



### **Information Request 1**

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### **Responses to Information Request 1**

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## Information Request

### IR 1 – Cumulative Effects Assessment

#### References:

CEAA 2012; EIS Guidelines, Section 2.7.1.4; EIS, Section 2.8.3

#### Rationale:

Subsection 19(1) of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) requires a cumulative effects assessment to be completed for the Project:

“19. (1) The environmental assessment of a designated project must take into account the following factors:

(a) the environmental effects of the designated project, including ... **any cumulative environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out;**

(b) the significance of the effects referred to in paragraph (a)”. (emphasis added)

Accordingly, the EIS Guidelines (p. 34) state that “The Proponent shall identify and assess likely cumulative environmental effects of the Project... in combination with other past, present or reasonably foreseeable projects or activities...” Taseko is instructed in the Guidelines to consult the Cumulative Effects Assessment Practitioners Guide for further direction in this matter.

The Cumulative Effects Assessment Practitioners Guide provides the following guidance:

“A CEA, for a single project under regulatory review, should fundamentally do the following:

1. Determine if the project will have an effect on a VEC.
2. If such an effect can be demonstrated, determine if the incremental effect acts cumulatively with the effects of other actions, either past, existing or future.
3. Determine if the effect of the project, in combination with the other effects, may cause a significant change now or in the future in the characteristics of the VEC after the application of mitigation for that project.”

In Section 2.7.1.4 of the EIS (p. 395), the Proponent identifies three conditions that were applied to determine whether or not a cumulative effects assessment would be completed.

- “The project will result in a measurable, demonstrable or reasonably-expected residual environmental effect on a component of the biophysical or human

- environment (i.e., is there an environmental effect that can reasonably be expected to occur?).
- The project-specific residual environmental effect on that component does, or is likely to, act in a cumulative fashion with the environmental effects of other past or future projects and activities that are likely to occur (i.e., Is there overlap of environmental effects – i.e., A cumulative environmental effect?).
  - There is a reasonable expectation that the Project's contribution to cumulative environmental effects will affect the viability or sustainability of the resource or value.”

The first two conditions applied by Taseko are in accordance with the cumulative effects assessment requirements under the Act. The Proponent's third condition is not a requirement of the Act nor does it represent the directions provided in the EIS Guidelines or guidance documents. In the Panel's opinion, by applying the third condition, many VECs or key indicators for which a cumulative effects assessment is required by the Act have been excluded.

**Information Requested:**

The Panel requests that Taseko complete additional cumulative effects assessments for all those VECs and key indicators that were excluded in Taseko's cumulative effects assessments but for which:

1. there was a residual adverse project effect identified; and
2. the effects of other projects and activities act cumulatively.

As part of this additional assessment, Taseko should assess the cumulative effects of past forest harvesting activities that have contributed to effects that may be caused by the Project on VECs or key indicators.

**Information Request #1**

The Panel requests that Taseko complete additional cumulative effects assessments for all those VECs and key indicators that were excluded in Taseko's cumulative effects assessments but for which:

- i. there was a residual adverse project effect identified; and
- ii. the effects of other projects and activities act cumulatively.

As part of this additional assessment, Taseko should assess the cumulative effects of past forest harvesting activities that have contributed to effects that may be caused by the Project on VECs or key indicators.

**Response Summary**

Taseko has re-evaluated the significance of environmental effects of the Project on vegetation, wildlife, and resource uses having regard to other physical activities that have been or will be carried out, including forest harvesting activities. We conclude there is no significant environmental effect on these VECs.

With the exception of vegetation, wildlife and resource uses, the VEC's assessed in the 2012 EIS do not meet the criteria triggering a cumulative effects assessment. A rationale for each is provided in the discussion.

**Discussion**

As requested, further assessment of residual Project effects that could act cumulatively with those of other physical activities that have been or will be carried out is presented here. Residual Project effects that fall into this category, as identified in the 2012 EIS, are those on Vegetation, Wildlife and Resource Uses. A rationale is also provided as to why further assessment is not required with respect to other VECs; i.e. those for which affects do not act cumulatively with those of other projects and activities.

It is not clear whether Pine Beetle deforestation constitutes a physical activity as that term is used in Section 19 (1) a of CEA Act, 2012. In any case, the effects of Mountain Pine Beetle (MPB) have been incorporated into updated baseline values and considered in the context of future forest harvesting and effects on vegetation, wildlife and resource uses.

The effects of the Project are expected to act cumulatively with those of one physical activity; forest harvesting. The scale and spatial distribution of forest harvesting has been influenced in recent years by the mountain pine beetle (MPB) infestation. MPB "salvage logging" in the RSA has been the dominant factor driving forest harvesting compared to traditional forest harvest planning. The following discussion of cumulative effects describes the Project's contribution to cumulative effects on key indicators in this context. The discussion examines the cumulative

effects on key indicators in the baseline, project (maximum disturbance), and future cases. The baseline case has been updated from the 2009 EIS, using the most current data available to include the effects of harvesting and MPB to 2011. The future case cumulative effects are estimated semi-quantitatively based on the understanding that future harvesting will target salvage of areas subject to MPB infestation (Government of British Columbia 2013).

## **Vegetation**

In the assessment of vegetation resources, there were residual adverse project effects identified for the following key indicators:

- Old forest

- Wetland ecosystems

- Riparian ecosystems

- Grassland ecosystems

- Rare plants

- Rare ecosystems

- Country food plant species

As identified in Section 2.7.2.7 of the 2012 EIS, there is potential for forest harvesting activities and the natural infestation of MPB to interact cumulatively with the Project's effects to vegetation key indicators.

The cumulative effects of both past forest harvesting activities (based on the 2011 Vegetation Resources Inventory [VRI] dataset) and MPB (based on Hawkins [2013]) were analyzed to understand the contributions of these factors to effects that may be caused by the Project on vegetation key indicators. The areas of vegetation key indicators in the RSAs at baseline were updated to differentiate between areas that have been harvested to date, areas that have been subject to severe MPB infestation, and areas that remain intact at baseline. The areas of vegetation key indicators affected by the Project at both the maximum disturbance and post closure periods were similarly updated.

Effects of future harvesting are estimated semi-quantitatively based on the understanding that future harvesting will target salvage of areas subject to MPB infestation (Government of British Columbia 2013). As such, areas of severe MPB infestation at baseline represent areas of potential future harvesting. Therefore in the post closure scenario, pine dominated communities are considered to be lost to either harvesting or severely decayed due to MPB, while existing (undisturbed) non-pine stands are "grown" forward to the year 2053 and represent potential recruitment of additional old forest.

## ***Old Forest***

### *Baseline and Project Cases*

The Project's contribution to cumulative effects on old forest is small relative to the losses due to harvesting and MPB. Tables 1-1, 1-2, and 1-3 quantify the cumulative effects of past forest harvesting and MPB to old forest in the mine site, transmission corridor and access road RSA, respectively

As shown in Table 1-1, of the old forest in the mine site RSA at baseline, 134 ha have been harvested through forestry activities, and 5,107 ha are subject to severe MPB infestation, leaving 672 ha remaining intact with effectively all of that being non-pine. The project's incremental contribution to effects to old forest in the mine site RSA is the loss of approximately 177 ha of intact non-pine old forest at maximum disturbance which is 3.3 % of the cumulative loss of old forest from the Project, forest harvesting and MPB in the RSA.

Further, it is anticipated that non-pine forest stands currently (2011) not-severely infested by MPB will grow to contribute 12 ha towards old forest area within the mine site RSA over the next 44 years as current trees age.

**Table 1-1. Old Forest Areas in the Mine Site RSA**

Leading Tree Species	BEC Unit	Updated RSA Baseline – 2011 (ha)			Area Impacted within MDA Relative to Updated Baseline (ha)			Change in RSA at Post-Closure Relative to Updated Baseline (ha)	Final Area Remaining (Intact) at Post Closure
		Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Change in Area Remaining	Final Area Altered at Post Closure	
Lodgepole pine	MSxv	60	2,766	1	0	468	0	-1 <sup>c</sup>	0
	SBPSxc	60	2,341	0	0	285	0	0	0
Spruce	MSxv	8	0	494	2	0	-124	-119 <sup>d</sup>	375
	SBPSxc	6	0	137	0	0	-53	-49 <sup>d</sup>	88
Poplar	SBPSxc	0	0	33	0	0	0	3 <sup>d</sup>	37
Douglas fir	SBPSxc	0	0	7	0	0	0	0	7
<b>Total (All)</b>		<b>134</b>	<b>5107</b>	<b>672</b>	<b>2</b>	<b>753</b>	<b>-177</b>	<b>-165</b>	<b>507</b>
<b>Total (Non-Pine)</b>		<b>14</b>	<b>0</b>	<b>671</b>	<b>2</b>	<b>0</b>	<b>-177</b>	<b>-164</b>	<b>507</b>

**NOTES:**

<sup>a</sup> Harvesting since 2009 EIS based on 2011 VRI dataset

<sup>b</sup> Greater than 50% attack from mountain pine beetle (MPB) based on Hawkins (2013); MPB is assumed to affect only pine-leading stands

<sup>c</sup> Intact (remaining or undamaged) pine communities from baseline are considered to be 100% lost to MPB at post-closure

<sup>d</sup> Includes growing intact non-pine forest stands forward to the year 2053, therefore change at post-closure is less than at maximum disturbance for these stands.

As shown in Table 1-2, of the 5,810 ha of old forest reported in the transmission RSA at baseline in the 2009 EIS, approximately 1,140 ha have been harvested through forestry activities, while approximately 3,352 ha are subject to severe MPB infestation. The Project's incremental contribution to effects on old forest in the transmission line is the clearing of approximately 37 ha of non-pine old forest, which is 0.8% of the total effects from the Project, forest harvesting and MPB.

An important mitigation measure for this VEC along the transmission line is avoidance during final alignment and detailed design. Where feasible, the alignment of the transmission line will be such that it parallels and/or makes use of existing cleared areas and access roads; avoids old non-pine forest, wetlands and riparian areas; and, minimizes disturbance in grasslands.



**Table 1-2. Old Forest Areas in the Transmission Corridor RSA**

Leading Tree Species	BEC Unit	Updated RSA Baseline – 2011 (ha)			Area Impacted within ROW Relative to Updated Baseline (ha)		
		Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Change in Area Remaining
Lodgepole pine	ESSFxv2	157	348	0	10	12	0
	IDFdk4	0	30	0	0	2	0
	MSxv	613	2140	28	18	54	0
	SBPSmk	47	49	1	0	0	0
	SBPSxc	241	785	4	2	3	0
Spruce	ESSFxv2	21	0	230	2	0	-12
	MSxv	12	0	426	1	0	-7
	SBPSxc	29	0	186	0	0	-12
Douglas fir	IDFdk3	0	0	170	0	0	-5
	IDFdk4	4	0	164	0	0	-1
	IDFxm	0	0	5	0	0	0
	SBPSmk	16	0	82	0	0	0
	SBPSxc	0	0	22	0	0	0
<b>Total Old Forest (All Species)</b>		<b>1,140</b>	<b>3,352</b>	<b>1,318</b>	<b>-33</b>	<b>-100</b>	<b>-37</b>
<b>Total Old Forest (Non-Pine)</b>		<b>81</b>	<b>0</b>	<b>1,286</b>	<b>-3</b>	<b>0</b>	<b>-37</b>

**NOTES:**<sup>a</sup>Harvesting since 2009 EIS based on 2011 VRI dataset<sup>b</sup>Greater than 50% attack from mountain pine beetle (MPB) based on Hawkins (2013); MPB only considered an effect to pine-leading stands

As shown in Table 1-3, of the 1,926 ha of old forest reported in the access road RSA at baseline in the 2009 EIS, 513 ha have been harvested through forestry activities, 980 ha are subject to severe MPB infestation, and 433 ha remains intact. This will remain intact as the Project's incremental contribution to effects to old forest in the RSA and through minor modifications to the road can be avoided in final design.

**Table 1-3. Old Forest Areas in the Access Road RSA**

Leading Tree Species	BEC Unit	Updated RSA at Baseline - 2011 (ha)		
		Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)
Lodgepole pine	MSxv	268	150	2
	SBPSxc	227	830	72
Spruce	MSxv	10	0	105
	SBPSxc	8	0	29
Douglas-fir	IDFdk4	0	0	165
	IDFxm	0	0	60
<b>Total Old Growth Forest (All Species)</b>		<b>513</b>	<b>980</b>	<b>433</b>
<b>Total Old Growth Forest (Non-Pine)</b>		<b>18</b>	<b>0</b>	<b>359</b>

**NOTES:**

<sup>a</sup>Harvesting since 2009 EIS based on 2013 VRI dataset

<sup>b</sup>Greater than 50% attack from mountain pine beetle (MPB) based on Hawkins (2013); Mountain pine beetle only considered an effect to pine-leading stands.

*Future Case*

In the future, severe MDP infestation is predicted for all pine dominated stands that are not yet severely infected at baseline, including those within the MDA. In response to the mountain pine beetle outbreak in British Columbia, forest harvesting has shifted to focus on dead pine (i.e. salvage harvesting), and will continue to do so until it is not economically feasible (*British Columbia's Mountain Pine Beetle Action Plan 2006-2011*)<sup>1</sup>. As such, it is predicted that future

<sup>1</sup> [http://www.for.gov.bc.ca/hfp/mountain\\_pine\\_beetle/actionplan/2006/Beetle\\_Action\\_Plan.pdf](http://www.for.gov.bc.ca/hfp/mountain_pine_beetle/actionplan/2006/Beetle_Action_Plan.pdf)

forest harvesting activities will have negligible effects on the “intact” areas of old forest (non-pine) in the RSA, but will rather shift areas from being classified as “severely impacted by MPB” to “harvested.”. In other words the effects of the Project on non-pine old forest are not likely to overlap with forestry harvesting effects on non-pine old forest. Project effects on pine old forest will be on dead or severely affected pine, as will forest harvesting. Both physical activities, the Project and forest harvesting will be affecting pine old forest that is, or will be dead in the absence of either activity.

At this time, there are no existing or other planned industrial facilities or physical activities within the RSA. As a result, there is no likelihood of overlap of old forest effects with similar environmental effects from other existing or planned physical activities in the area.

The result of the 2012 assessment is that there is no significant effect of the Project on old forest.

### ***Wetland ecosystems***

#### ***Baseline and Project Cases***

There is limited potential for cumulative effects on wetlands as harvesting targets forested ecosystem types; 84.2% of the mine site RSA wetlands are non-forested,

As shown in Table 1-4, harvesting and MPB have limited cumulative interactions with wetlands in the mine site. Of the 2,072 ha of wetland ecosystems reported in the mine site RSA at baseline in the 2009 EIS, only 8 ha have been harvested through forestry activities, while 283 ha are potentially subject to severe MPB infestation. Although, considering that pine is not usually the leading species in these identified wetlands, the actual effect from MPB to these ecosystems are unlikely to be severe.

Of the wetlands affected by the Project at maximum disturbance, 1 ha has been previously logged and 71 ha have been previously potentially affected by MPB. Of the wetlands affected by the Project at post closure, 1 ha will have been previously harvested and 52 ha will have been potentially affected by MPB. But again, as stated above the actual effect on these ecosystems as a result of MPB will be minimal ecologically. As such, interactions with forestry and MPB are small relative to the residual effect of the Project.

**Table 1-4. Wetland Ecosystem Areas in the Mine Site RSA**

Wetland Ecosystem	Updated RSA at Baseline - 2011 (ha)			Area Impacted within MDA Relative to Updated Baseline (ha)			Change in RSA at Post-Closure Relative to Updated Baseline (ha)			Final Area Remaining at Post Closure <sup>c</sup> (ha)
	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Change in Area Remaining	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Final Area Altered at Post-Closure	
<b>Fen</b>										
Water sedge – Beaked sedge	0	0	743	0	0	-146	0	0	-125	618
Willow – Scrub birch – Sedge	0	0	639	0	0	-128	0	0	-85	554
<i>Fen Total</i>	0	0	1,382	0	0	-274	0	0	-210	1172
<b>Swamp</b>										
Drummond's willow – Sedge	0	0	4	0	0	-3	0	0	-2	2
Sxw – Horsetail – Crowberry	8	141	93	1	57	-73	1	40	-10	191
Sxw – Horsetail – Glow moss	0	76	25	0	12	-14	0	10	-2	89
Sxw – Horsetail – Meadowrue	0	60	34	0	0	0	0	0.0	0	94
Sxw – Labrador tea – Willow	0	2	1	0	2	-3	0	2	-1	0
<i>Swamp Total</i>	8	279	157	1	71	-93	1	52	-15	376
<b>Shrub-Carr</b>										
Grey-leaved willow – Glow moss	0	0	173	0	0	-38	0	0	-32	141
<i>Shrub-Carr Total</i>	0	0	173	0	0	-38	0	0	-32	141
<b>Other</b>										
Open Water	0	0	59	0	0	-1	0	0	-1	58
TRIM Marsh	0	0	9	0	0	0.0	0	0	0.0	9
TRIM Swamp	0	4	1	0	0	0.0	0	0	0.0	5
<i>Other Total</i>	0	4	69	0	0	-1	0	0	-1	72
<b>Grand Total</b>	<b>8</b>	<b>283</b>	<b>1,781</b>	<b>1</b>	<b>71</b>	<b>-407</b>	<b>1</b>	<b>52</b>	<b>-258</b>	<b>1760</b>

**NOTES:**

<sup>a</sup> Harvesting of treed swamps and TRIM swamps since 2009 EIS based on 2011 VRI dataset

<sup>b</sup> Greater than 50% attack from mountain pine beetle (MPB) based on Hawkins (2013); MPB only applicable to treed swamps and TRIM swamps

<sup>c</sup> Includes all wetland ecosystems remaining in the RSA at post closure, including those subject to harvesting and MPB in 2011.

As shown in Table 1-5, harvesting and MPB have limited cumulative interactions with wetlands in the transmission corridor RSA. Of the 1,870 ha of wetland ecosystems reported in the transmission corridor RSA at baseline in the 2009 EIS, 42 ha have been harvested through forestry activities and 203 ha are potentially subject to severe MPB infestation. Pine is not generally a leading species in wetland ecosystems, and so the overall ecological effect on these ecosystems is minimal.

Of the wetlands affected by the Project due to clearing of the ROW, 1 ha has been previously harvested and 4 ha have been potentially previously affected by MPB. As such, the Project, harvesting and MPB in combination affect only 41 ha (2.2%) of wetland ecosystems in the transmission RSA.

An important mitigation measure for this VEC along the transmission line is avoidance during final alignment and detailed design. Where feasible, the alignment of the transmission line will be such that it parallels and/or makes use of existing cleared areas and access roads; avoids old non-pine forest, wetlands and riparian areas; and, minimizes disturbance in grasslands.

**Table 1-5. Wetland ecosystem Areas in the transmission RSA**

Wetland Class	Updated RSA Baseline – 2011 (ha)			Area Impacted within ROW Relative to Updated Baseline (ha)		
	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Change in Area Remaining
Fen	0	0	679	0	0	-15
Swamp	42	203	273	1	4	-5
Marsh	0	0	42	0	0	-1
Shrub-carr	0	0	301	0	0	-17
Saline Meadow	0	0	19	0	0	-2
Open Water	0	0	311	0	0	-1
<b>Grand Total</b>	<b>42</b>	<b>203</b>	<b>1,625</b>	<b>1</b>	<b>-</b>	<b>-41</b>

**NOTES:**

<sup>a</sup>Harvesting of swamps since 2009 EIS based on 2011 VRI dataset

<sup>b</sup>Greater than 50% attack from mountain pine beetle (MPB) based on Hawkins (2013); MPB only applicable to swamps

As shown in Table 1-6, harvesting and MPB have limited interaction with wetlands in the access road RSA. Of the 1,040 ha of wetland ecosystems reported in the access road RSA at baseline in the 2009 EIS, 8 ha have been harvested through forestry activities, and 45 ha are potentially subject to severe MPB infestation. The effect is minimal as pine is not generally a leading species in wetland ecosystems. The residual effects of the Project on wetlands are very small, and through minor modifications to the road can be avoided in final design. There is limited potential for cumulative interaction between the small effects from the Project, harvesting and MPB.

**Table 1-6. Wetland Ecosystem Areas in the Access Road RSA**

Wetland Class	Updated RSA Baseline – 2011 (ha)		
	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)
Fen	0	0	420
Swamp	7	42	91
Marsh	0	0	27
Shrub-carr	0	0	217
Saline Meadow	0	0	150
Open Water	0	0	39
TRIM Marsh	0	0	41
TRIM Swamp	1	3	2
<b>Grand Total</b>	<b>8</b>	<b>45</b>	<b>987</b>

**NOTES:**

<sup>a</sup>Harvesting of swamps since 2009 EIS based on 2011 VRI dataset

<sup>b</sup>Greater than 50% attack from mountain pine beetle (MPB) based on Hawkins (2013); MPB only applicable to swamps

### *Future Case*

Future harvesting and MPB are predicted to have no direct effects on the areal extent of wetlands, and thus do not have potential to change wetland functions through changes in structural stage and species composition. Overall potential changes to wetland function will be minimal as effects from past harvesting and MPB have been restricted to spruce dominated swamps which have a low abundance of pine. As such, there will be limited changes to hydrological or habitat function in these ecosystems and that trend is expected to continue for future impacts.

### *Determination of Significance of Effects*

Future forest harvesting, including salvage logging of areas affected by MPB is predicted to have minimal effects on wetland ecosystems as they will not decrease the areal extent of wetland ecosystems and are predicted to change the wetland functions of only a small proportion of the wetlands in the RSAs. Section 2.7.2.7 of the 2012 Prosperity EIS, as well as the response to IR 31, discuss the Project effects to wetlands.

The Project's contribution to cumulative effects is small, and having regard to potential cumulative effects with other physical activities including forest harvesting, there is no significant effect of the Project on the wetland ecosystems.

### ***Riparian ecosystems***

#### *Baseline and Project Cases*

Past and future forest harvesting activities are not expected to have substantive cumulative interactions with riparian ecosystems, as provisions in the Forest Planning and Practices Regulation under the *Forest and Range Practices Act* are designed to avoid ecosystem loss and minimize indirect environmental effects to riparian areas. As such, of the 3,132 ha of riparian ecosystems in the mine site RSA at baseline in the 2009 EIS, only 104 ha have been harvested in the intervening years, while 2,197 ha have been severely infected by MPB (Table 1-7).

As a result of the Project, the residual effect to riparian ecosystems in the mine site RSA is the loss of 145 ha of intact riparian ecosystems at maximum disturbance. This area constitutes 5.9% of the cumulative effects of the Project, harvesting and MPB on riparian ecosystems. Riparian buffers will be established around Pit Lake and permanent water features at post-closure, resulting in a reduction of riparian impact to 107 ha in post-closure.

Through planning and implementation of the Habitat Compensation Plan (see IR 32), Taseko aims to fully mitigate Project-related residual adverse effects and achieve no net loss of wetland/riparian functions

**Table 1-7. Riparian Ecosystems Areas in the Mine Site RSA**

Riparian Type	Updated RSA Baseline – 2011 (ha)			Area Impacted within MDA Relative to Updated Baseline (ha)			Change in RSA at Post-Closure Relative to Updated Baseline (ha)			Final Area Remaining at Post Closure <sup>c,d</sup> (ha)
	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)	Area Recently Harvested	Area Severely Infected by MPB <sup>b</sup>	Change in Area Remaining	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Change in Area Remaining	
TRIM rivers, marshes and swamps	52	949	250	1	144	-20	1	87	-13	1,151
30 m buffer adjacent to wetland ecosystems <sup>c</sup>	51	1,248	581	3	272	-125	2	214	-94	1,569
<b>Riparian Total</b>	<b>103</b>	<b>2,197</b>	<b>831</b>	<b>3</b>	<b>416</b>	<b>-145</b>	<b>3</b>	<b>301</b>	<b>-107</b>	<b>2,720</b>

**NOTES:**

<sup>a</sup>Harvesting since 2009 EIS based on 2011 VRI dataset

<sup>b</sup>Greater than 50% attack from mountain pine beetle (MPB) based on Hawkins (2013);

<sup>c</sup>For both the 2009 Prosperity EIS and 2012 New Prosperity EIS, riparian buffers were put on Pit Lake and permanent water features (Diversion Ditches, Sediment Ponds and TSF Lake)

<sup>d</sup>These totals include both those ecosystems still intact but also riparian ecosystems that have been logged or severely infested by MPB within the RSA as of 2011. The logged and MPB areas outside of the MDA have not been "lost," rather their structure and composition has been altered. So they are still remaining at PC



As shown in Table 1-8, harvesting and MPB have limited cumulative interactions with riparian ecosystems in the transmission corridor RSA. Of the 5,068 ha of riparian ecosystems reported in the transmission corridor RSA at baseline in the 2009 EIS, 372 ha have been harvested through forestry activities and 1,876 ha are subject to severe MPB infestation. Of the riparian areas affected by the Project due to clearing the ROW, 9 ha will be harvested and 43 ha will be affected by MPB. As currently planned, the Project will be clearing 77 ha of intact riparian area, which is relatively small compared to the amount of harvesting and MPB infestation. However before the construction phase most of these identified riparian communities will also be avoided as part of pre-survey design and route planning. As such, the overall cumulative effect of the Project on riparian areas within the transmission line will be negligible.

**Table 1-8. Riparian Ecosystem Areas in the Transmission Corridor RSA**

Riparian Type	Updated RSA Baseline – 2011 (ha)			Area Impacted within ROW Relative to Updated Baseline (ha)		
	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Change in Area Remaining
Riparian SEI	0	16	339	0	0	-12
TRIM rivers, marshes and swamps	264	992	1,776	6	23	-47
30 m buffer adjacent to wetland ecosystems	108	867	705	3	20	-18
<b>Grand Total</b>	<b>372</b>	<b>1,875</b>	<b>2,820</b>	<b>9</b>	<b>-43</b>	<b>-77</b>

**NOTES:**

<sup>a</sup> Harvesting since 2009 EIS based on 2011 VRI dataset

<sup>b</sup> Greater than 50% attack from mountain pine beetle (MPB) based on Hawkins (2013);

As shown in Table 1-9, of the 586 ha of riparian ecosystems reported in the access road RSA at baseline in the 2009 EIS, 23 ha have been harvested through forestry activities, and 138 ha have been subject to severe MPB infestation. These two factors affect approximately 25% of the riparian ecosystems in the access road RSA by changing the structural stage and composition of the communities; they will not result in the direct loss of any riparian ecosystems.

**Table 1-9. Riparian Ecosystem Areas in the Access Road RSA**

Riparian Type	Updated RSA Baseline – 2011 (ha)		
	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)
Riparian TEM	16	90	314
TRIM rivers, marshes and swamps	7	42	91
30 m buffer adjacent to wetland ecosystems	0	5	21
<b>Grand Total</b>	<b>23</b>	<b>137</b>	<b>426</b>

**NOTES:**

<sup>a</sup>Harvesting since 2009 EIS based on 2011 VRI dataset

<sup>b</sup>Greater than 50% attack from mountain pine beetle (MPB) based on Hawkins (2013);

A total of 426 ha of riparian ecosystems remain intact in the access road RSA. Most of this area will remain intact as the Project's incremental contribution to effects to riparian ecosystems in the RSA and through minor modifications to the road can be avoided in final design.

*Future Case*

Future forest harvesting activities are not expected to have substantive cumulative interactions with riparian ecosystems, as provisions in the Forest Planning and Practices Regulation under the *Forest and Range Practices Act* are designed to avoid ecosystem loss and minimize indirect environmental effects to riparian areas. Future MPB infestation will not affect the areal extent of riparian ecosystems, but may lead to indirect effects through changes in community structure and species composition.

### *Determination of Significance of Effects*

Neither harvesting nor MPB lead to direct ecosystem loss, and indirect effects through harvesting are minimized by the forestry sector being required to follow setbacks from riparian areas under the Forest Planning and Practices Regulation. Although there is some cumulative interaction with future forest harvesting, including salvage logging of areas affected by MPB, the Project's incremental contribution to cumulative effects on riparian ecosystems is predicted to be small.

Having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on riparian ecosystems.

### *Grassland ecosystems*

As noted in section 2.7.2.7 of the 2012 EIS, forest harvesting and MPB are not expected to contribute negatively to cumulative effects on grassland ecosystems. Project effects on grassland ecosystems are not significant as well, with a loss of only 1% of identified grasslands. Positive effects on grasslands are possible as harvesting of timbered areas within Grassland Benchmark Areas in the RSA will facilitate restoration of open grassland conditions, following the land use objectives of the Cariboo Chilcotin Land Use Plan (2011).

A mitigation measure for this VEC along the transmission line is avoidance during final alignment and detailed design. Where feasible, the alignment of the transmission line will be such that it parallels and/or makes use of existing cleared areas and access roads; avoids old non-pine forest, wetlands and riparian areas; and, minimizes disturbance in grasslands.

At this time, there are no existing or other planned industrial facilities or physical activities within the RSA. As a result, there is no likelihood of overlap of grassland ecosystems with similar environmental effects from other existing or planned physical activities in the area.

The conclusion of the 2012 assessment is that there is no significant effect on grassland ecosystems.

### *Rare plants*

Birdfoot buttercup (*Ranunculus pedatifidus* spp. *affinis*) is the only rare plant assessed as having residual Project effects. Since it is associated with non-forested wetlands, Project effects on it are unlikely to act cumulatively with effects due to harvesting activities or MPB attack.

At this time, there are no existing or other planned industrial facilities or physical activities within the RSA. As a result, there is no likelihood of overlap of effects on birdfoot buttercup with similar environmental effects from other existing or planned physical activities in the area.

The conclusion of the 2012 assessment is that there is no significant effect on rare plants.

***Rare ecosystems******Baseline and Project Cases***

Residual Project effects to rare ecosystems in the mine site RSA are small and the Project is not expected to result in a measurable change in the availability of rare ecosystems. In addition, other reasonably foreseeable activities that could make a substantive contribution to cumulative environmental effects on rare ecosystems, such as forest harvesting, including salvage logging of areas affected by MPB, are likely to cause changes in structural stage and species composition, rather than direct changes to the areal extent of these communities in the RSA.

As shown in Table 1-10, Project effects to the red listed lodgepole pine – trapper’s tea – crowberry community are small relative to the effect from MPB attack, affecting only 0.1 ha of current intact ecosystem at maximum disturbance (which is expected to be infested in the absence of the Project).

**Table 1-10. Rare Ecosystems Areas in the Mine Site RSA**

Rare Ecosystems			Updated RSA Baseline - 2011 (ha)			Area Impacted within MDA Relative to Updated Baseline (ha)		
BC List	BEC Unit/ Map Code	Site Series Name	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Change in Area Remaining
Red	MSxv05 LT	Lodgepole pine- Trapper's Tea- Crowberry	0	335	7	0	4	0
Blue	SBPSxc06 SM	White spruce- horsetails-western meadowrue	0	0	95	0	0	0
<b>Total</b>			<b>0</b>	<b>335</b>	<b>102</b>	<b>0</b>	<b>4</b>	<b>0</b>

**NOTES:**

<sup>a</sup> Harvesting since 2009 EIS based on 2011 VRI dataset

<sup>b</sup> Greater than 50% attack from mountain pine beetle (MPB) based on Hawkins (2013);

As shown in Table 1-11, harvesting and MPB have limited cumulative interactions with rare ecosystems in the transmission corridor RSA. Harvesting and MPB infestation have affected 40 and 470 ha respectively in the transmission corridor RSA during the intervening years. The Project's incremental contribution to effects to rare ecosystems in the transmission corridor is small relative to the effects from harvesting and MPB. Table 1-11 presents the potential clearing of 62 ha as a result of the Project; however, Taseko is committed to avoiding rare ecosystems within this ROW during detailed planning and design as feasible. Furthermore environmentally sensitive construction practices (identified in IR 34b), will be adopted and implemented in order to avoid the loss of identified rare ecosystems along the transmission line ROW.

**Table 1-11. Rare Ecosystem Areas in the Transmission Corridor RSA**

Rare Ecosystems			Updated RSA Baseline - 2011 (ha)			Area Impacted within ROW Relative to Updated Baseline (ha)		
BC List	Map Code	Site Series Name	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Change in Area Remaining
Red	BGxh3/00 SS	Sand dropseed – needle-and-thread grass			24			
Red	BGxh3/01 SW	Big sagebrush – bluebunch wheatgrass			301			7
Red	BGxw2/00 SP	Big sagebrush - Bluebunch wheatgrass			36			1
Red	BGxw2/01 WN	Bluebunch wheatgrass - Needle and thread grass			344			11
Red	IDFdk3/Gs02 AF	Nuttall's alkaligrass - foxtail barley	1	0.1	6			1
Red	IDFdk3/02 DK	Douglas-fir–Rocky Mountain juniper / kinnikinnick	0	1.2	10			
Red	IDFdk4/Gs02 AF	Nuttall's alkaligrass - foxtail barley	2	3.3	40	0	0.1	1
Red	IDFdk4/Wm07 RM	Baltic rush <sup>2</sup>	01	0.1	3			
Red	IDFdk4/00 WB	Bluebunch wheatgrass - Balsamroot	0.1	7.6	31		0.3	0
Red	IDFxm/00 AN	Trembling aspen - spreading needlegrass - old man's whiskers			5			0
Red	IDFxm/03 DJ	Douglas-fir - common juniper - clad lichens			28			

<sup>2</sup> Baltic rush may represent either the red listed Baltic rush – Common silverweed community or the blue listed Baltic rush – Field sedge community in the IDFdk4. It is listed in Table1-11 as red to be conservative.

Rare Ecosystems			Updated RSA Baseline - 2011 (ha)			Area Impacted within ROW Relative to Updated Baseline (ha)		
BC List	Map Code	Site Series Name	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Change in Area Remaining
Red	IDFxm/00 GR	Alkali saltgrass - Nuttall's alkaligrass			2			0
Red	IDFxm/00 PP	Northern wormwood - Short-awned porcupinegrass	0.5		179			3
Red	IDFxm/07 RS	Douglas-fir - prickly rose - wild sarsaparilla	0.4	4.2	8	<0.1	0.4	0
Red	MSxv/05 LT	Lodgepole pine - trapper's tea - crowberry	0.2	0.5	6	<0.1	<0.1	1
<b>Red Total</b>			<b>3.9</b>	<b>17.0</b>	<b>1,022.8</b>	<b>0.1</b>	<b>0.8</b>	<b>26.0</b>
Blue	ESSFxv2/Wf02 WB	Scrub birch – water sedge fen		0.4	0		0.1	
Blue	IDFdk3/Wm06 BU	Hard-stemmed bulrush deep marsh	<0.1	0.1	2			0
Blue	IDFdk3/Wm05 CT	Cattail marsh	0.1	0.5	1			
Blue	IDFdk3/03 DJ	Douglas-fir - Rocky Mountain juniper - shrubby penstemon		1.8	8			
Blue	IDFdk3/05 DM	Douglas-fir - red-stemmed feathermoss - step moss	0.6	0.3	38	0.1		2
Blue	IDFdk3/04 DW	Douglas-fir - bluebunch wheatgrass - stiff needlegrass	0.9	0.5	8			
Blue	IDFdk3/08 SS	White spruce - prickly rose - wild sarsaparilla	2.2	8.6	59	<0.1	0.2	4
Blue	IDFdk3/Wf02 SW	Scrub birch - Water sedge fen	0.2	0.8	1	0.1		0
Blue	IDFdk3/Ws05	MacCalla's Willow - Beaked Sedge OR Tall	0.1	2.7	5		0.1	0



Rare Ecosystems			Updated RSA Baseline - 2011 (ha)			Area Impacted within ROW Relative to Updated Baseline (ha)		
BC List	Map Code	Site Series Name	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Change in Area Remaining
	TS	Willows – Sartwells’s sedge						
Blue	IDFdk4/Wm06 BU	Hard-stemmed bulrush deep marsh	<0.1	1.8	31			
Blue	IDFdk4/03 DJ	Douglas-fir - Rocky Mountain juniper - prairie sagewort <sup>3</sup>	1.0	13.8	8		0.2	0
Blue	IDFdk4/07 DM	Douglas-fir - red-stemmed feathermoss - step moss	1.8	38.9	11		1.4	
Blue	IDFdk4/04 DS	Douglas-fir - Rocky Mountain juniper - prairie sagewort		<0.1	1			
Blue	IDFdk4/05 DW	Douglas-fir - bluebunch wheatgrass - pinegrass	0.9	17.5	46		0.8	1
Blue	IDFdk4/02 JP	Douglas-fir - Rocky Mountain juniper - shrubby penstemon	0.5	4.4	2			0
Blue	IDFdk4/00 NP	Spreading needlegrass - Pussytoes	<0.1	4.2	23			2
Blue	IDFdk4/00 NR	Spreading needlegrass - Baltic rush	0.5	11.6	113		0.1	2
Blue	IDFdk4/09 SF	White spruce - red-stemmed feathermoss - ragged-mosses	4.8	34.1	70	0.2	1.1	2
Blue	IDFdk4/Wf02 SW	Scrub birch - Water sedge fen	<0.1	0.3	3			0
Blue	IDFdk4/Ws05 TS	MacCalla's Willow - Beaked Sedge	8	12.8	78	0.1	0.1	2
Blue	IDFxm/Wm04 CM	Common spike rush marsh			1			

<sup>3</sup> TEM map units IDFdk4/03 DJ and IDFdk4/04 DS have the potential to include or represent the BC CDC rare community Douglas fir – Rocky Mountain juniper – prairie sagewort community.

Rare Ecosystems			Updated RSA Baseline - 2011 (ha)			Area Impacted within ROW Relative to Updated Baseline (ha)		
BC List	Map Code	Site Series Name	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Change in Area Remaining
Blue	IDFxm/05 DM	Douglas-fir - red-stemmed feathermoss - step moss	1		112	<0.1		3
Blue	IDFxm/06 DR	Douglas-fir - red-stemmed feathermoss - step moss	0.1		1			
Blue	IDFxm/04 DS	Douglas-fir - Rocky Mountain juniper - prairie sagewort	0.5		88			3
Blue	IDFxm/02 DW	Douglas-fir - Rocky Mountain juniper - shrubby penstemon			46			
Blue	IDFxm/00 NG	Spreading needlegrass - Sticky purple geranium	<0.1		9			1
Blue	IDFxm/00 NP	Spreading needlegrass OR Spreading needlegrass – pussytoes	1.5	235.2	237			13
Blue	IDFxm/00 NR	Spreading needlegrass - Baltic rush	0.4		0			
Blue	IDFxm/08 SS	Hybrid white spruce - prickly rose - palmate coltsfoot	0.3	1.3	41			1
Blue	MSxv/Wf02 BW	Scrub birch - Water sedge fen	0.9	8.8	18		<0.1	0
Blue	MSxv/02 LF	PI - Altai fescue - foam lichens	3	0.35				
Blue	MSxv/Wf08 MS	Shore sedge - Buckbean - Hook moss	0.1	27.9	70		0.4	1
Blue	SBPSxc/Wf02 BW	Scrub birch - Water sedge fen	0.5	3.4	34		0.1	0
Blue	SBPSxc/06 SM	White spruce - horsetails - western meadowrue	4.9	18.1	5		0.1	

Rare Ecosystems			Updated RSA Baseline - 2011 (ha)			Area Impacted within ROW Relative to Updated Baseline (ha)		
BC List	Map Code	Site Series Name	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Change in Area Remaining
Blue	SBPSxc/Ws05 TS	MacCalla's Willow - Beaked Sedge OR Tall willows – Sartwell's sedge	0.1	3.1	11			
<b>Blue Total</b>			<b>34.9</b>	<b>453.3</b>	<b>35</b>	<b>453</b>	<b>1,184</b>	<b>1</b>
<b>Grand Total</b>			<b>39</b>	<b>470</b>	<b>39</b>	<b>470</b>	<b>2206</b>	<b>1</b>

**NOTES:**

<sup>a</sup> Harvesting since 2009 EIS based on 2011 VRI dataset

<sup>b</sup> Greater than 50% attack from mountain pine beetle (MPB) based on Hawkins (2013);

As shown in Table 1-12, harvesting and MPB have limited cumulative interactions with rare ecosystems in the access road RSA.

**Table 1-12. Rare Ecosystem Areas in the Access Road RSA**

BC List	BEC Unit/ Map Code	Rare Ecosystems Site Series Name	Updated RSA Baseline - 2011 (ha)		
			Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)
Blue	IDFdk4Gs03 RS	Baltic rush – field sedge	5.2	6.8	47
Blue	IDFdk4Ws05 TS	Tall willows – Sartwell’s sedge		0.8	1
Blue	IDFdk402 JP	Douglas fir – Rocky Mountain juniper – shrubby penstemon	0.3	3.3	26
Blue	IDFdk403 DJ	Douglas fir – Rocky Mountain juniper – prairie sagewort	20.5	80.9	340
Blue	IDFdk407 DM	Douglas fir – red-stemmed feathermoss – step moss	38.8	47.5	99
Blue	IDFdk409 SF	White spruce – red-stemmed feathermoss – ragged-mosses	1.4	9.0	28
Blue	IDFdk4Wf02 SW	Scrub birch – water sedge fen	2.5	7.5	40
Blue	IDFxm02 DW	Douglas fir – Rocky Mountain juniper – shrubby penstemon	1.3	0.4	206
Blue	IDFxm04 DS	Douglas fir – Rocky Mountain juniper – prairie sagewort			1
Blue	IDFxm05 DM	Douglas fir – red-stemmed feathermoss – step moss		0.4	98
Blue	IDFxm08 SS	Hybrid white spruce – prickly rose – palmate coltsfoot			3

Rare Ecosystems			Updated RSA Baseline - 2011 (ha)		
BC List	BEC Unit/ Map Code	Site Series Name	Area Recently Harvested <sup>a</sup>	Area Severely Infected by MPB <sup>b</sup>	Area Remaining (Intact in 2011)
Blue	SBPSxcGs03 RS	Baltic rush – field sedge	2.2	12.7	58
Blue	SBPSxc06 SM	White spruce – horsetails – western meadowrue	0.9	8.3	3
Blue	SBPSWf02 BW	Scrub birch – water sedge fen	0.2	1.9	22
<b>Blue Total</b>			<b>73</b>	<b>180</b>	<b>973</b>
Red	0.2	0.2	1	0.2	1.2
Red	19.1	1.2	381	1.2	381.1
Red	0.2		3		2.9
Red	0.0	0.4	2	0.4	1.5
Red Total			20	2	387
Grand Total			93	181	1,360

**NOTES:**

<sup>a</sup>Harvesting since 2009 EIS based on 2011 VRI dataset

<sup>b</sup>Greater than 50% attack from mountain pine beetle (MPB) based on Hawkins (2013)

A total of 1,360 ha of rare ecosystems remain intact in the access road RSA. Most of this area will remain intact as the Project's incremental contribution to effects to these ecosystems would be small and through minor modifications to the road can be avoided in final design.

#### *Future Case*

Future forest harvesting, including salvage logging of areas affected by MPB will have minimal effects on rare ecosystems, as many of the rare ecosystems are non-forested and non-pine leading and, therefore, not subject to effects from harvesting and MPB, respectively. In addition, harvesting and MPB affect the structural stage and species composition of the rare ecosystems, but do not eliminate the supporting site series.

#### *Determination of Significance of Effects*

The residual loss of rare ecosystems within the mine site, transmission line, and access road RSAs as a result of the Project has been assessed as being not significant. This effect will interact cumulatively with future forest harvesting, including salvage logging of areas affected by MPB. Given that harvesting and MPB affect the structural stage and species composition rather than areal extent of rare ecosystems, and given the mitigation measures proposed by the Project to minimize effects to rare ecosystems, having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on rare ecosystems.

#### **Country Food Plant Species**

The effects on availability of country food plant species are assessed as part of old forest, wetland, riparian and grassland ecosystems discussions above. Having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on old forest, wetland, riparian, and grassland ecosystems.

With respect to the quality of country foods the assessment of effects on atmosphere and human health concludes no significant environmental effect.

#### **Wildlife**

Wildlife key indicators that required a re-evaluation of effects in the 2012 EIS due to changes in project design, proposed mitigation measures or additional regulatory requirements; and those that required re-assessment due to expected increased Project effects were the following (from Table 2.7.2.8-3):

- Mule deer
- Moose
- Grizzly bear

- Black bear
- Fisher
- Great blue heron
- Mallard
- Barrow's goldeneye
- Prairie falcon
- Short-eared owl
- Amphibians

The residual loss of wildlife habitat as a result of the Project will interact cumulatively with similar effects from forest harvesting, including salvage logging of areas affected by MPB. The following discussion addresses the future case cumulative effects assessment scenario for each of the key indicators identified above plus the other 10 wildlife key indicators addressed in the 2009 EIS, including those that are only likely to interact with the transmission line component of the Project.

Effect on species designed under the *Species at Risk Act* was factored into the assessment in a variety of way, depending on the species. Habitat for some species was directly assessed, whereas others were inferred from effects on surrogate key indicators. IR 28a identifies those species of conservation concern associated with the Project as well as how Project effects were assessed. Those assessed directly are discussed below, whereas others are inferred from old forest, grasslands or wetland losses.

The future case for wildlife incorporates the following:

- The wildlife MDA (from the 2012 EIS) plus the 80-m right-of-way for the transmission line (from the 2009 EIS). Since the vast majority of the access road already exists and upgrades to existing roads have small footprints and are located within the existing (already disturbed) zone of road influence, the focus of the assessment for wildlife is on the mine site and transmission line RSAs.
- Existing forest harvesting current to 2011
- Areas identified as “severely impacted by MPB” (see above) in 2011. These areas are considered to represent the most likely areas of future forest harvesting based on the

understanding that future forest harvesting will target salvage of areas subject to MPB infestation (Government of British Columbia 2013).

For the purposes of this future case assessment, the areas of existing forest harvesting that have occurred since the 2009 EIS and the areas of future forest harvesting (i.e., areas “severely impacted by MPB”) are considered to be nil value as wildlife habitat. This is a worst case prediction as early seral post-logging areas may be suitable as habitat for many species (e.g., moose, birds that nest in open or shrubby habitats). It is also assumed that the future harvesting will occur within the near future (i.e., within 5 years).

### ***California Bighorn Sheep***

California bighorn sheep only interact with the transmission line component of the Project. Direct loss of bighorn sheep habitat is predicted to be minimal (see Volume 5, Section 6.3.1.4 [2009 EIS]) and will not interact cumulatively with effects from forest harvesting and MPB.

At this time, there are no existing or other planned industrial facilities or physical activities within the RSA. As a result, there is no likelihood of overlap of effects on California Bighorn Sheep with similar environmental effects from other existing or planned physical activities in the area.

The conclusion of the 2012 assessment is that there is no significant effect on Bighorn Sheep.

### ***Mule Deer***

The peak residual Project effects on mule deer winter habitat are predicted to be:

- Long-term loss of up to 124 ha of effective winter shelter habitat and less than 1 ha of effective winter feeding habitat at maximum disturbance in the mine site RSA (see IR 35c, Table 35C-2)
- Permanent loss of 469 ha of upland habitat, some of which may have potential as mule deer winter range, at post-closure in the mine site RSA (Section 2.7.2.8, Page 1087, 2012 EIS)
- Long-term loss of 192 ha of mature and old non-pine leading forest types (i.e., suitable winter habitat) in the transmission line RSA for this species (see Table 1-13)

The residual loss of mule deer winter habitat as a result of the Project will interact cumulatively with similar effects from forest harvesting, including salvage logging of areas affected by MPB. The effect of forest harvesting on the availability of mule deer winter habitat is recognized as a concern in Region 5<sup>4</sup>, and is being addressed through a regional management strategy. The

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<sup>4</sup> The mine site and transmission line RSAs are within Region 5 (Cariboo Region) of the BC Ministry of Forests, Lands and Natural Resources Operations



Region 5 mule deer population is currently considered sustainable (harvestable) by the Province despite the past and present level of human disturbance and habitat loss.

The Project's incremental contribution to the cumulative effect on mule deer habitat is predicted to be small for the following reasons:

- Residual loss of effective winter shelter habitat due to mine site clearing is high with respect to the mine site RSA (46%, see Table 35C-2) and includes some permanent loss of habitat; however, the mine site LSA has not been identified as regionally important mule deer winter range
- Since 2009, there has been a 91% (2790 ha) decrease in the availability of effective mule deer winter shelter habitat in the mine site RSA as the result of forest harvesting and MPB (see Table 35C-2); the effect of the Project (loss of 124 ha) in this context is small (4%)
- Residual loss of mature and old non-pine-leading forest (i.e., suitable winter habitat) due to ROW clearing is small (3%) with respect to the transmission line RSA for mule deer (see Table 1-13) and no permanent loss is predicted

**Table 1-13. Project Effect on Area of Mature and Old Non-Pine Leading Forest in Transmission Line Regional Study Area, 2011 Forest Conditions**

<b>Species/Habitat</b>	<b>Area (ha) of Intact Mature and Old Non-pine-leading Forest in RSA*</b>	<b>Area (ha) of Intact Mature and Old Non-pine-leading Forest in RoW (Direct Loss)</b>	<b>Direct Loss as Percentage of RSA</b>
Mule deer suitable winter habitat, moose suitable winter habitat, black bear suitable denning habitat	7380	192	2.6
Townsend's big-eared bat suitable summer roosting habitat	6887	163	2.4
*RSA for mule deer, moose and black bear is the extent of the SEI mapping along the entire transmission line, that is, a 3-km wide corridor centered on the proposed alignment (see Volume 5, Section 6.1.5.2 [2009 EIS]); RSA for Townsend's big-eared bat is the same except that the western boundary is defined by the extent of the Interior Douglas-fir Dry Cold Chilcotin variant.			

### *Determination of Significance of Effects*

As concluded in the EIS, environmental effects on mule deer are assessed as being not significant. Given that the Region 5 mule deer population is currently considered sustainable by the Province and that the Project's contribution to cumulative effects is small, having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on Region 5 mule deer.

### ***Moose***

The peak residual Project effects on moose winter habitat are predicted to be:

- Long-term loss of up to 162 ha of effective winter shelter habitat and 147 ha of effective winter feeding habitat at maximum disturbance in the mine site RSA (see Table 35C-2)
- Permanent loss of 469 ha of upland habitat, some of which may have potential as moose winter shelter habitat, at post-closure in the mine site RSA (Section 2.7.2.8, Page 1089, 2012 EIS)
- Long-term loss of 192 ha of mature and old non-pine leading forest types (i.e., suitable winter habitat) in the transmission line RSA for this species (see Table 1-13)

The residual loss of moose winter habitat as a result of the Project will interact cumulatively with similar effects from forest harvesting, including salvage logging of areas affected by MPB. The effect of forest harvesting on the availability of moose winter habitat is recognized as a concern in Region 5, and is being addressed through a regional management strategy. The Region 5 moose population is currently considered sustainable (harvestable) by the Province despite the past and present level of human disturbance and habitat loss.

The Project's incremental contribution to the cumulative effect on moose habitat is predicted to be small for the following reasons:

- Residual loss of effective winter habitat due to mine site clearing is high with respect to the mine site RSA (26 to 30%, depending on type, see Table 35C-2) and includes some permanent loss of habitat; however, the mine site LSA has not been identified as regionally important moose winter range
- Since 2009, there has been a 89% (4992 ha) decrease in the availability of effective moose winter shelter habitat in the mine site RSA as the result of forest harvesting and MPB (see Table 35C-2); the effect of the Project (loss of 162 ha) in this context is small (3%)

- Residual loss of mature and old non-pine-leading forest (i.e., suitable winter habitat) due to ROW clearing is small (3%) with respect to the transmission line RSA for moose (see Table 1-13) and no permanent loss is predicted
- Through planning and implementation of the Habitat Compensation Plan (see IR 32), Taseko aims to fully mitigate Project-related residual adverse effects and achieve no net loss of wetland/riparian functions, which is habitat for this species.
- Taseko is also committed to the measures identified in the Grizzly Bear Risk Reduction Plan (2012 EIS Section 2.7.2.8). By working towards reducing linear density features in access management planning and road decommissioning, other species dependent on uplands benefit, including those species important to First Nations, such as moose.

Wetlands are also very important to moose, particularly during the growing season, because of their feeding value. The wetland ecosystems assessment presented earlier in this response predicts that the Project will make only a small contribution to the cumulative loss of wetlands in the mine site and transmission line RSAs.

#### *Determination of Significance of Effects*

As concluded in the EIS, environmental effects on moose are assessed as being not significant. Given that Project's contribution to cumulative effects is small, having regard to potential cumulative effects with other physical activities, including forest harvesting; there is no significant effect of the Project on Region 5 moose population.

#### *Grizzly Bear*

A detailed cumulative effects assessment for grizzly bear is presented in Section 2.7.2.8 (Pages 1118 to 1134) of the 2012 EIS.

#### *Black Bear*

The peak residual Project effects on black bear denning habitat are predicted to be:

- Long-term loss of up to 62 ha of effective denning habitat at maximum disturbance in the mine site RSA (IR 35c, Table 35C-2)
- Permanent loss of 469 ha of upland habitat (see mule deer and moose), some of which may have potential as denning habitat, at post-closure in the mine site RSA
- Long-term loss of 192 ha of mature and old non-pine leading forest types (i.e., suitable denning habitat) in the transmission line RSA for this species (see Table 1-13)

The residual loss of black bear denning habitat as a result of the Project will interact cumulatively with similar effects from forest harvesting, including salvage logging of areas affected by MPB. The effect of forest harvesting on the availability of black bear denning habitat does not appear to be a specific concern in Region 5, perhaps because black bear den site selection is relatively opportunistic and site-specific, in contrast to mule deer winter range requirements. The Region 5 black bear population is currently considered sustainable (harvestable) by the Province despite the past and present level of human disturbance and habitat loss.

The Project's incremental contribution to the cumulative effect on black bear habitat is predicted to be small for the following reasons:

- Residual loss of effective denning habitat due to mine site clearing is high with respect to the mine site RSA (25%, see Table 35C-2) and includes some permanent loss of habitat; however, black bears are generally opportunistic, and den site selection is not necessarily linked to a particular habitat type or seral condition
- Since 2009, there has been a 92% (2774 ha) decrease in the availability of effective black bear denning habitat in the mine site RSA as the result of forest harvesting and MPB (see Table 35C-2); the effect of the Project (loss of 62 ha) in this context is small (2%)
- Residual loss of mature and old non-pine-leading forest (i.e., suitable denning habitat) due to ROW clearing is small (3%) with respect to the transmission line RSA for black bear (see Table 1-13) and no permanent loss is predicted

#### *Determination of Significance of Effects*

Environmental effects on black bear are assessed in the EIS as being not significant. Given that the Region 5 black bear population is currently considered sustainable by the Province and that the Project's contribution to cumulative effects is small, having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on the Region 5 black bear population.

#### ***Fisher***

The peak residual Project effects on fisher natal denning habitat are predicted to be:

- Permanent loss of 1 ha of effective natal denning habitat in the mine site RSA (see Table 35C-2)
- Long-term loss of up to 54.9 ha of effective natal denning habitat in the transmission line RSA for this species (see Table 1-14)

The residual loss of fisher natal denning habitat as a result of the Project will interact cumulatively with similar effects from forest harvesting, including salvage logging of areas affected by MPB. The effect of forest harvesting on higher value fisher natal denning habitat (i.e., mature and old deciduous forest) is mitigated to some extent by application of riparian area guidelines; however, Douglas-fir and lodgepole pine have also been identified as important for fisher in the central British Columbia (Weir and Almuedo 2010). At present, fishers in much of Region 5<sup>5</sup> are considered sustainable (harvestable) by the Province despite the past and present level of human disturbance and habitat loss.

The Project's incremental contribution to the cumulative effect on fisher habitat is predicted to be small for the following reasons:

- Residual loss of effective natal denning habitat due to mine site clearing is small with respect to the mine site RSA (2%, see Table 35C-2)
- Since 2009, there has been a 71% (175 ha) decrease in the availability of effective fisher natal denning habitat in the mine site RSA as the result of forest harvesting and MPB (see Table 35C-2); the effect of the Project (loss of 1ha) in this context is small (less than 1%)
- Residual loss of effective natal denning habitat due to ROW clearing is small (3%) with respect to the transmission line RSA for fisher (see Table 1-14) and no permanent loss is predicted

**Table 1-14. Project Effect on Effective Fisher Natal Denning Habitat Availability in Transmission Line Regional Study Area, 2011 Forest Conditions**

Area (ha) Available in RSA at Baseline	Area (ha) Available in RSA at Maximum Disturbance	Change in Availability at Maximum Disturbance	
		ha	Percent
1717	1662	-55	-3.2

#### *Determination of Significance of Effects*

As concluded in the EIS, environmental effects on fisher are assessed as being not significant. Given that much of the Region 5 fisher population is currently considered sustainable by the Province and that the Project's contribution to cumulative effects is small, having regard to

<sup>5</sup> There is overlap between the Cariboo subpopulation of fisher and Region 5

potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on the Cariboo subpopulation of fisher.

### ***American Badger***

American badger only interacts with the transmission line component of the Project. No residual loss of high potential badger denning habitat is predicted at any project phase (see Volume 5, Section 6.3.7.4 [2009 EIS]).

### ***Townsend's Big-eared Bat***

Townsend's big-eared bat only interacts with the transmission line component of the Project. The peak residual Project effect on Townsend's big-eared bat summer roosting habitat is predicted to be:

- Long-term loss of 163 ha of mature and old non-pine leading forest types (i.e., suitable summer roosting habitat) in the transmission line RSA for this species (see Table 1-13)

An important mitigation measure for this species, and the one that will have the greatest benefit, is avoidance during final alignment and detailed design. Where feasible, the alignment of the transmission line will be such that it parallels and/or makes use of existing cleared areas and access roads; avoids old non-pine forest; and, avoids sensitive wildlife features identified through pre-construction surveys. In addition, disturbance in high valued habitats, such as grasslands, wetlands and riparian areas, are minimized.

The residual loss of Townsend's big-eared bat summer roosting habitat as a result of the Project will interact cumulatively with similar effects from forest harvesting, including salvage logging of areas affected by MPB. The effect of forest harvesting on the availability of summer roosting habitat does not appear to be identified as a specific concern in the Province (BC CDC 2013), likely because this habitat is not as critical as over-wintering habitat (caves), and this bat will use other types of summer roosts besides trees (e.g., cliffs).

### ***Determination of Significance of Effects***

The Project's incremental contribution to the cumulative effect on bat habitat is predicted to be small because residual loss of mature and old non-pine-leading forest (i.e., suitable summer roosting habitat) due to ROW clearing is small (2%) with respect to the transmission line RSA for this species (see Table 1-13) and no permanent loss is predicted. As concluded in the EIS, the environmental effects on Townsend's big-eared bat are assessed as being not significant. Given the adaptability of Townsend's big-eared bat to other summer roosting sites and that the Project's contribution to cumulative effects is small; having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on the Townsend's big-eared bat provincial population.

### ***Great Blue Heron***

The peak residual Project effects on heron feeding habitat are predicted to be:

- Long-term loss of up to 4 ha of effective feeding habitat at maximum disturbance in the mine site RSA (see Table 35C-2)
- Permanent loss of 258 ha of wetlands, some of which may have potential as heron feeding habitat, at post-closure in the mine site RSA
- Through planning and implementation of the Habitat Compensation Plan (see IR 32), Taseko aims to fully mitigate Project-related residual adverse effects to regional and local wildlife populations of migratory birds.

No residual loss of heron feeding habitat was predicted for the transmission line in 2009 (Volume 5, Section 6.3.9.4 [2009 EIS]).

The residual loss of heron feeding habitat as a result of the Project will interact cumulatively with similar effects from forest harvesting, including salvage logging of areas affected by MPB. However, the potential for these interactions is considered to be low as forest harvesting is constrained by operational guidelines that are designed to avoid wetland loss and minimize indirect effects to wetlands, and MPB effects will not result in the direct loss of wetlands<sup>6</sup>. Despite past and present level of human disturbance, the breeding population in the interior was reported as increasing in the late 1990s and early 2000s (Gebauer and Moul 2001). Limited new information is available regarding expansion of the breeding population, but based on a comparison of the species' breeding distribution from Campbell et al. (1990) and the BC Breeding Bird Atlas (2013), there appears to have been little change.

The Project's incremental contribution to the cumulative effect is predicted to be small since residual loss of effective heron feeding habitat due to mine site clearing is small with respect to the mine site RSA (3%, see Table 35c-2).

#### *Determination of Significance of Effects*

Project effects on great blue heron were assessed as not significant in the EIS. Given that there is limited interaction between heron feeding habitat and forest loss, and that the Project's contribution to cumulative effects on heron habitat is small; having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on the interior heron population.

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<sup>6</sup> Although changing hydrological conditions with loss of forest cover may alter wetland function

This conclusion is supported by the assessment for wetland ecosystems presented earlier in this response which predicts that the Project will make only a small contribution to the cumulative loss of wetlands in the mine site and transmission line RSAs.

### *Mallard*

The peak residual Project effects on mallard feeding habitat are predicted to be:

- Long-term loss of up to 5 ha of effective feeding habitat at maximum disturbance in the mine site RSA (see Table 35C-2)
- Permanent loss of 258 ha of wetlands, some of which may have potential as mallard feeding habitat, at post-closure in the mine site RSA
- Through planning and implementation of the Habitat Compensation Plan (see IR 32), Taseko aims to fully mitigate Project-related residual adverse effects to regional and local wildlife populations of migratory birds.

No residual loss of mallard habitat was predicted for the transmission line in 2009 (Volume 5, Section 6.3.10.4 [2009 EIS]).

The residual loss of mallard feeding habitat as a result of the Project will interact cumulatively with similar effects from forest harvesting, including salvage logging of areas affected by MPB. However, the potential for these interactions is considered to be low as forest harvesting is constrained by operational guidelines that are designed to avoid wetland loss and minimize indirect effects to wetlands, and MPB effects will not result in the direct loss of wetlands. The Region 5 mallard population is currently considered sustainable (harvestable) by the Province despite the past and present level of human disturbance and habitat loss.

### *Determination of Significance of Effects*

The environmental effects on mallard were assessed as not significant in the EIS. The Project's incremental contribution to the cumulative effect on mallard habitat is predicted to be small because the residual loss of effective mallard feeding habitat due to mine site clearing is small with respect to the mine site RSA (3%, see Table 35c-2). Given that the Region 5 mallard population is currently considered sustainable by the Province and that the Project's contribution to cumulative effects is small, having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on the Region 5 mallard population.

This conclusion is supported by the assessment for wetland ecosystems presented earlier in this response which predicts that the Project will make only a small contribution to the cumulative loss of wetlands in the mine site and transmission line RSAs.



***Barrow's Goldeneye***

The peak residual Project effects on Barrow's Goldeneye nesting habitat are predicted to be:

- Long-term loss of up to 5 ha of effective nesting habitat at maximum disturbance in the mine site RSA (see Table 35C-2)
- Permanent loss of 469 ha of upland habitat (see mule deer and moose), some of which may have had potential as nesting habitat, at post-closure in the mine site RSA
- Through planning and implementation of the Habitat Compensation Plan (see IR 32), Taseko aims to fully mitigate Project-related residual adverse effects to regional and local wildlife populations of migratory birds.

No residual loss of Barrow's goldeneye nesting habitat was predicted for the transmission line in 2009 (Volume 5, Section 6.3.11.4 [2009 EIS]).

The residual loss of Barrow's goldeneye nesting habitat as a result of the Project will interact cumulatively with similar effects from forest harvesting, including salvage logging of areas affected by MPB. The effect of forest harvesting on higher value Barrow's goldeneye nesting habitat (i.e., mature and old deciduous forest) is partially mitigated by application of riparian area guidelines. In addition, the salvage of beetle-killed trees is unlikely to target the highest value Barrow's goldeneye nesting habitat. The Region 5 Barrow's goldeneye population is currently considered sustainable (harvestable) by the Province despite the past and present level of human disturbance and habitat loss.

The Project's incremental contribution to the cumulative effect on Barrow's goldeneye habitat is predicted to be small for the following reasons:

- Residual loss of effective nesting habitat due to mine site clearing is moderate with respect to the mine site RSA (19%, see Table 35C-2) and includes some permanent loss of habitat; however, in general, the mine site RSA has lower value as nesting habitat primarily because of the dominance of pine-leading old forest, which is a less suitable source of nest trees, and the limited area of old deciduous forest, which is a good source of nest trees. In addition, within the mine site LSA, Fish Lake is not characteristic of higher value Barrow's goldeneye breeding lakes (see Volume 5, Section 6.3.11.4 [2009 EIS]).
- Since 2009, there has been a 90% (220 ha) decrease in the availability of effective Barrow's goldeneye nesting habitat in the mine site RSA as the result of forest harvesting and MPB (see Table 35C-2); the effect of the Project (loss of 5 ha) in this context is small (2%)

### *Determination of Significance of Effects*

The environmental effects on Barrow's goldeneye were assessed as not significant in the EIS. Given that the Region 5 Barrow's goldeneye population is currently considered sustainable by the Province and that the Project's contribution to cumulative effects is small, having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on the Barrow's Goldeneye population in Region 5.

### *Sandhill Crane*

Sandhill crane is only likely to interact with the transmission line component of the Project. No residual loss of sandhill crane feeding and nesting habitat is predicted at any project phase (see Volume 5, Section 6.3.12.4 [2009 EIS]).

### *Long-billed Curlew*

Long-billed curlew only interacts with the transmission line component of the Project. No residual loss of long-billed curlew nesting habitat is predicted at any project phase (see Volume 5, Section 6.3.13.4 [2009 EIS]).

### *Lewis's Woodpecker*

Lewis's woodpecker only interacts with the transmission line component of the Project. The peak residual Project effect on Lewis's woodpecker nesting habitat is predicted to be the long-term loss of up to 12 ha of effective nesting habitat in the transmission line RSA for this species (see Table 29B-1).

An important mitigation measure for this species, and the one that will have the greatest benefit, is avoidance during final alignment and detailed design. Where feasible, the alignment of the transmission line will be such that it parallels and/or makes use of existing cleared areas and access roads; avoids old non-pine forest; and, avoids sensitive wildlife features identified through pre-construction surveys. In addition, disturbance in high valued habitats, such as grasslands, wetlands and riparian areas, are minimized.

The residual loss of Lewis's woodpecker nesting habitat as a result of the Project will interact cumulatively with similar effects from forest harvesting and MPB. Provincially, loss of habitat due to a variety of factors, including forest harvesting, including salvage logging of areas affected by MPB, is recognized as a concern for this species (BC MWLAP 2004a; Wong 2008). There is no information available on the population trend for this species in Region 5, but in the province as a whole the population has declined from historical levels (BC MWLAP 2004a; COSEWIC 2010a). In 2007, the estimated population in British Columbia was 315-460 breeding pairs (Environment Canada 2011). A more recent estimate was not available, but the management objective is to achieve 600 pairs by 2040 (Environment Canada 2011).

### *Determination of Significance of Effects*

The Project's incremental contribution to the cumulative effect is predicted to be small for the following reasons:

- Residual loss of effective nesting habitat due to ROW clearing is small (3%) with respect to the transmission line RSA for this species (see Table 29B-1), and there is no permanent loss of habitat
- Cariboo-Chilcotin is not the main breeding area for this species in the province

The Project's contribution to cumulative effects is small and having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on the Lewis Woodpecker population..

### *Yellow-breasted Chat*

Yellow-breasted chat only interacts with the transmission line component of the Project. No residual loss of yellow-breasted nesting habitat is predicted at any project phase (see Volume 5, Section 6.3.15.4 [2009 EIS]).

### *Sagebrush Brewer's Sparrow*

Sagebrush Brewer's sparrow only interacts with the transmission line component of the Project. No residual loss of sagebrush sparrow nesting habitat is predicted at any project phase (see Volume 5, Section 6.3.16.4 [2009 EIS]).

### *Sharp-tailed Grouse*

Sharp-tailed grouse is only likely to interact with the transmission line component of the Project. No residual loss of sharp-tailed grouse feeding and nesting habitat is predicted at any project phase (see Volume 5, Section 6.3.17.4 [2009 EIS]).

### *Prairie Falcon*

No residual loss of prairie falcon nesting habitat is predicted at any project phase (see Volume 5, Section 6.3.18.4 [2009 EIS]).

### *Short-eared Owl*

The peak residual Project effects on short-eared owl feeding habitat are predicted to be:

- Long-term loss of up to 111 ha of feeding habitat at maximum disturbance in the mine site RSA (see Table 35C-2)

- Permanent loss of 469 ha of upland habitat (see moose and mule deer) and 258 ha of wetlands, some of which may have potential as short-eared owl feeding habitat, at post-closure in the mine site RSA

No residual loss of short-eared owl feeding habitat was predicted for the transmission line in 2009 (Volume 5, Section 6.3.19.4 [2009 EIS]).

The residual loss of short-eared owl feeding habitat as a result of the Project will interact cumulatively with similar effects from forest harvesting, including salvage logging of areas affected by MPB. However, the potential for these interactions is considered to be low because:

- a) forest harvesting is constrained by operational guidelines that are designed to avoid wetland loss and minimize indirect effects to wetlands;
- b) MPB effects will not result in the direct loss of wetlands; and
- c) forest harvesting and MPB will not affect grassland ecosystems.

The population trend in British Columbia is unknown; however, in virtually all other parts of its range in southern Canada and the United States there have been observed declines (COSEWIC 2008), and in the southern and central interior of British Columbia breeding habitat has decreased (BC MWLAP 2004b). Reliable population estimates for British Columbia are not available, owing in part to lack of survey effort and the nomadic and cyclic nature of the species (BC MWLAP 2004b; COSEWIC 2008). This species is considered “relatively common” in the Central Interior Ecoprovince (see Volume 5, Section 6.3.19.3 [2009 EIS]) despite the existing level of human disturbance.

The Project’s incremental contribution to the cumulative effect is predicted to be small because although residual loss of short-eared owl feeding habitat due to mine site clearing is high with respect to the mine site RSA (40%, see Table 35c-2), and includes some permanent loss of habitat, the area is not a regionally important critical (wintering) area for this species and the mine site is rated as low value. Wintering habitat is thought to be the limiting factor for short-eared owl populations in British Columbia (Campbell et al. 1990). In the Cariboo-Chilcotin, the Bunchgrass and Interior Douglas-fir zones have been identified as having high value to short-eared owls for feeding, wintering, and breeding (BC MWLAP 2004). The mine site RSA is outside these zones.

#### *Determination of Significance of Effects*

Given that there is limited interaction between short-eared owl habitat and forest loss, and that the Project’s contribution to cumulative effects is small; having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on the Central Interior Ecoprovince short-eared owl population.

This conclusion is supported by the assessment for wetland and grassland ecosystems presented earlier in this response which predicts that the Project will make only a small contribution to the cumulative loss of these ecosystems in the mine site and transmission line RSAs.

### *Flammulated Owl*

Flammulated owl only interacts with the transmission line component of the Project. The peak residual Project effect on flammulated owl nesting habitat is predicted to be a long-term loss of up to 17 ha of effective nesting habitat at maximum disturbance in the transmission line RSA for this species (Table 29B-1).

An important mitigation measure for this species, and the one that will have the greatest benefit, is avoidance during final alignment and detailed design. Where feasible, the alignment of the transmission line will be such that it parallels and/or makes use of existing cleared areas and access roads; avoids old non-pine forest; and, avoids sensitive wildlife features identified through pre-construction surveys. In addition, disturbance in high valued habitats, such as grasslands, wetlands and riparian areas, are minimized.

The residual loss of flammulated owl nesting habitat as a result of the Project will interact cumulatively with similar effects from forest harvesting, including salvage logging of areas affected by MPB. Provincially, loss of habitat through various forest management activities (e.g., harvesting, salvage logging, thinning, road construction) is recognized as the greatest immediate risk to this species (BC MWLAP 2004c; Wong 2008). There is no information available on the population trend for this species in Region 5 (BC MWLAP 2004c), but estimates from 2001 that use combined survey data and habitat models suggest that 600-750 breeding pairs occur in British Columbia (van Woudenberg 2001). The current population estimate for Canada is 600-1,000 breeding pairs, plus another estimated 1,500 non-breeding individuals (COSEWIC 2010b).

### *Determination of Significance of Effects*

The Project's incremental contribution to the cumulative effect is predicted to be small for the following reasons:

- Residual loss of nesting habitat due to ROW clearing is small (4%) with respect to the transmission line RSA for this species (see Table 29-3), and there is no permanent loss of habitat
- Cariboo-Chilcotin region is not the main breeding area for this species in the province

The Project's contribution to cumulative effects is small and having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on the flammulated owl provincial population.

## ***Amphibians***

The peak residual Project effects on amphibian breeding habitat are predicted to be:

- Permanent loss of 258 ha of wetlands at post-closure in the mine site RSA

A negligible effect on amphibian breeding habitat was predicted for the transmission line in 2009 (Volume 5, Section 6.3.21.4 [2009 EIS]).

The residual loss of amphibian breeding habitat as a result of the Project will interact cumulatively with similar effects from forest harvesting, including salvage logging of areas affected by MPB. However, the potential for these interactions is considered to be low as forest harvesting is constrained by operational guidelines that are designed to avoid wetland loss and minimize indirect effects to wetlands, and MPB effects will not result in the direct loss of wetlands. While it is not possible to estimate population numbers, detections in the mine site and transmission line RSAs were common enough to suggest that amphibians are thriving despite the existing level of habitat disturbance.

Through planning and implementation of the Habitat Compensation Plan (see IR 32), Taseko aims to fully mitigate Project-related residual adverse effects and achieve no net loss of wetland/riparian functions, which is habitat for this group.

The Project's incremental contribution to the cumulative effect is predicted to be small because although permanent loss of wetlands due to mine site clearing is relatively high with respect to the mine site RSA (15%, see Section 2.7.2.7, Page 1012, 2012 EIS), the population effect is localized to the mine site LSA.

### *Determination of Significance of Effects*

The environmental effects on amphibian habitat are assessed in the EIS as not significant. Given that there is limited direction interaction between amphibian habitat and forest loss, and that the Project's contribution to cumulative effects is small; having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on the Region 5 amphibian population.

This conclusion is supported by the assessment for wetland ecosystems presented earlier in this response which predicts that the Project will make only a small contribution to the cumulative loss of wetlands in the mine site and transmission line RSAs.

## **Resource Use**

Residual Project effects on the socio-economic environment that can act cumulatively with effects from other projects or activities relate to the Resource Use VEC, specifically Project effects in combination with forestry effects on hunting, trapping and grazing.

No residual effects are anticipated for land use, forestry, fishing, or outdoor recreation and tourism (Section 2.7.3.1 of the EIS). There are residual effects related to hunting, trapping and grazing in the LSA.

Future effects of forest harvesting, including salvage logging of areas affected by MPB on hunting in the LSA are a result of increased access due to harvesting in the MPB infested areas and areas of intact forest. This increased access from forestry, in combination with temporary increased access in the transmission line area could have an initial positive effect on hunting of ungulates; however, the increased access may result in an increased pressure from predators (e.g. wolves) which may cause a future decrease in ungulates, and corresponding decrease in hunting opportunities and success rates. The contribution of project effects on hunting is minimal due to its limited spatial extent of the mine site, and Taseko's commitments to facilitate access management planning with First Nations, regulators, landowners, and other stakeholders, and decommission existing roads along the transmission line corridor during construction, where feasible..

Trapping opportunities for old forest-dependent species may be reduced by harvesting old forest. Forestry- and Project-induced increased access for hunters and recreationalists in the LSA may have a negative effect on trappers by increasing human presence in the area. The mine site LSA represents a small portion of both the habitat and the harvest of fur-bearers among two licensees, although some minor effects are anticipated. Overall, the conditions and values received from these traplines would not be measurably different in the future with the Project, than if the Project did not proceed. The Project's contribution to residual effects on trapping activities is expected to be very small.

As noted in Section 2.7.2.8 and in the earlier discussion of fisher, an indicator species for this activity, we have concluded no significant environmental effector for this species.

Timbered areas with meadows and man-influenced open areas such as clear cuts and roadways are used for summer grazing in the RSA. In the transmission line RSA, clearing areas with tree encroachment within Grassland Benchmark Areas (an objective of the Cariboo Chilcotin Land Use Plan), arising from either the Project or forest harvesting, will have a positive effect on both grasslands and grazing.. To address potential grazing management issues that could be affected by clearing and harvesting through the loss of natural barriers, Taseko has previously committed (2009 EIS) to work with the tenure holders and regulators to replace the barriers with fencing.

Grazing areas and opportunities are unlikely to be adversely affected by harvesting activity either in the RSA or the mine area, as noted in Section 2.7.2.7 (Vegetation).

In the mine RSA, forest harvesting creates positive effects on grazing by providing additional forage, although logging road create grazing management issues. Although the Project would have an adverse effect on one range licensee and one First Nations rancher by removing some productive range within the RSA, in consideration of the potential cumulative effects with other

physical activities, including forest harvesting and construction of forest roads, the Project's contribution to effects would be minimal, reversible after closure, and is not expected to give rise to a significant adverse effect.

Considering the magnitude and extent of the Project effects, having regard to potential cumulative effects with other physical activities, including forest harvesting, there are no significant environmental effects of the Project on hunting, trapping and grazing.

### **Atmospheric Environment**

The residual project effects for all phases of the project are extremely limited. While the direction is adverse, in general the magnitude is moderate to low, local in extent, and reversible. The duration and frequency for most activities is regular and medium term.

The March 2009 EIS/Application revealed no CAC industrial sources present locally at that time. As of 2012, no other major industrial project with a potential to emit CACs has been publicly announced for the Project study area. None of the regional sources of CACs or projects listed in the inclusion list are likely to interact cumulatively with the Projects residual effects on the atmospheric environment.

As none of the regional sources of CACs or projects listed in the inclusion list are likely to interact cumulatively with the Projects residual effects on the atmospheric environment, the conclusion of the 2012 assessment is that there is no significant effect on the atmospheric environment.

### **Acoustic Environment**

Increases in ambient sound levels are expected during construction, operation and closure but maximum predicted sound levels are predicted to be well below the guideline permissible sound levels at the nearest human dwelling locations.

At this time, there are no other existing or planned industrial facilities within the RSA. As a result, there is a no likelihood of overlap of noise effects with similar environmental effects from other existing or planned physical activities in the area.

As there is no likelihood of overlap of noise effects of the project with similar effects from other existing or planned projects, no cumulative effects are expected during Project operations. The conclusion of the 2012 assessment is that there is no significant effect on the acoustic environment.

### **Aquatic Environment – Hydrology and Hydrogeology**

Diversion of water within and around the 2012 New Prosperity Project area will permanently alter the flow regime for the Fish Creek Watershed. The increased water table elevation in the TSF may result in a portion of the groundwater divide separating the Fish Creek watershed from



the Big Onion Lake watershed and Taseko River along the western ridge to be lost, allowing groundwater migration from the TSF region towards Wasp Lake and Big Onion Lake. The groundwater changes predicted for the New Prosperity mine site are all restricted to within 2 km of the mine footprint.

At this time, there are no existing or planned industrial facilities within the RSA. As a result, there is no likelihood of overlap of hydrology or hydrogeology effects with similar environmental effects from other existing or planned physical activities in the area.

The residual effects of the 2012 New Prosperity Project are different than those presented in 2009 but there continues to be no overlap with any past, present or reasonably foreseeable projects or physical activities. The conclusion of the 2012 assessment is that there will be no significant effect on hydrology and hydrogeology.

### **Aquatic Environment - Water Quality**

There is potential for residual effects on water quality within the Fish Creek and Beece Creek watersheds and on the Taseko River as discussed in detail in the 2012 EIS submission.

At this time, there are no existing or planned industrial facilities within the RSA. As a result, there is no likelihood of overlap of water quality effects with similar environmental effects from other existing or planned physical activities in the area.

The residual effects of the 2012 New Prosperity Project outside the Fish Creek watershed are virtually the same as those presented in 2009, and there continues to be no overlap with any past, present or reasonably foreseeable project or physical activities. The conclusion of the 2012 assessment is that there will be no significant effect on water quality.

### **Aquatic Environment - Aquatic Ecology**

There is potential for Project-specific residual effects in the Fish Creek and Beece Creek watersheds as discussed in detail in the 2012 EIS submission.

At this time, there are no existing or planned industrial facilities within the RSA. As a result, there is no likelihood of overlap of aquatic ecology effects with similar environmental effects from other existing or planned physical activities in the area.

The residual effects of the 2012 New Prosperity Project outside the Fish Creek watershed are virtually the same as those presented in 2009, and there continues to be no overlap with any past, present or reasonably foreseeable project or physical activities. The conclusion of the 2012 assessment is that there will be no significant effect on aquatic ecology.

### **Aquatic Environment - Sediment Quality and Benthic Invertebrates**

There is potential for Project-specific residual effects on sediment quality in the Fish Creek and Beece Creek watersheds as discussed in detail in the 2012 EIS submission. The sediment quality changes predicted for the New Prosperity mine site are all restricted to the Fish Lake watershed.

At this time, there are no existing or planned industrial facilities or physical activities within the RSA. As a result, there is no likelihood of overlap of sediment quality and benthic invertebrate effects with similar environmental effects from other existing or planned physical activities in the area.

The residual effects of the 2012 New Prosperity Project outside the Fish Creek watershed are the same as those presented in 2009, and there continues to be no overlap with any past, present or reasonably foreseeable projects or physical activities. The conclusion of the 2012 assessment is that there will be no significant effect on sediment quality and benthic invertebrates.

### **Fish and Fish Habitat**

The Project will result in environmental effects on fish and fish habitat in the Fish Creek Watershed, including Fish Lake and Little Fish Lake. These effects will be mitigated through the Fish and Fish Habitat Compensation Plans and other mitigation measures detailed in the 2012 EIS submission such that there are no residual environmental effects on fish and fish habitat.

At this time, there are no existing or planned industrial facilities or physical activities within the RSA. As a result, there is no likelihood of overlap of fish and fish habitat effects with similar environmental effects from other existing or planned physical activities in the area.

There are no residual effects of the 2012 New Prosperity Project on Fish and Fish habitat and there continues to be no overlap with any past, present or reasonably foreseeable project or physical activities. The conclusion of the 2012 assessment is that there will be no significant effect on fish and fish habitat.

### **Terrestrial Environment - Terrain**

The residual project effects for all phases of the project are extremely limited as detailed in the 2012 EIS submission. The effects are localized to within 2 km of the mine footprint.

At this time, there are no existing or planned industrial facilities or physical activities within the RSA. As a result, there is no likelihood of overlap of terrain effects with similar environmental effects from other existing or planned physical activities in the area.

The residual effects of the 2012 New Prosperity Project are virtually the same as those presented in 2009, and there continues to be no overlap with any past, present or reasonably foreseeable projects or physical activities. The conclusion of the 2012 assessment is that there will be no significant effect on terrain.

**Terrestrial Environment - Soil**

Soil disturbance associated with the Project will result in residual effects to soil due to changes in physical properties. An estimated 22% of the volume of topsoil in areas that will have surface disturbance within the mine footprint will not be salvaged. There will be no residual effect from ore extraction and processing on soil chemical properties.

At this time, there are no existing or planned industrial facilities or physical activities within the RSA. As a result, there is no likelihood of overlap of soil effects with similar environmental effects from other existing or planned physical activities in the area.

The residual effects of the 2012 New Prosperity Project are the same as those presented in 2009, and there continues to be no overlap with any past, present or reasonably foreseeable projects or physical activities. The conclusion of the 2012 assessment is that there will be no significant effect on soil

**Socio-economic Environment - Navigation**

There will be no change to the right to navigate Fish Lake but there will be a residual effect to navigation in Little Fish Lake. The effects on navigation as a result of the project are site specific.

At this time, there are no existing or planned industrial facilities or physical activities within the RSA. As a result, there is no likelihood of overlap of navigation effects with similar environmental effects from other existing or planned physical activities in the area.

The residual effects of the 2012 New Prosperity Project are less than those presented in 2009, and there continues to be no overlap with any past, present or reasonably foreseeable projects or physical activities. The conclusion of the 2012 assessment is that there will be no significant effect on navigation.

**Socio-Economic Environment - Human Health**

While there are residual effects to air quality, water quality, soils, and vegetation, they do not represent health concerns for terrestrial animal receptors or humans in the LSA.

At this time, there are no existing or planned industrial facilities or physical activities within the RSA. As a result, there is no likelihood of overlap of human health effects with similar environmental effects from other existing or planned physical activities in the area.

Since 2009, there continues to be no overlap with any past, present or reasonably foreseeable projects or physical activities. The conclusion of the 2012 assessment is that there will be no significant effect on human health.

### **Physical and Cultural Heritage Resources – Archaeology**

Residual Effects of the Project on archaeology are site specific and the discovery and preservation of artifacts is a positive effect. Of the seventy nine identified archaeological sites four low scientific value sites and one moderate scientific value site will be disturbed but the artifacts have been recovered and preserved. Three high scientific value sites are outside of the area that will be directly disturbed.

At this time, there are no existing or planned industrial facilities or physical activities within the mine site and transmission line RSA, other than forest harvesting. Forest harvesting activities require archaeological investigations regulated under the BC Heritage Conservation Act, thereby minimizing risks to disturbing unidentified archaeological resources. In combination with forest harvesting, the Project would have a positive effect in identifying archaeological resources in the region.

The conclusion of the 2012 EIS is that there will be no significant effect on archaeology. The Project's contribution to cumulative effects is small, and having regard to potential cumulative effects with other physical activities including forest harvesting, there is no significant effect of the Project on archaeological resources.

### **Aboriginal Interests – Current Use**

Effects on aboriginal use of the Project area for fishing, hunting, trapping, and plant gathering, is influenced by project effects on fish and fish habitat, vegetation, wildlife and access, which have been discussed previously. First Nations have expressed concern that due to increased access elsewhere in the region arising from forest harvesting, and in combination of the loss of access to land and resources in the Project footprint, the cumulative effect would be increased pressure on these resources in other areas of the region, impacting aboriginal use.

At this time, there are no existing or planned industrial facilities or physical activities within the RSA. As a result, there is no likelihood of overlap of effects on cultural heritage with similar environmental effects from other existing or planned physical activities in the area. The effects of the Project in combination with forest harvesting are predicted to be not significant because:

The Project effects are site specific, and relative to effects of forest harvesting on access, wildlife habitat and hunting opportunities, are very small;

With the implementation of mitigation and compensation plans, Project effects are neutral in direction. The measures include:

- 'no hunting /fishing policy for employees and contractors while on shift',
- providing access to Fish Lake and surrounding areas through the mine site during construction and operations,

- Taseko's commitment to work with others on access planning and decommissioning roads where feasible along the transmission line corridor during construction,
- Taseko's commitment to Fish and Fish Habitat Compensation, and
- Taseko's commitment to Habitat Compensation,

The conclusion of the 2012 assessment is that having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on current use for traditional purposes.

### **Aboriginal Interests – Cultural Heritage**

The predicted residual effects on cultural heritage for New Prosperity have decreased relative to 2009 as detailed in the 2012 EIS. In comparison to the 2009 Prosperity Project, the 2012 New Prosperity preserves Fish Lake and the island in the lake, stated to be of significance to the Tsilhqot'in.

At this time, there are no existing or planned industrial facilities or physical activities within the RSA. As a result, there is no likelihood of overlap of effects on cultural heritage with similar environmental effects from other existing or planned physical activities in the area

The effects of the Project on cultural heritage are predicted to be low in light of project redesign and mitigation measures, such as providing access through the mine site to Fish Lake during construction and operations. The Project effects on cultural heritage are site specific, and because of the localized effects do not overlap with effects from forest harvesting.

The conclusion of the 2012 assessment is that having regard to potential cumulative effects with other physical activities, including forest harvesting, there is no significant effect of the Project on cultural heritage.

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