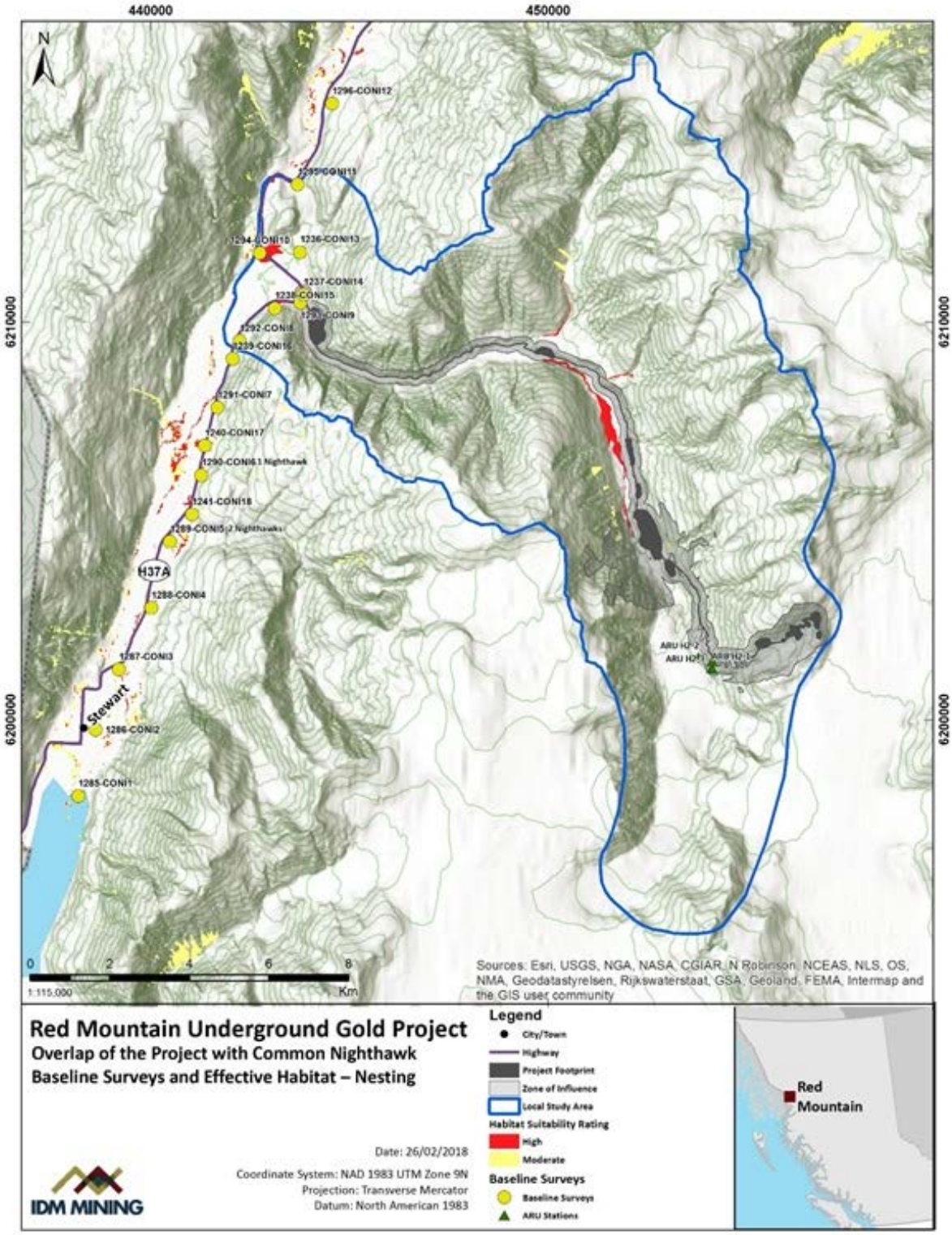
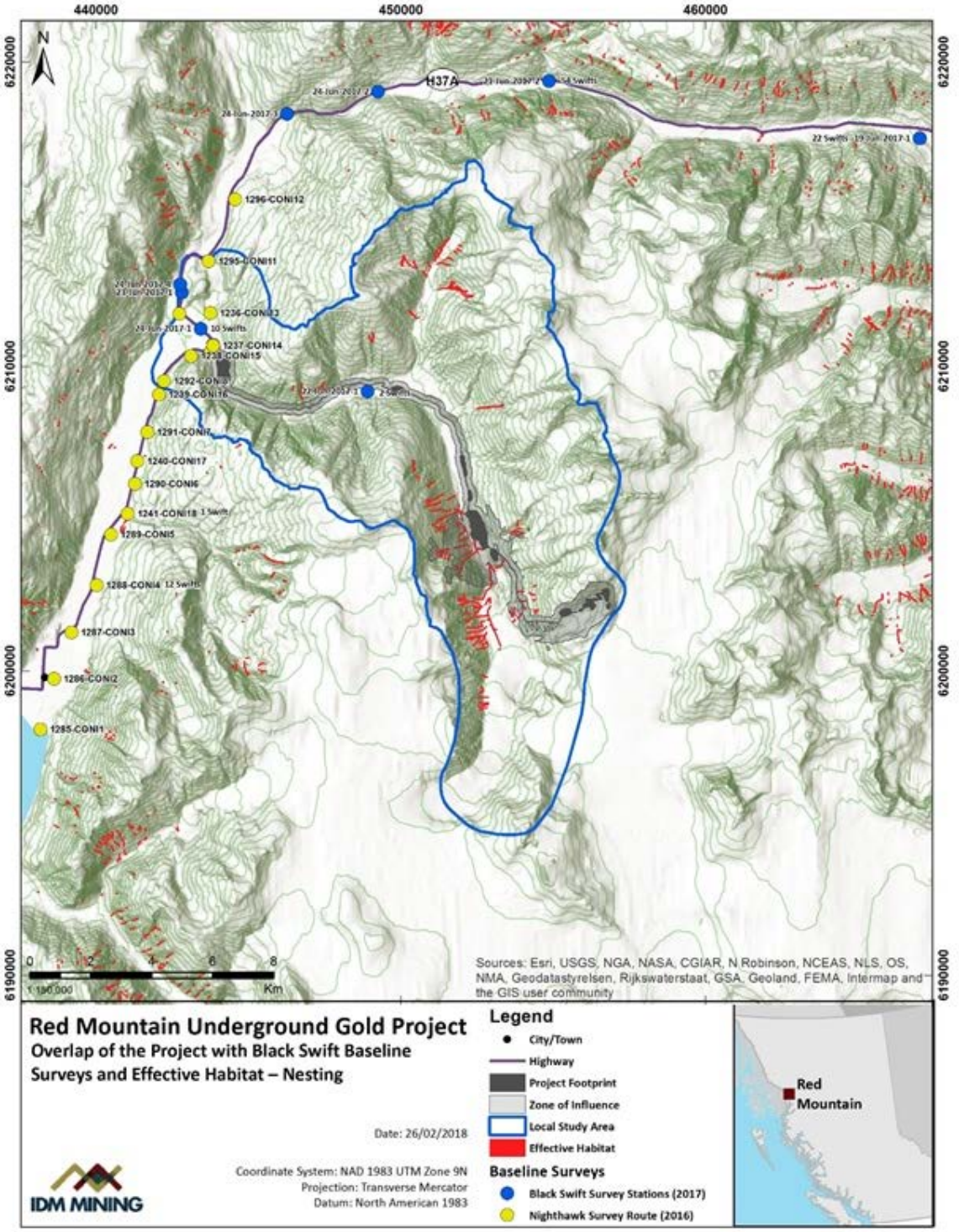


Figure 8-2 Black Swift



8.2.2 IDM Response to IR1-23(b)

The EA and Wildlife Management and Mitigation Plan (WMMP) defines generalized mitigation measures for Common Nighthawk, Western Screech-owl and Black Swift. The mitigation measures are designed to follow the mitigation hierarchy, that is avoidance will be the primary mitigation measure to reduce potential negative effects. Avoidance will include measures related to spatial avoidance of high-quality habitat for these species and temporal avoidance by clearing outside the nesting season wherever practicable. In particular, Section 29.26.7.4 of the WMMP provides the following mitigation measures regarding birds and bird nests:

"The Project area contains a wide variety of habitats that provide breeding habitat for multiple bird species including raptors, waterbirds, waterfowl, shorebirds, and upland birds, including several species at risk. To protect birds nesting within the Project area, several mitigation measures have been developed in addition to the Project design and general mitigation measures identified above:

- During construction, vegetation clearing will be conducted outside of the migratory bird nesting period (May 1 to July 31). If clearing outside of the bird nesting period is not possible, bird nest surveys will be conducted prior to clearing and any active nests identified will be protected within a no-disturbance buffer. Survey methods will follow BMPs, and include the following:
    - Surveys will be conducted by qualified individuals who are experienced in performing pre-clearing surveys and have knowledge of regional bird species;
    - Surveys will extend beyond the Project footprint to the distance of the appropriate no-disturbance setbacks based on the habitat;
    - Survey information including date, time, survey effort, and details on any nests located (e.g., location, species, nest status, photos etc.) will be documented on standardized forms;
    - A no-disturbance setback around active nests will be established until chicks have fledged or the nest is determined to have been predated or abandoned;
    - Once the survey is completed, clearing activities will be completed within a seven-day window (in areas where no nests have been found); and
    - Survey results will be communicated with the on-site Construction Supervisor.

A species-specific buffer will be employed around identified nest sites that are detected during pre-clearing nest surveys or on infrastructure. Species-specific buffers will be selected using guidance from General Nesting Periods of Migratory Birds in Canada (ECCC 2017). These nests will be monitored until the young have fledged or the nest is abandoned. The minimum

buffer distance of 30 to 50 m will be utilized whenever practicable as determined by a QEP, assuming Project operability."

All monitoring and pre-clearing surveys will be overseen by a QEP to ensure that species-specific survey protocols are followed wherever necessary. It is recognized that pre-clearing nest surveys are limited in their effectiveness and that species-specific survey measures may be necessary depending on the timing and location of project activities.

Furthermore, the WMMP provides guidelines for a monitoring program to help inform adaptive management measures. Further details are provided in Section 29.26 of the WMMP.

If necessary, IDM is willing to work with ECCC and CWS to further define species-specific mitigation measures.

9 IR1-24: HABITAT SUITABILITY MAPS

9.1 Agency Information Request IR1-24

Rationale: *The EIS Guidelines (section 6.1.6) state that the EIS must describe the various ecosystems related to migratory bird habitat found in the Project area likely to be affected, and the movement corridors, habitat requirements, and key habitat areas of species at risk that may occur in the Project area (section 6.1.7).* This information is intended to assist the Agency in meeting subsection 79(2) of the *Species At Risk Act* which requires the Agency to identify the adverse effects of the Project on the listed wildlife species and its critical habitat.

Chapter 16 and Appendix 16-A of the EIS describe the habitat suitability models for bats, western toad, and black swift. The Agency identified the following species or species groups where additional information is required:

- Bats: Chapter 16, table 16.4-8 identifies a two-class summer habitat rating scheme, i.e. "useable" or "not useable" habitat, which is not helpful to effectively assess potential effects on bats from the Project. Habitat suitability for bats should consider more than two suitability classes, and should be guided by existing habitat suitability models developed in similar geographical areas and published literature.

- Little brown myotis: Appendix 16-A, table 4-55 suggests that little brown myotis are present in the Project area year-round, however no models are provided for winter habitat.

- Western toad: Appendix 16-A, table 4-120 provides habitat attributes for living, reproducing (eggs) and hibernating life requisites. However, the habitat suitability model only considered reproduction (eggs). Additional information on potential movement corridors and non-reproducing habitat requirements are needed.

Requested Information:

a) Describe habitat suitability for bats which considers more than two suitability classes, including foraging and maternal roosting in growing and living seasons and winter life requisites.

b) Provide a map overlaying the location of habitat suitability with survey locations for bats with project infrastructure.

c) Describe habitat suitability for movement corridors and non-reproducing life states for western toad.

9.2 IDM Response to IR1-24

9.2.1 IDM Response to IR1-24(a)

A two-class living habitat rating scheme, i.e. "useable" or "not useable" habitat was utilized for the habitat modelling. This broad rating scheme included habitat used for foraging, daytime roosting, maternal roosting and hibernation. A two-class scheme is typical for data where there is limited information as per RIC Standards (RIC 1999). A more refined filter that differentiates foraging and maternal roosting in growing and living seasons and winter life requisites would be difficult given the limited complexity of the TEM data. This challenging identification is compounded by the fact that bat roost fidelity varies in response to roost microclimate or condition, parasite load, distance to favourable foraging areas, disturbance or predation risk, or young familiarity with alternative roost sites (Lewis 1995; Rabe et al. 1998 in Holroyd et al 2016). None of these vectors to roost selection are captured in traditional habitat data.

References

Holroyd, S.L., V.J. Craig, and P. Govindarajulu. 2016. Best Management Practices for Bats in British Columbia, Chapter 1: Introduction to the Bats of British Columbia. B.C. Ministry of Environment, Victoria, BC. 108 pp.IDM

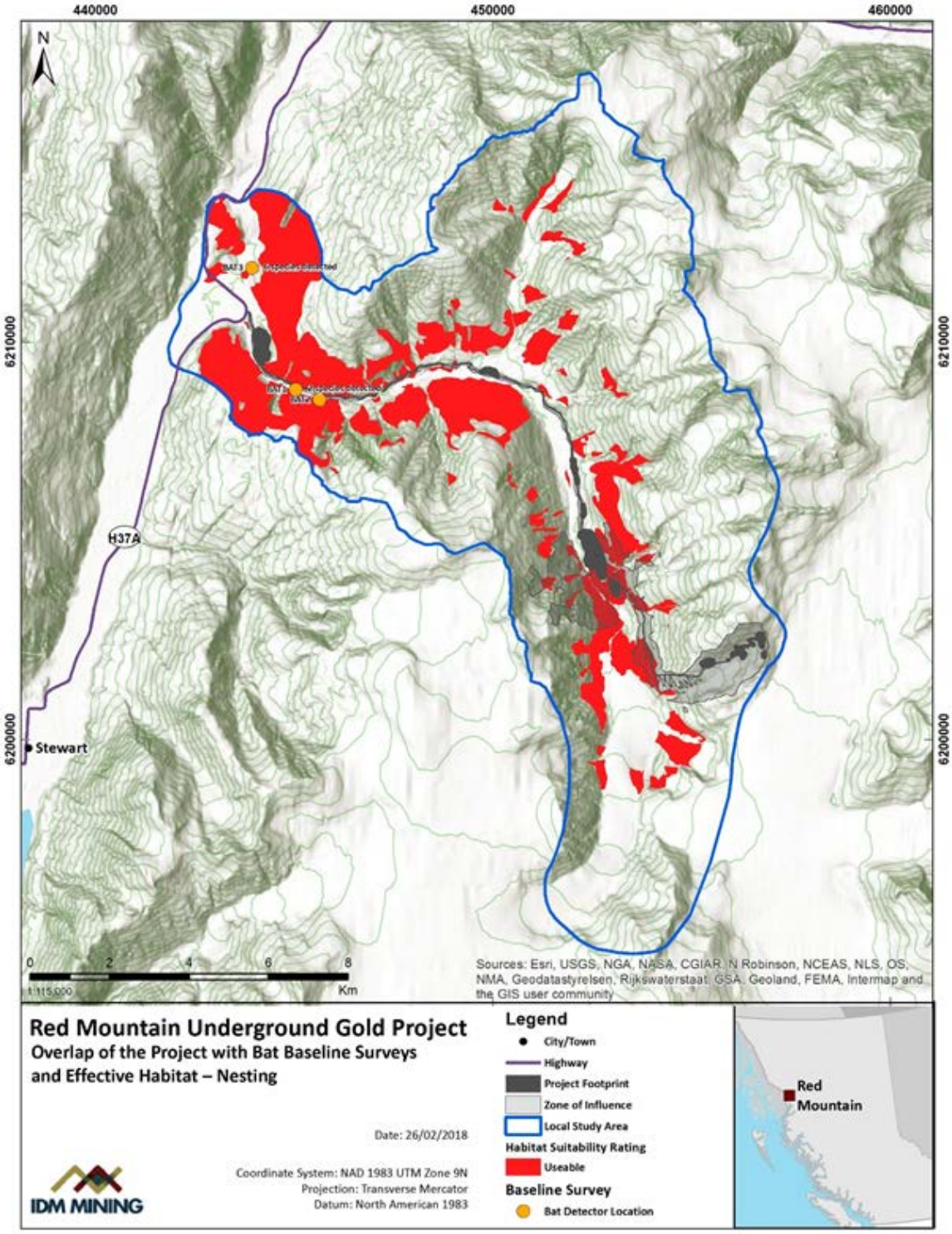
Lewis, S.E. 1995. Roost fidelity of bats: a review. Journal of Mammalogy 76:481-496.

Rabe, M.J., T.E. Morrell, H. Green, J.C. deVos, Jr., and C.R. Miller. 1998. Characteristics of ponderosa pine snag roosts used by reproductive bats in northern Arizona. Journal of Wildlife Management 62:612–621.

9.2.2 IDM Response to IR1-24(b)

Baseline data for bats (Figure 9-1, below) is presented for the breeding season indicating their general presence on the landscape during this period. The three species identified as focal VCs were considered resident species and assumed likely to be hibernating in BC, in the non-breeding season. A targeted search for hibernating habitat would likely be disturbing to any bats present and thus a more non-invasive approach was utilized, focusing on landforms that could have the potential for hibernating habitat. Habitat modelling focused on living growing habitat and included mature and old conifer forests near moist areas below 600 masl along with hibernacula landforms, such as cliff, talus, escape terrain, and rock outcrop habitats as usable non-breeding habitat (see Chapter 16, Section 16.4.4.6.5).

Figure 9-1 Bat Baseline



9.2.3 IDM Response to IR1-24(c)

The dispersal habitat of western toads has not been well defined. Metamorphs migrate en masse from their natal waterbody following metamorphosis. Western toads are at their highest densities in the terrestrial environment at this stage of metamporph dispersal (COSEWIC 2012). Metamorphs have been found to use drainages for dispersal (Bull 2009) but juveniles and adults can be found in a wide range of habitats, except for some unsuitable habitats such as xeric uplands or high alpine passes (COSEWIC 2012).

Western toads may move one kilometre or more from breeding sites to foraging and hibernation areas (PWTWG 2014); however, they have also been found up to 30 km from known breeding sites in northwestern BC (COSEWIC 2012). A review of the COSEWIC Assessment and Status Report (2012) indicates various dispersal distances in different locations:

- Northwest BC – up to 30 km from known breeding sites
- Vancouver Island – directional long-distance dispersal up to 7.2 km in less than 24 hours
- Alberta – hibernation sites located between 146 and 1936 m from breeding sites
- Oregon – hibernation sites located between 180 and 6230 m from breeding sites
- Idaho – greatest seasonal movement between a breeding site and a summer home range was 0.94 km by a male and 2.3 km by a female
- Montana – 2.9 km average in-stream summer movements, 13 km maximum movement.

In addition, the Environment and Climate Change Canada Management Plan (2016) notes that most western toads disperse within 2 km of breeding sites but much longer movements have occasionally been reported. In light of this information, a 2,000 m buffer is concluded to be a reasonable distance within which most dispersal of western toads would occur. For example, Semlitsch and Bodie (2003) and Bartlet et. al. (2004) suggest that a buffer around core wetlands and aquatic resources of 150 – 290 m should ensure the protection of a large percentage of western toad movement.

Though not explicitly stated in the literature, it is presumed that steep valley sides such as those in Bitter Creek and Bear River are not likely to be highly suitable for western toad dispersal. As noted above, drainages do appear to be important for metamorph dispersal.

For the Project, western toad dispersal habitat was modelled using the following assumptions:

- Dispersal (especially by metamorphs) is greatest within 2 km of suitable breeding habitat; and
- Steep valley side slopes do not make suitable dispersal habitat.

Thus, dispers-al habitat includes all areas within 2 km of suitable breeding habitat not including steep side slopes as presented in Figure 9-2, "Western Toad Dispersal Habitat". The figure also shows a 250 m buffer around all suitable breeding habitat as a reference for a buffer width suggested by Semlitsch and Bodie (2003) and Bartlet et. al. (2004).

As identified in Figure 9-2, much of the Project infrastructure overlaps potentially suitable western toad dispersal habitat; however, none is within 250 m of highly suitable habitat and a limited portion is within 250 m of moderately suitable habitat. IDM will apply mitigation measures as described in the Application/EIS and WMP, notably to identify western toad migration routes crossing the access or haul roads or other project infrastructure and use tools such as drift fences and culverts to direct migrating toads and minimize mortality risk.

References

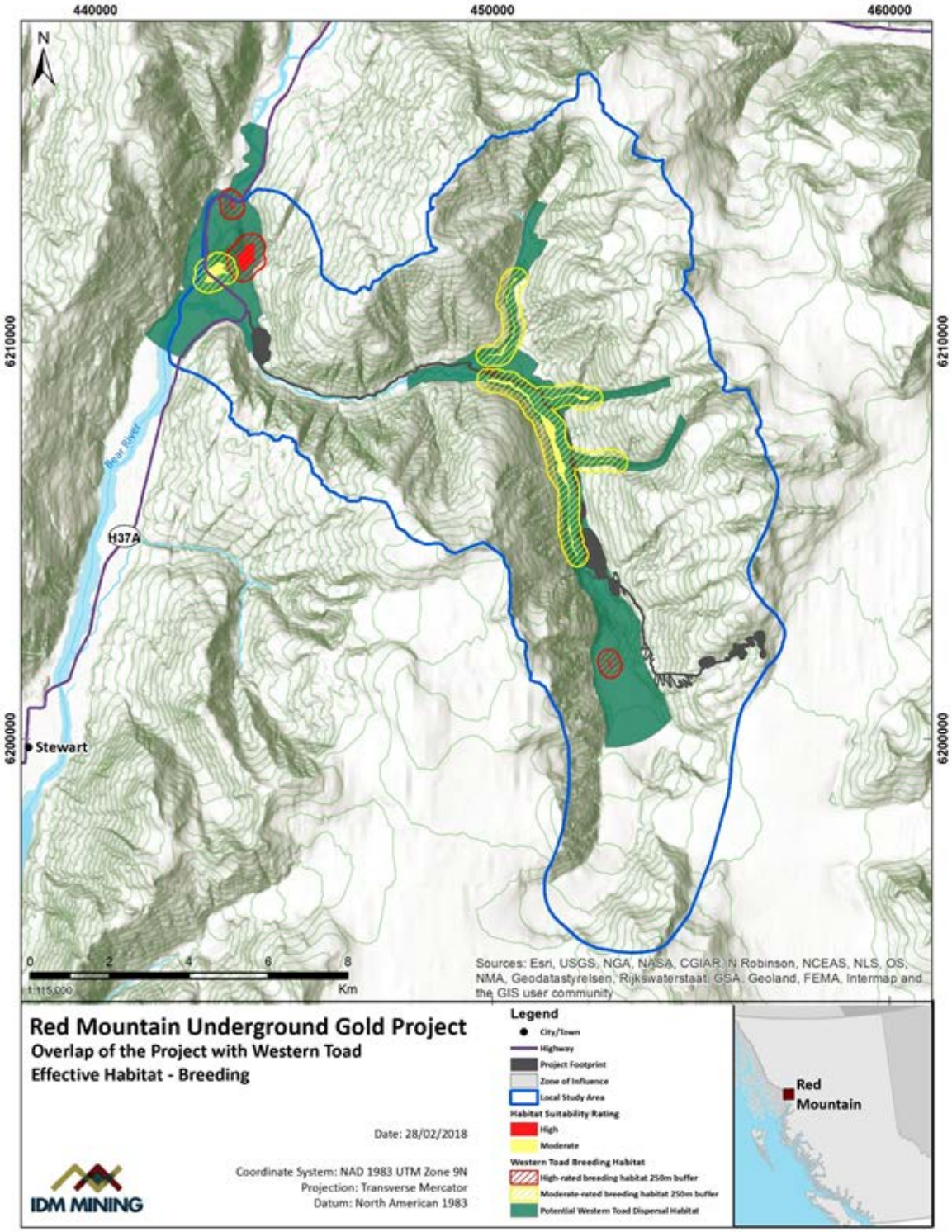
Bartlet, P.E., C.R. Peterson and R.W. Klaver. 2004. Sexual differences in the post-breeding movements and habitats selected by western toads (Bufo boreas) in southeastern Idaho. Herpetologica 60: 455-467.

Bull, E.L. 2009. Dispersal of newly metamorphosed and juvenile western toad (Anaxyrus boreas) in northeastern Oregon, USA. Herpetological Conservation and Biology 4: 236-247.

COSEWIC. 2012. COSEWIC Assessment and Status Report on the Western Toad Anaxyrus boreas in Canada. Committee on the Status of Endangered Wildlife in Canada. Xiv+pp.

Semlitsch, R.D. and J.R. Brodie. Biological criteria for buffer zones around wetlands and riparian habitats for: amphibians and reptiles. Conservation Biology 17: 1219-1228

Figure 9-2 Western Toad



10 IR1-25: BLACK SWIFT SURVEY PROTOCOL

10.1 Agency Information Request IR1-25

Rationale: *The EIS Guidelines (section 6.1.6) state that the EIS must describe the various ecosystems related to migratory bird habitat found in the Project area likely to be affected, and the movement corridors, habitat requirements, and key habitat areas of species at risk that may occur in the Project area (section 6.1.7).* This information is intended to assist the Agency in meeting subsection 79(2) of the *Species At Risk Act* which requires the Agency to identify the adverse effects of the Project on the listed wildlife species and its critical habitat.

The Agency has identified the following areas where there is uncertainty in the effects assessment for black swift:

- In November 2015 (see provincial Application Information Requirements tracking table dated 2016_11_04, comment 309), Canadian Wildlife Service (CWS) recommended that black swift surveys be conducted in accordance with the following CWS Black Swift Protocol (ECCC- CWS_Memo04_BlackSwiftProtocol_20150727). It is unclear whether this survey protocol was followed.

- Detailed information on the parameters of the habitat suitability model for black swift is not provided in the Chapter 16, Appendix 16-A, or in the black swift supplemental memo, as it is for other species. This makes it difficult to assess the habitat values provided in Chapter 16, table 16.7-12 (Summary of Change in Habitat Availability) and figure 16.7-21 (Overlap of the Project with Black Swift Effective Habitat – Nesting).

Requested Information:

a) Describe if and how the CWS Black Swift Protocol was incorporated into baseline survey methodology.

b) Describe the parameters of the habitat suitability model for black swift.

10.2 IDM Response to IR1-25

10.2.1 IDM Response to IR1-25(a)

The Canadian Wildlife Service Black Swift survey protocol was followed but was adapted to project objectives, including the following:

- Surveys were completed in late June, as opposed to July and August as recommended by the protocol.

- Surveys at each station lasted between 30 minutes and two hours in duration.

- The bulk of surveys were completed at dusk with opportunistic surveys completed during and after marbled murrelet surveys at dawn.

10.2.2 IDM Response to IR1-25(b)

The parameters for the Black Swift habitat suitability model were described in a memorandum titled "Red Mountain Underground Gold Project: Black Swift Baseline Summary" and dated May 4, 2017. The habitat suitability modeling methodology is described therein; the table below describes the key habitat requirements and ratings assumptions.

Table 10-1 Black Swift Key Habitat Requirements

General Habitat	Cliffs, steep canyons walls close to waterfalls
Key Habitat Requirements	
Flowing water, high relief, high ambient humidity, darkness, inaccessibility to predators Cliffs or rock outcrops near waterfalls.	
Ratings	**Assumptions**
U	CWHwm,MHmm1,MHmm2,MHmmp,ICHvc selection of Rock Cliff or Rock Outcrop which intersect streams; intersection of selected Rock Cliff and Rock outcrop 30m buffer with stream 30m buffer.
X	All habitats within other subzones and greater then 30m from rock cliff, rock outcrop or streams

11 IR1-26: MARBLED MURRELET CRITICAL HABITAT

11.1 Agency Information Request IR1-26

Rationale: *The EIS Guidelines (section 6.1.7 and 6.3.3) state that the EIS provide the key habitat areas of species at risk that may occur in the Project area to assess the potential effects of the Project on federally listed species at risk*. This information is intended to assist the Agency in meeting subsection 79(2) of the *Species At Risk Act* which requires the Agency to identify the adverse effects of the Project on the listed wildlife species and its critical habitat.

The Agency has identified the following areas where there is uncertainty in the effects assessment for marbled murrelet:

- Appendix 16-A and figure 4-63 identifies nesting habitat suitability. Map 2 in the supplemental memo provides updated habitat ratings. There appears to be contradictory habitat suitability ratings in the EIS and the memo.

- Chapter 16 and figure 16.7-23 provides an overlap of the Project footprint with habitat suitability models for marbled murrelet, and Appendix 16-A and figure 4-63 identifies critical habitat mapped as suitable nesting habitat. However, no figure was provided depicting the influence from the Project to marbled murrelet nesting habitat.

Requested Information:

a) Explain the differences between the nesting habitat described in Appendix 16-A and figure 4-63, as compared to map 2 in the supplemental memo.

b) Provide a map overlaying the critical habitat provided in Appendix 16-A and figure 4-56 with the Project footprint and zone of influence.

11.2 IDM Response to IR1-26

11.2.1 IDM Response to IR1-26(a)

The following clarifies the sources of information provided:

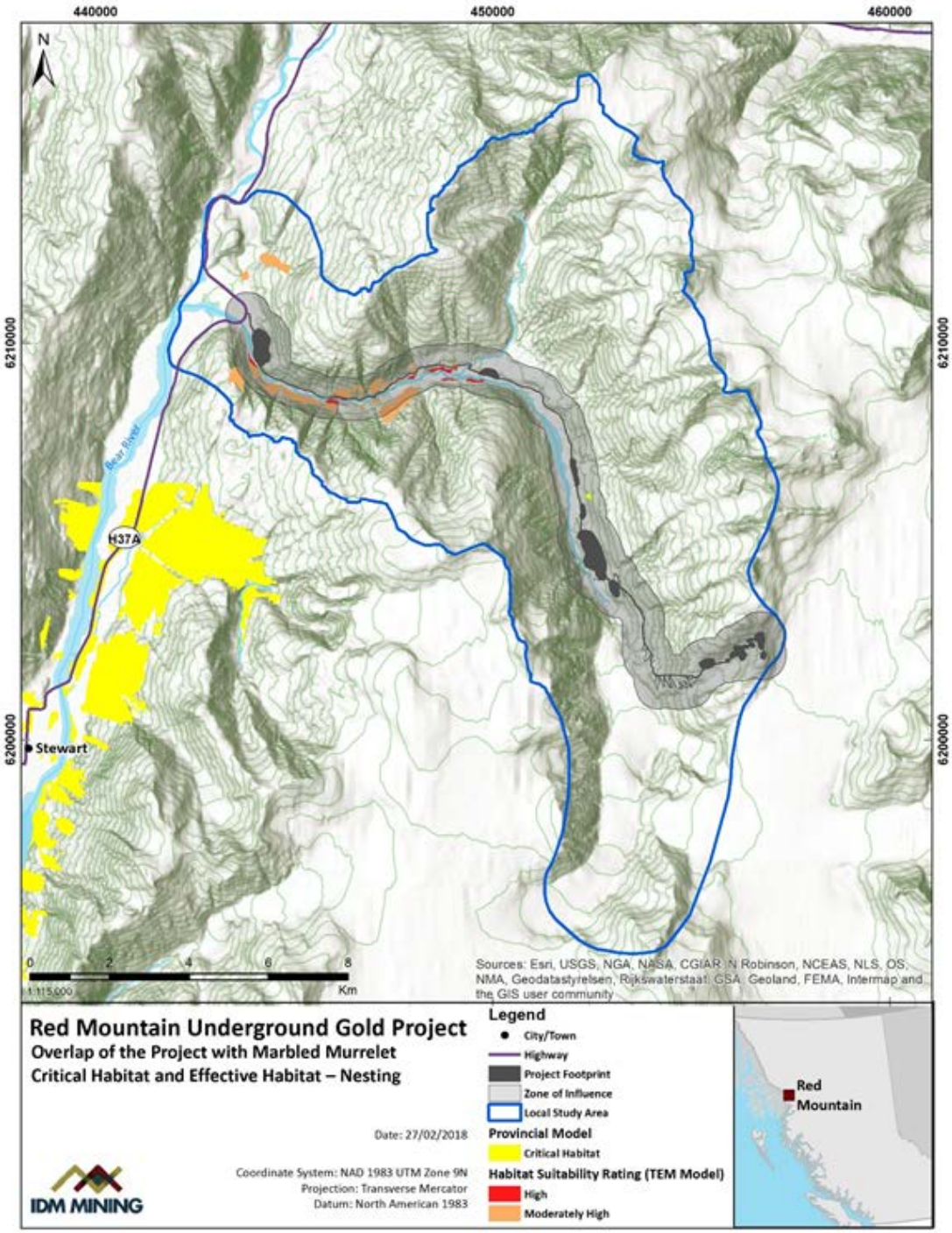
- The nesting habitat described in Appendix 16-A refers to the results of the TEM model within the LSA, as well as field verification results.

- Figure 4-63 provides the results of an aerial survey of a portion of the LSA in lower Bitter Creek.

- Map 2 in the supplemental memo provides the results of the TEM model within the LSA.

11.2.2 IDM Response to IR1-26(b)

Figure 11-1 Overlap of the Project with Marbled Murrelet Critical Habitat and Effective Habitat – Nesting



12 IR1-27: NEST PHENOLOGY OF MARBLED MURRELET

12.1 Agency Information Request IR1-27

Rationale: *The EIS Guidelines (section 6.1.7) state that the EIS must provide the general life history of species at risk that may occur in the Project area, or be affected by the Project.* This information is intended to assist the Agency in meeting subsection 79(2) of the *Species At Risk Act* which requires the Agency to identify the adverse effects of the Project on the listed wildlife species and its critical habitat.

Section 3.2.14 and 4.16 of Appendix 16-A state that detailed systematic searches for marbled murrelet were conducted in July 2016 around suitable nest trees identified during ground surveys to identify any egg shell fragments, and that no egg shells were found during searches around the 25 nest trees. However, the locations of these nest trees were not provided in the EIS.

Egg laying has been documented to occur between mid-May and late July in BC, with birds in northern latitudes sometimes initiating egg-laying later in that period (Nelson, K., 1997). As only one round of searches for egg shell fragments was performed in early July, and the EIS does not provide phenology information on the nesting period for marbled murrelet in the Project area, there is a high level of uncertainty for nest confirmation.

Reference: Nelson, S. Kim. 1997. Marbled Murrelet (Brachyramphus marmoratus), version 2.0. In The Birds of North America (P. G. Rodewald, editor). Cornell Lab of Ornithology, Ithaca, New York, USA. https://doi.org/10.2173/bna.276

Requested Information:

a) Provide a map overlaying the locations of the potentially suitable nest trees where eggshells searches were conducted, and the corrected habitat suitability maps.

b) Provide available nest phenology information for the Project area, and a description of the confidence in the egg shell surveys conducted in early July to detect nests in the Project area.

12.2 IDM Response to IR1-27

12.2.1 IDM Response to IR1-27(a)

IDM does not have the locations where eggshell searches were conducted and the work completed subsequently replaces this baseline work. Subsequent work is summarized in "Red Mountain Environmental Application: Supplemental Information – Marbled Murrelet and Black Swift Field Studies" (November 2017). The habitat suitability map for Marbled Murrelet provided in this report is the final suitability map produced for the Project.

12.2.2 IDM Response to IR1-27(b)

The nesting phenology for Marbled Murrelets in this area is not precisely known beyond the mid-May to late-July period indicated for the species. We have very low confidence in egg shell surveys to detect the presence of Marbled Murrelet nests. The lack of detection of any egg shell fragments was not interpreted as an absence of nests and did not influence and conclusions regarding the potential for the presence of the species within the LSA.