

**A Range Assessment for the Klaza Caribou Herd  
in the Dawson Range, West-central Yukon**

**APPENDIX B:  
Future Land Use Scenario and  
Potential Levels of Human Disturbance**

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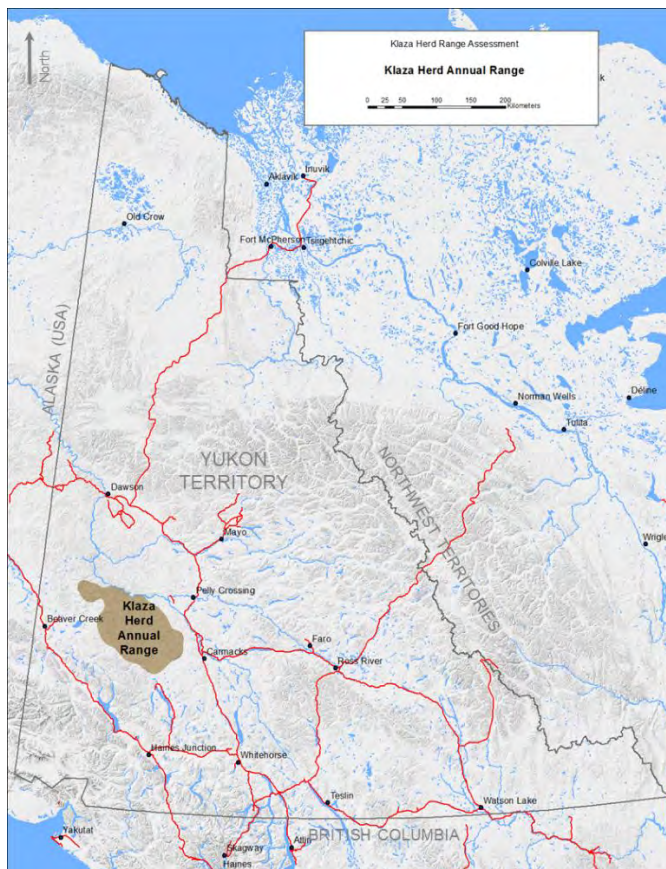
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## Klaza Caribou Herd Range Assessment

### APPENDIX B: FUTURE LAND USE SCENARIO and POTENTIAL LEVELS OF HUMAN DISTURBANCE

## 1 PURPOSE

Appendix B describes a conceptual mineral exploration and development scenario for the annual range of the Klaza caribou herd in the Dawson Range of west-central Yukon (**Figure 1**). The purpose of this land use scenario is not to predict what may happen given certain economic conditions but to provide a means to investigate potentially increasing mineral exploration and development activity on the Klaza caribou herd. Based on current and likely developments, the Klaza range future land use scenario outlines a potential sequence of mineral exploration and development activities over a period of 25 years. Potential levels of human seasonal disturbance (i.e., zone of influence - ZOI) resulting from the future activities have been calculated to aid in the assessment of potential future risks facing the Klaza caribou herd. Exploring future land use also aids in the identification of better-informed landscape-level management and mitigation strategies in advance of potentially increasing levels of human activity within the herd's range. The potential effects of the Klaza herd range future land use scenario on Klaza caribou and their habitats are discussed in Section 5 of the main report.



**Figure 1.** Annual range of the Klaza caribou herd in west-central Yukon.

## 1.1 Background

A land use scenario is a plausible future situation based on specific assumptions about the rate, location and timing of land use activities. The purpose of the Klaza herd range land use scenario is not to predict the future; it is intended to provide a framework for investigating the potential effects of plausible future land use activity on the Klaza caribou herd and its habitats.

Human land use results in a variety of direct and indirect disturbances to woodland caribou and their habitat. Many of the potential risks facing the Klaza caribou herd may be associated with potential future land use activity within its annual range. In order to better understand the magnitude of these potential risks, it was necessary to develop a future land use scenario and consider the cumulative effect of multiple land uses or projects over a meaningful time period. Such analyses are often beyond the scope of individual project assessments as examined through the *Yukon Environmental and Socio-economic Assessment Act* (YESAA) process.

## 2 METHODS

Scenario methodology generally follows that used by Francis and McNeil (2014). The Klaza herd range future land use scenario was developed based on plausible timelines of existing, reasonably foreseeable, or likely mineral exploration and development projects, using the following sources:

- Mineral exploration and development projects considered as part of prior Government of Yukon work in the Dawson Range (Francis and McNeil 2014);
- Projects identified in the Casino Project EIA, Appendix 5B (Cumulative Effects Project List)<sup>1</sup>; and
- Other existing advanced exploration mineral projects with longer-term potential of becoming an operating mine.

The location of existing and advanced quartz and placer mineral projects, and active mineral claims and permits was obtained from Government of Yukon mapping databases<sup>2</sup>, current November 2014.

### 2.1 Existing and Future Projects

A generalized mineral project database (point .shp GIS file) was developed from available Government of Yukon databases and surface disturbance mapping completed for the Klaza herd range assessment (**Table 1**). The mineral project database contained active mines, past mines, advanced exploration projects, active placer mines, some early exploration projects, and airstrips. Future potential grass roots (i.e., Class 1) quartz mineral exploration projects were not included in this database—only existing identified projects were projected forward through the 25 year scenario period. Selected advanced exploration properties were converted to active mines at defined periods, and some active mines were converted to past mines, based on their anticipated production lifespan. Active placer mines were

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<sup>1</sup> The Casino Project cumulative effects assessment considered the following major projects: Casino and Freegold Road extension, Minto Mine (active), Carmacks Copper (future) and Mount Nansen (closed).

<sup>2</sup> Mineral tenure and project data obtained from Geomatics Yukon at:  
<ftp://ftp.geomaticsyukon.ca/GeoYukon/Mining/>

assumed to continue operating in the same locations as current. This database was attributed for type of project, time period of activity, season of major activities (summer or all-season) and potential lower or higher human ZOI.

## 2.2 Existing and Future Linear Features

Linear features mapped as part of the main Klaza herd range assessment were used to represent the current road and trail network within and around the range. Seven linear feature types were identified (**Table 2**). Existing linear features were maintained throughout the 25 year scenario, and only new major features (i.e., Freegold Road extension and a potential road to Coffee Creek property) were added at specified time periods. Some roads were converted from summer-only access to all-season access where and when appropriate (e.g., existing Freegold Road becomes all-season road as part of the Casino Project).

**Table 1.** Generalized mineral project types and features included in the Klaza herd future land use scenario, and their associated lower and higher zones of influence (ZOI).

### Generalized Project Types

Feature Name	Feature Code	Description	Lower ZOI (m)	Higher ZOI (m)
Airstrip	A	Active airstrips.	1,000	4,000
Early Exploration	E_EXPL	Early quartz exploration activities. Class 1 exploration sites or heli-supported drilling without multi-season mining camp.	1,000	4,000
Advanced Exploration	A_EXPL	Advanced quartz exploration activities. Well established mineral properties with semi-permanent mining camp and extensive ground-based activities such as trenching and new road and trail construction. Airstrips are often associated with these sites.	2,000	5,000
Active Mine	MINE	Active (producing) quartz (hard rock) mine.	4,000	10,000
Past Mine	PAST_MINE	Past quartz mine(s) under care and maintenance or abandoned.	1,000	4,000
Placer	PLACER	Active placer mining area.	1,000	4,000

**Table 2.** Linear land use features included in the Klaza herd future land use scenario and their associated lower and higher zones of influence (ZOI).

### Linear Features

Feature Name	Feature Code	Description	Average Width (m) *	Lower ZOI (m)	Higher ZOI (m)
Powerline	PL	Cleared powerline right of way and associated above ground structures (power poles and power lines).	8	1,000	1,000
Rough Road	ROU	Other roads leading to or within areas of high mineral exploration activity.	10	1,000	4,000
Secondary Road	SEC	Wide maintained roads leading to areas of high mineral exploration activity (e.g., Freegold and Mount Nansen Roads).	10	1,000	4,000
Survey Cutline	SCL	Linear clearings; may be old winter roads or trails.	12	250	250
Trail	TRA	Exploration trails (access to drill pads, etc.).	6	250	250
Trench	TRE	Trenching conducted in support of mineral exploration.	10	250	250
Unknown	UNK	Other unclassified linear features (most appear to be trails and partially overgrown roads).	6	250	250

\* Average width (m) calculated from average of measured feature widths.

## 2.3 Season of Activity and Human Zone of Influence

As described in the main Klaza herd range assessment report, human ZOI values assigned to each linear feature and project type were determined based on a literature review of potential caribou responses to human infrastructure and activities. The lower and higher human ZOI values assigned to each feature or project type are listed in **Table 1** and **Table 2**. ZOI buffers were only applied to features or project locations during the season of activity. For mineral exploration and placer activities, it was assumed that most human activity associated with the site occurred during the summer season (summer defined as the snow-free period). Similarly, with the exception of the Mount Nansen Road, most roads and trails in the Klaza herd range were assumed to only receive human use during the summer season.

To simplify the analyses, only lower and higher ZOI buffers were applied seasonally and their area tabulated—the potential direct footprint resulting from future land use activities was not calculated. The seasonal area affected by potential human ZOI was reported by caribou assessment area (**Table 3**).



**Table 3.** Klaza herd range caribou assessment areas (CAA).

CAA Number	CAA Name	General Description and Rationale for Identification	Area (km <sup>2</sup> )	Area (% annual range)
1	Freegold Road – Mount Nansen	This area has the highest level of existing human development and activity in the Klaza herd range. There are two existing roads, a number of advanced quartz exploration and placer properties, and a past producing gold mine in the area.	3,104	28.7
2	Casino Trail – Coffee Creek	While this area currently has relatively low footprint and human activity, an all-season haul road and a large open pit mine are proposed for this part of the Klaza herd range. In addition, several advanced quartz mineral exploration properties are located along the proposed road route, as well as existing placer operations. Development of the all-season road and potential future mines would result in a large increase in all-season human activity and habitat disturbance in this area.	4,181	38.6
3	Klotassin River – Nisling River	This area is remote and currently receives limited human access. This part of the Klaza herd range has the lowest level of human development footprint and activity, and future levels of activity are also anticipated to be lower than in CAA 1 and CAA 2.	3,535	32.7
	TOTAL RANGE		10,819	100.0

### 3 SCENARIO DESCRIPTION

The Dawson Range has long been a region with high mineral exploration and development interest. Many of the existing advanced exploration properties have been known and explored for decades. Given this situation, the future land use scenario examines potential mineral exploration and development activity in the annual range of the Klaza caribou herd in the coming 25 years. A period of 25 years was selected as a reasonable length of time to examine the life-cycle of multiple mineral exploration and development projects.

The scenario focuses on mineral exploration and development for the following reasons:

- Almost all existing roads, trails and other human surface disturbances in the Klaza herd range have resulted from past or current quartz and placer mineral exploration activities. The Freegold and Mount Nansen roads were constructed to support mineral exploration and development activities.
- Given the large area of mineral staking and the number of advanced exploration properties resulting from the 2009 to 2011 White Gold staking rush, it is likely that a high level of mineral interest will continue into the future. One major mining and road transportation project is currently undergoing environmental assessment. Development of the new all-season

transportation corridor has the potential to make other projects more feasible, resulting in additional activity.

- There are relatively few other current land uses, or anticipated future land uses, in the area:
  - There is very limited potential for future oil and gas activities;
  - Tourism activities are currently focused along the Yukon River corridor and around Fort Selkirk, a pattern expected to continue in the future;
  - There is very limited commercial forestry potential; and
  - Guided outfitting and hunting occurs in the central Dawson Range but at low levels; a situation expected to continue in the future.

Given the intensity and scale of mineral staking and exploration activities that occurred over the past five years, it is unlikely that a similar level will happen again in the coming decade. Several advanced exploration targets were identified and it is likely that at least in the near to medium term, ongoing periodic exploration of these sites will be the major focus of activities. It is also likely that the existing advanced exploration sites have the greatest chance of resulting in a producing mine in the coming 10 to 20 years.

### 3.1 Scenario Timeline and Activities

**Figure 2** shows the location of current mineral projects considered as part of the Klaza herd range future land use scenario<sup>3</sup>. The timeline and activities associated with the future scenario are shown in **Table 4**. As described above, the land use scenario created for this project focuses on future mineral exploration and development. It begins with the current situation—one producing mine (Minto Mine), multiple advanced exploration sites, multiple placer mines, and a few all-season roads—to the development of a new major all-season road, the upgrading of some existing roads, and multiple producing mines over the 25 year period.

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<sup>3</sup> The time line assumed in this Klaza herd range scenario differs from that developed by Francis and McNeil (2014) as part of the Government of Yukon Dawson Range Cumulative Effect Pilot Project. When the cumulative effects pilot project was initiated, the Casino Project had not yet entered into the YESAB assessment process. Given the scale of the Casino project, it appeared likely that the project may occur at a later period in the scenario time line, with Kaminak Coffee and Carmacks Copper proceeding earlier in the scenario. For this Klaza range scenario, the Casino Project is now in the YESAB assessment process, and the project schedule as stated in its YESAB assessment project submission was followed. Therefore, the Freegold Road extension and development of the Casino mine are assumed to occur in Period 1 (1-7 years future) of the Klaza herd scenario.

The future scenario has four reporting periods (Periods 1 – 4). In each of the scenario periods, the following events are assumed to occur:

- **PERIOD 1 (1 to 7 years future):** the Casino Project and Freegold Road extension proceed as currently proposed, including the conversion and upgrading of the existing Freegold Road to an all-season haul road.
- **PERIOD 2 (8 to 13 years future):** Carmacks Copper begins production early in the period, and the Coffee Creek and Freegold properties become active mines near the end of the period. Only the Coffee Creek property requires development of new major road infrastructure, between the Casino property and the Coffee Creek deposit. Minto Mine ceases production.
- **PERIOD 3 (14 to 19 years future):** The Sonora Gulch property is brought to production, utilizing the Freegold Road extension for access.
- **PERIOD 4: (20 to 25 years future):** The Carmacks Copper mine ceases production. All other operating mines (Casino, Coffee Creek, Freegold, and Sonora Gulch) continue production until at least the end of the 25 year scenario period.

Additionally, existing advanced exploration properties and placer mining activities are assumed to continue as summer seasonal activities throughout the 25 year scenario. All closed or abandoned mines are assumed to require ongoing care and maintenance or reclamation activities for the duration of the scenario (e.g., once Minto Mine ceases production, ongoing reclamation or remediation activities will be required and the existing road to the property will remain open).



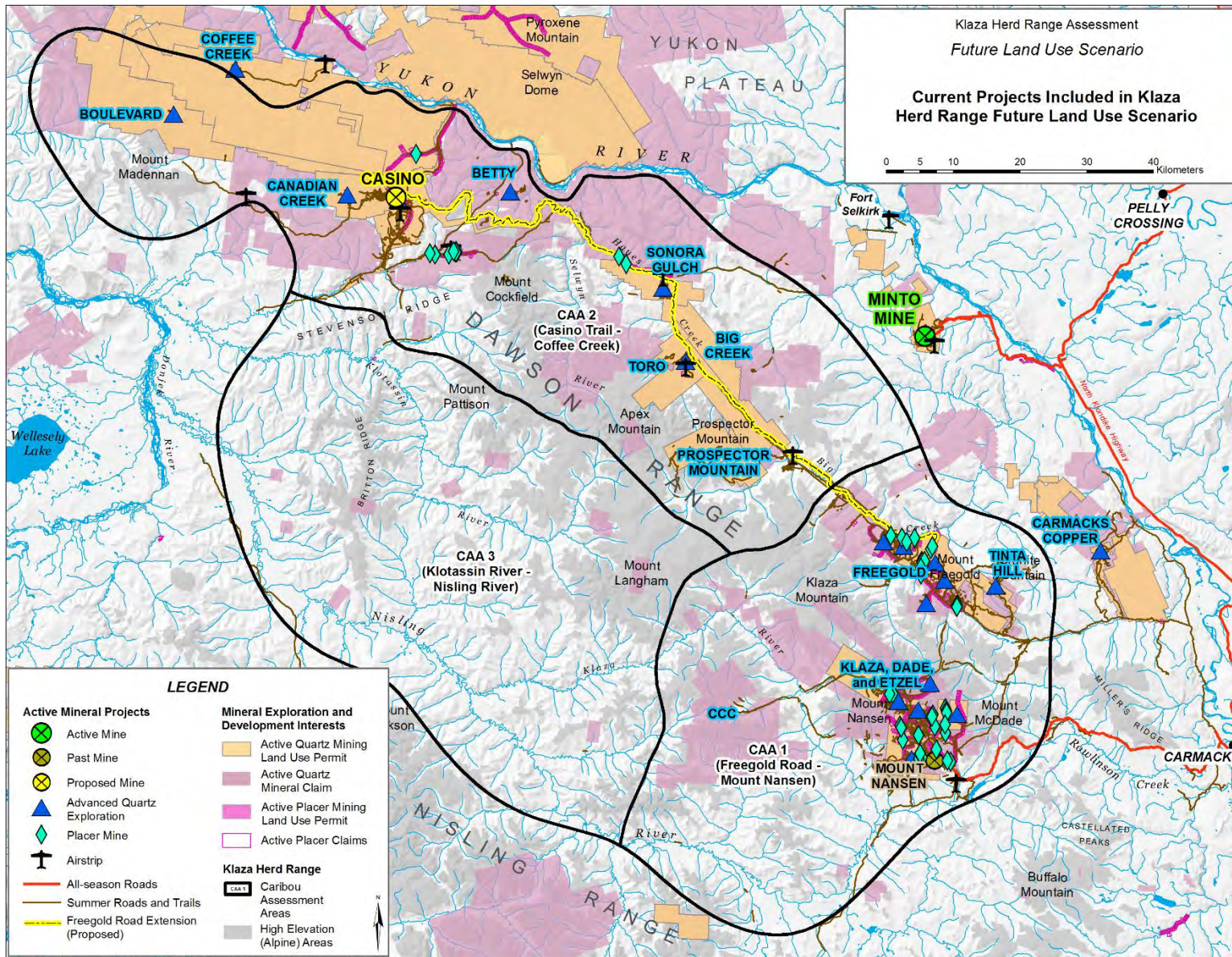


Figure 2. Location of current quartz and placer mineral exploration and development activity considered for the Klaza caribou herd range future land use scenario.

**Table 4.** Timeline of activities assumed for Klaza caribou herd range future land use scenario.

Activity	Project	Current	PERIOD 1							PERIOD 2						PERIOD 3						PERIOD 4							
			Year							Year						Year						Year							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		
QUARTZ MINE DEVELOPMENT and PRODUCTION	Casino																												
	Coffee Creek																												
	Freegold																												
	Sonora Gulch																												
	Mount Nansen																												
	Minto *																												
	Carmacks Copper *																												
QUARTZ EXPLORATION	Advanced Exploration properties continue as summer seasonal activities until selected properties are converted to one of the operating mines as shown above.																												
PLACER MINE PRODUCTION	Existing Placer Mines continue as summer seasonal activities. No new 'frontier' placer areas are created during the scenario.																												
TRANSPORTATION	Freegold Road Extension																												
	Coffee Creek Road																												

\* Minto and Carmacks Copper are outside of the Klaza herd range but may influence herd distribution.

--> Care and maintenance activities associated with mine closure and reclamation.

## 4 RESULTS

The location of current and potential future projects and their associated ZOIs resulting from the Klaza herd range land use scenario is displayed in a time series of maps (**Figure 3** to **Figure 12**). The potential area affected within each CAA is summarized in **Table 5** by time period, season, and lower or higher ZOI value. Seasonal changes in ZOIs in each CAA are shown in **Figure 13**.

### 4.1 Current Situation

Currently, there is a large seasonal difference in the potential level of human activity in the range. In the summer period, when most mineral exploration activities occur, a large portion of CAA 1 (Freegold Road-Mount Nansen) and CAA 2 (Casino Trail-Coffee Creek) may be influenced by human activity (**Figure 3**). In CAA 1, the amount of ZOI in the summer ranges between 23 to 50% of the area, while that in CAA 2 ranges between 13 to 42% (**Table 5**).

During the winter season, the amount of ZOI ranges from 1 to 6% in CAA 1, and almost none in CAA 2 (**Figure 4**). The Mount Nansen Road is maintained in the winter, providing access to the Mount Nansen mine site for ongoing remediation activities (this also provides public access to the area). On the periphery of the Klaza herd range, Minto Mine operations are all-season. The Casino Trail receives some winter road use for mine site material transport, but only infrequently.

In contrast to CAA 1 and CAA 2, CAA 3 (Klotassin River – Nisling River) receives very limited summer or winter human activity (**Figure 3** and **Figure 4**). As indicated by the relatively low number of active mineral claims in this area (**Figure 2**), in the recent past CAA 3 has not been an area of high mineral exploration interest in the Klaza herd annual range.

### 4.2 Future Situation

#### 4.2.1 CAA 1 (Freegold Road – Mount Nansen)

The Klaza future scenario assumes that as part of the Casino Project the existing Freegold Road is upgraded to an all-season haul road in Period 1, and the Freegold property becomes an active mine in Period 2. Due to the existing high levels of human activity in this area, the future additional footprint and activities may only add a relatively small amount of new disturbance to the level of summer ZOI (compare **Figure 3** to **Figure 11**). The current amount of summer ZOI ranges between 23 and 50% while at the end of Period 4, this increases only marginally, to between 23 and 52%.

However, as a result of the Freegold Road becoming an all-season road, and the Freegold property changing from a summer-only advanced exploration site to an all-season active mine site, the amount of ZOI during the winter period is expected to increase considerably (compare **Figure 4** to **Figure 12**). In CAA 1, the amount of winter ZOI increases from the current range of 2 to 6%, to between 6 and 22% at the end of Period 4. The largest change occurs in Period 1, when the Freegold Road becomes an all-season route.





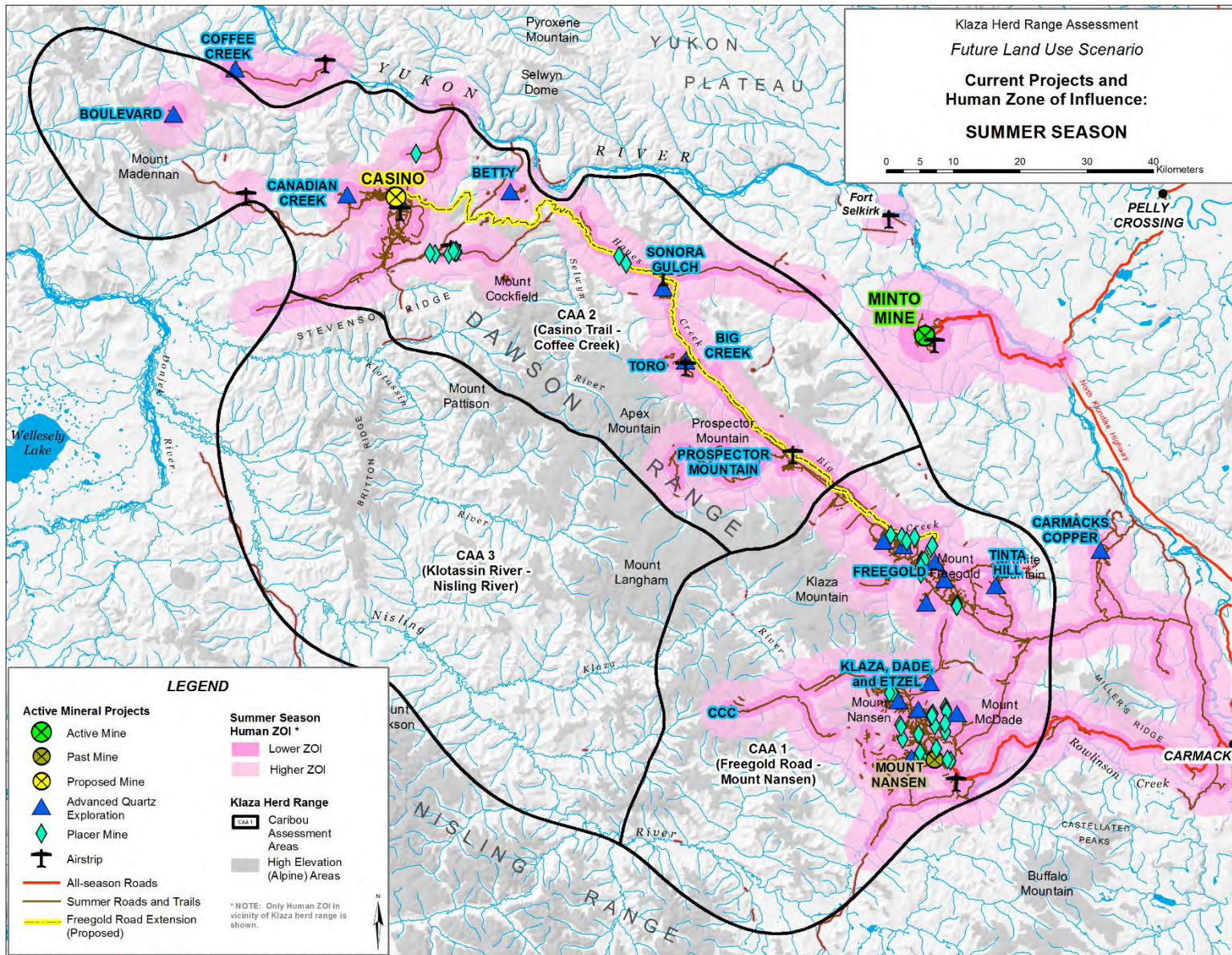


Figure 3. Current human ZOI resulting from Klaza caribou herd range land use scenario – summer season.



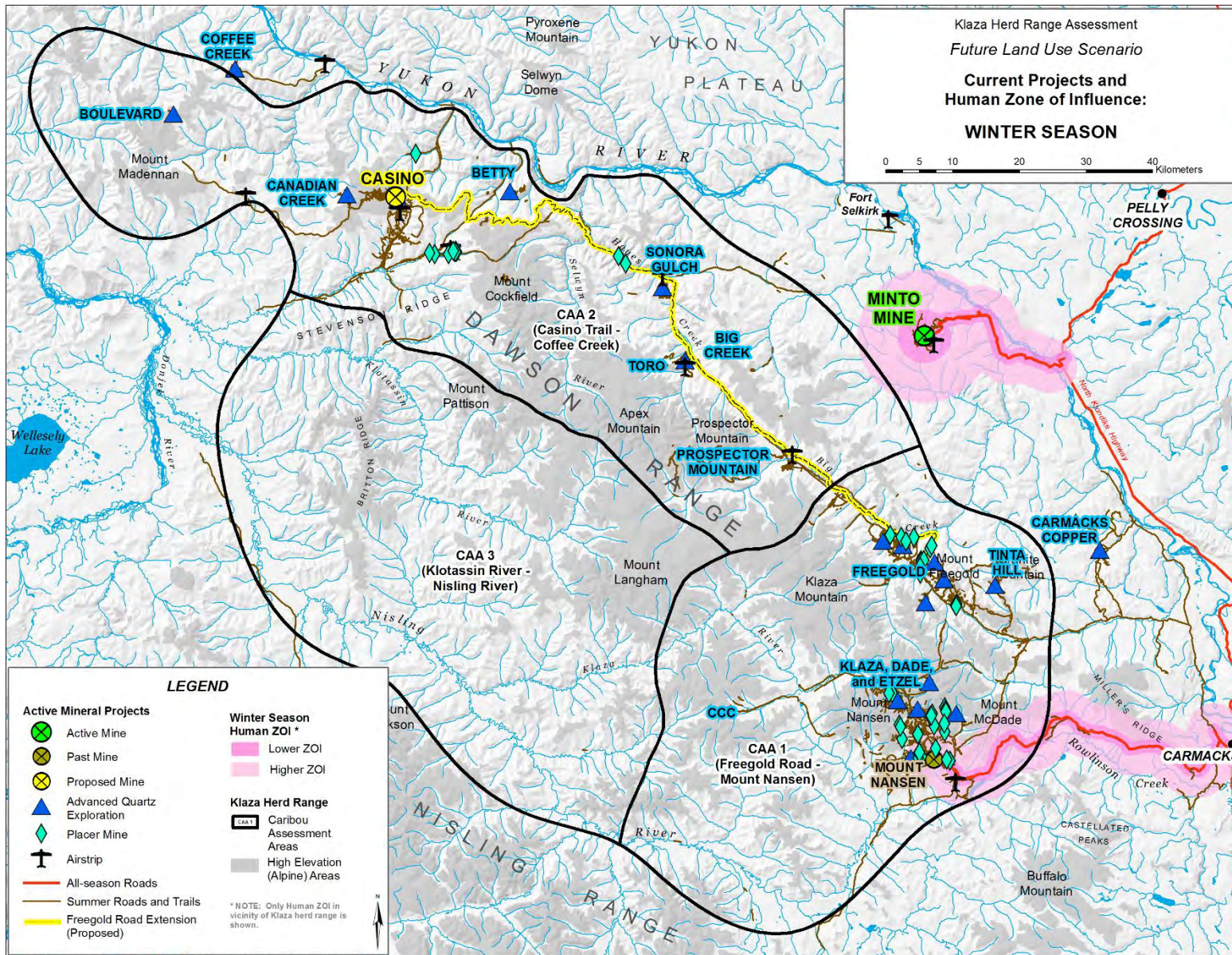


Figure 4. Current human ZOI resulting from Klaza caribou herd range land use scenario – winter season.



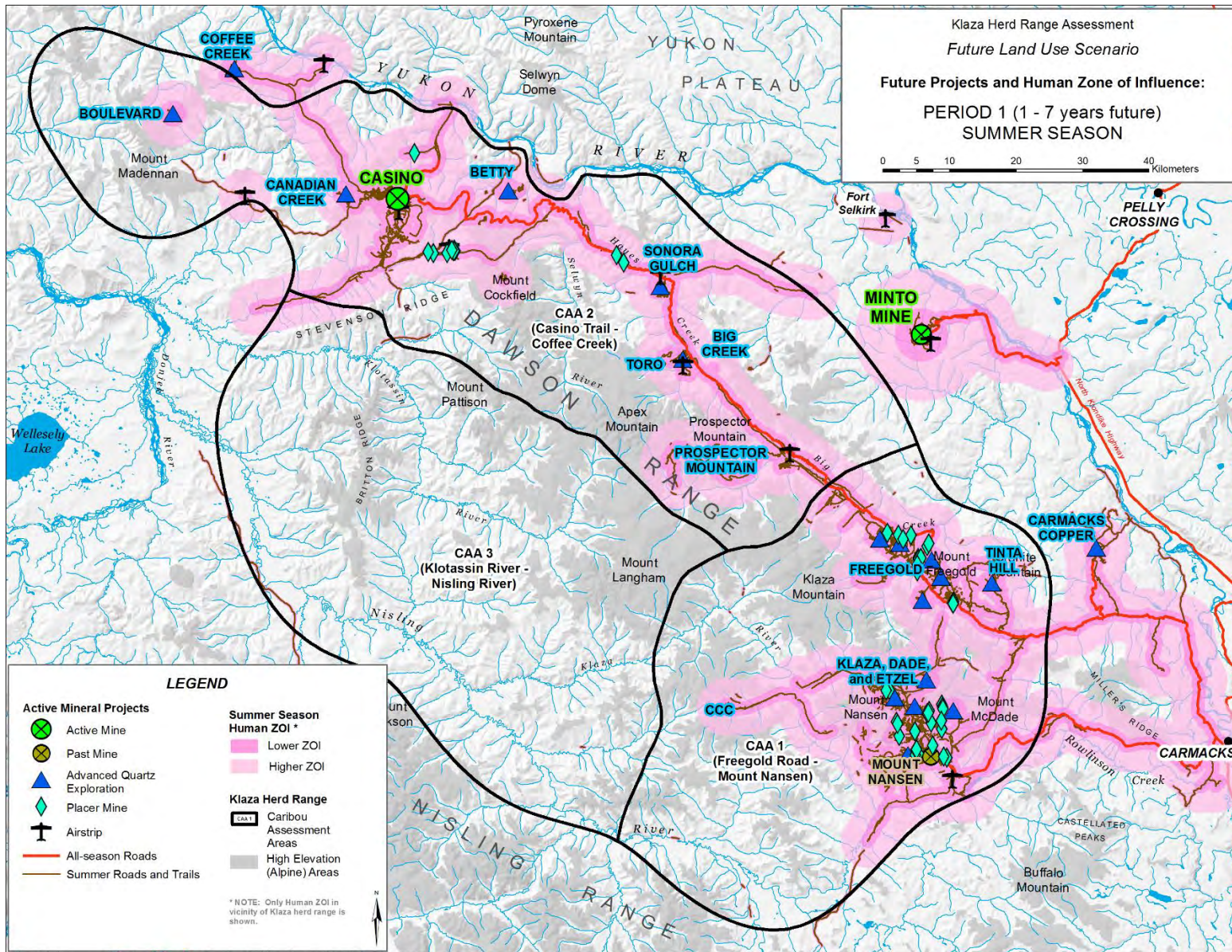


Figure 5. Potential future human ZOI resulting from Klaza caribou herd range land use scenario – Period 1 (1 to 7 years future), summer season.



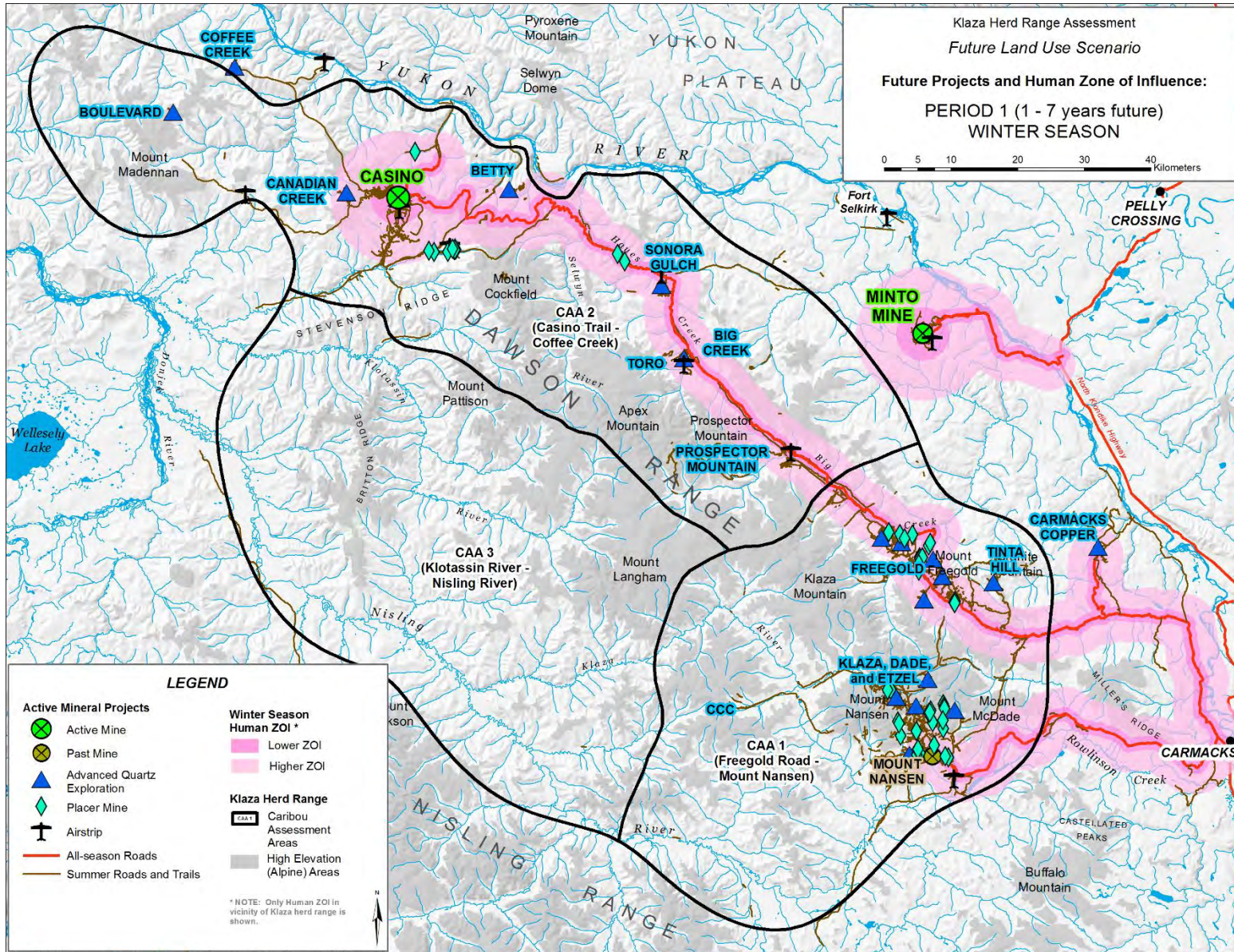


Figure 6. Potential future human ZOI resulting from Klaza caribou herd range land use scenario – Period 1 (1 to 7 years future), winter season.



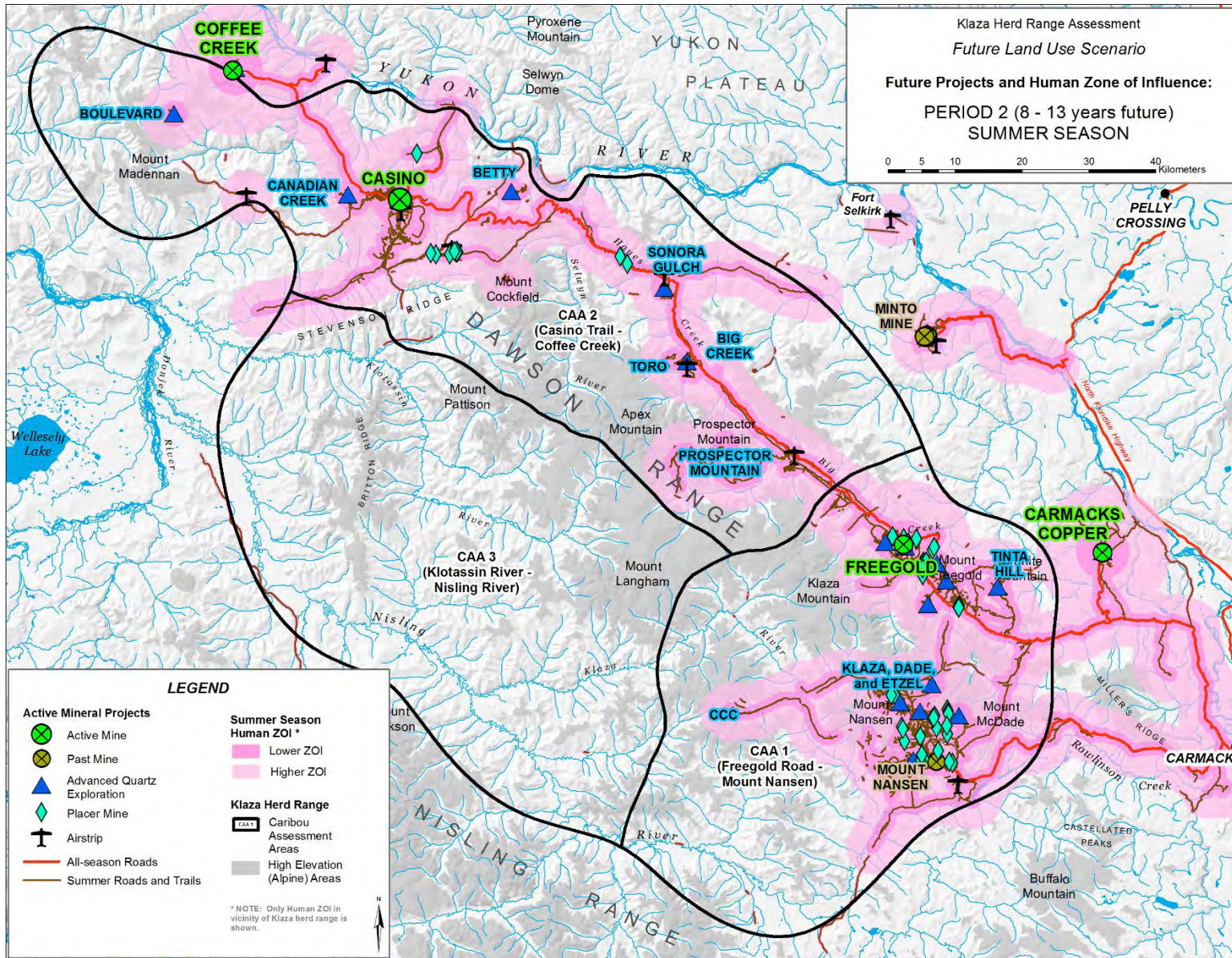


Figure 7. Potential future human ZOI resulting from Klaza caribou herd range land use scenario – Period 2 (8 to 13 years future), summer season.



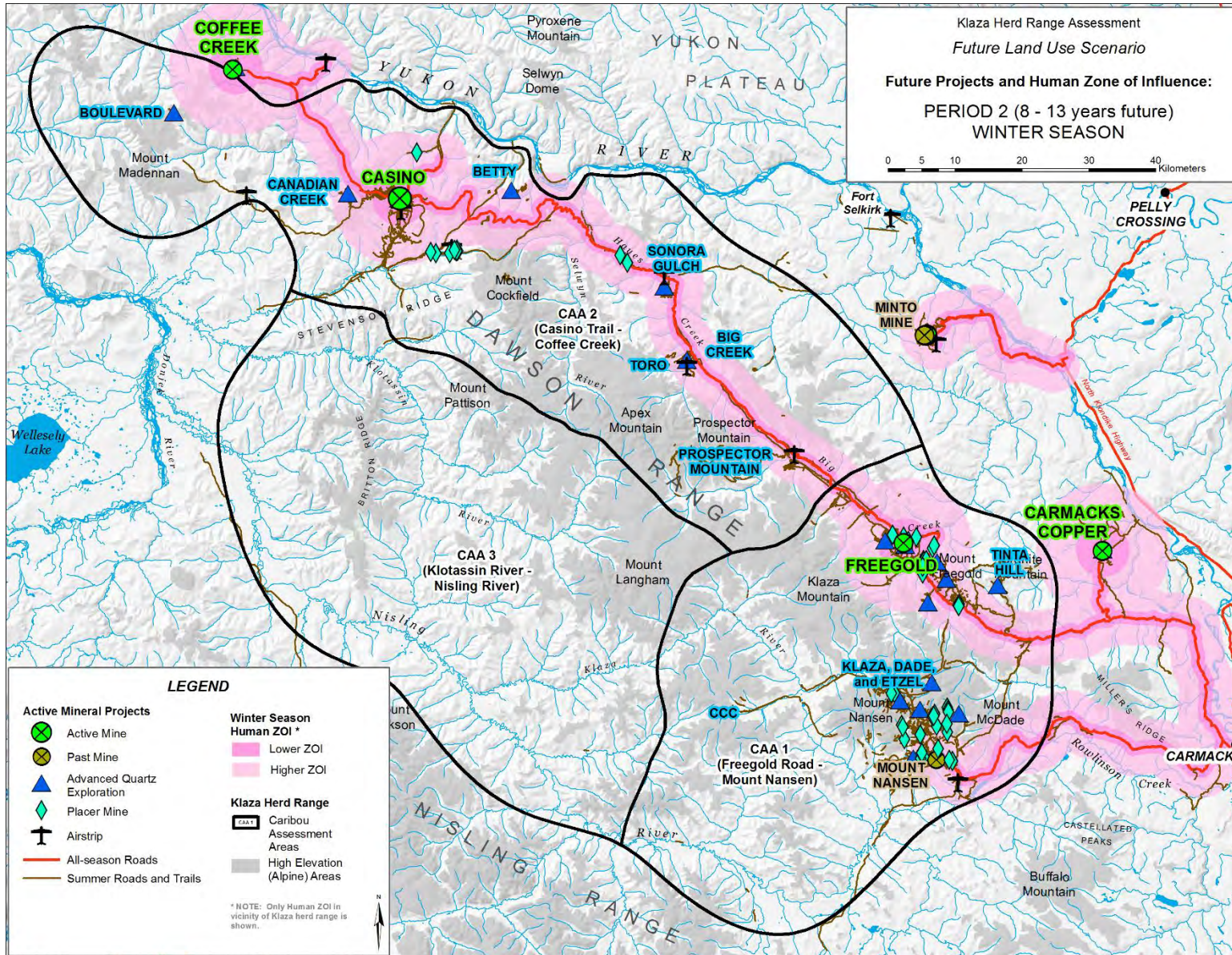


Figure 8. Potential future human ZOI resulting from Klaza caribou herd range land use scenario – Period 2 (8 to 13 years future), winter season.



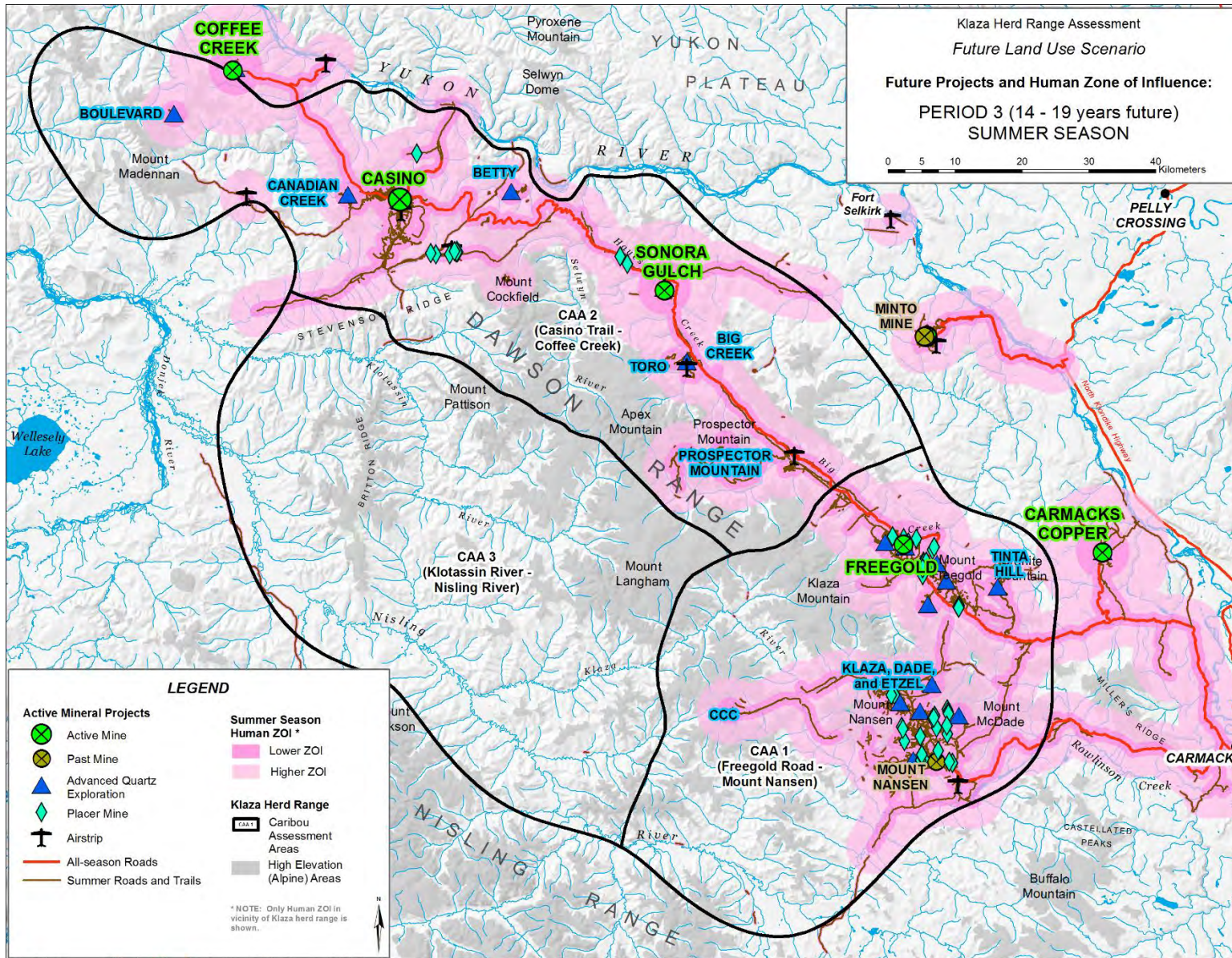


Figure 9. Potential future human ZOI resulting from Klaza caribou herd range land use scenario – Period 3 (14 to 19 years future), summer season.



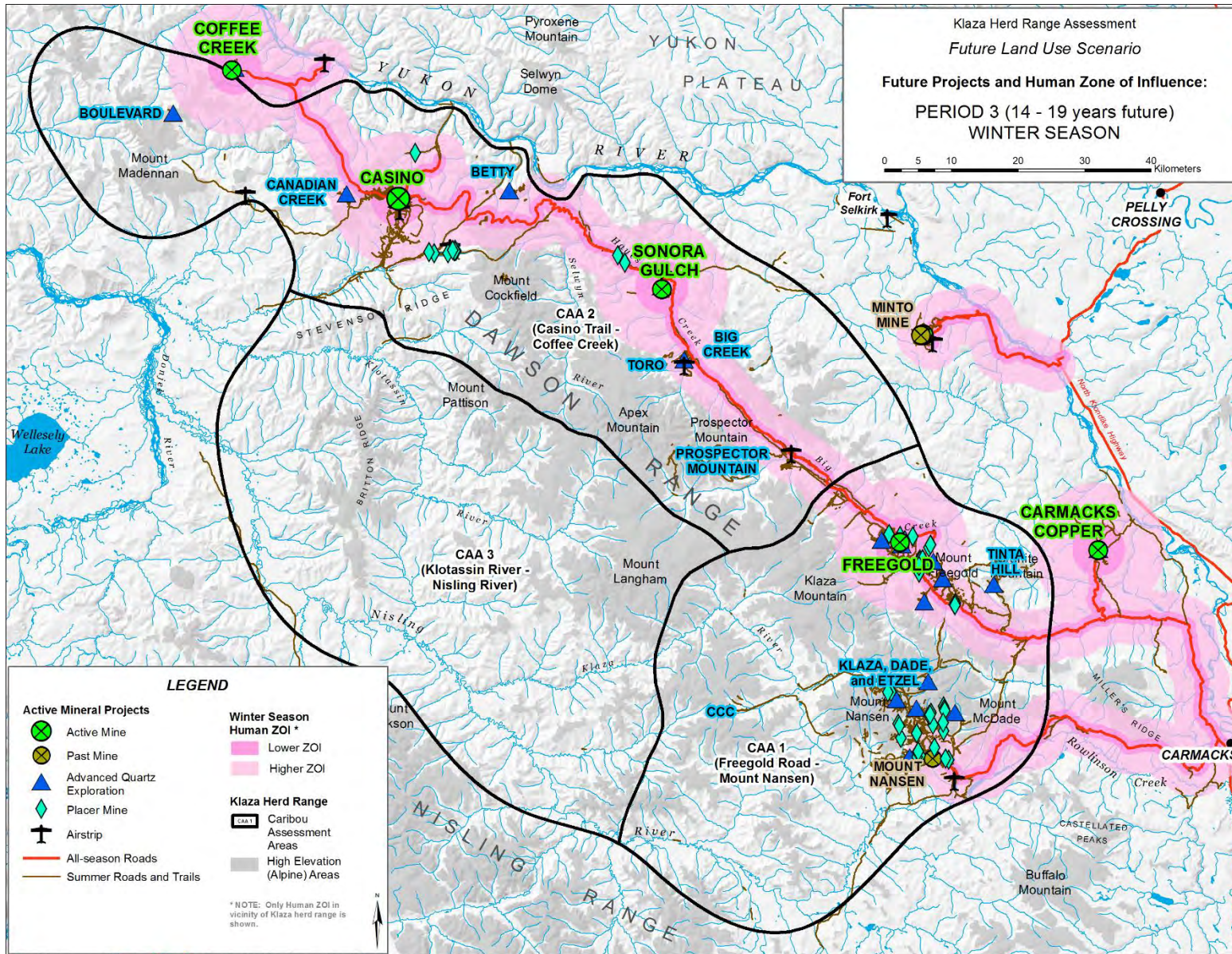


Figure 10. Potential future human ZOI resulting from Klaza caribou herd range land use scenario – Period 3 (14 to 19 years future), winter season.



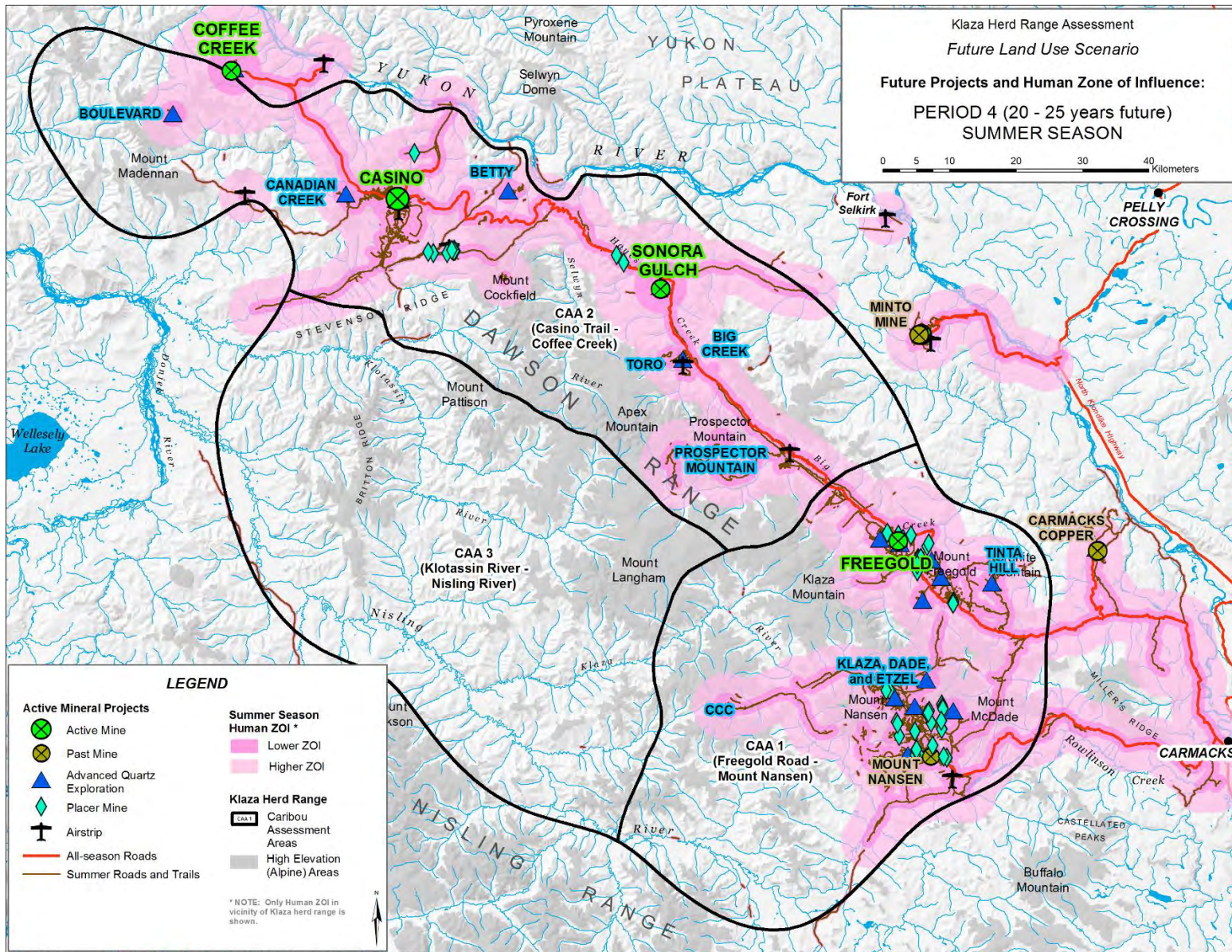


Figure 11. Potential future human ZOI resulting from Klaza caribou herd range land use scenario – Period 4 (20 to 25 years future), summer season.



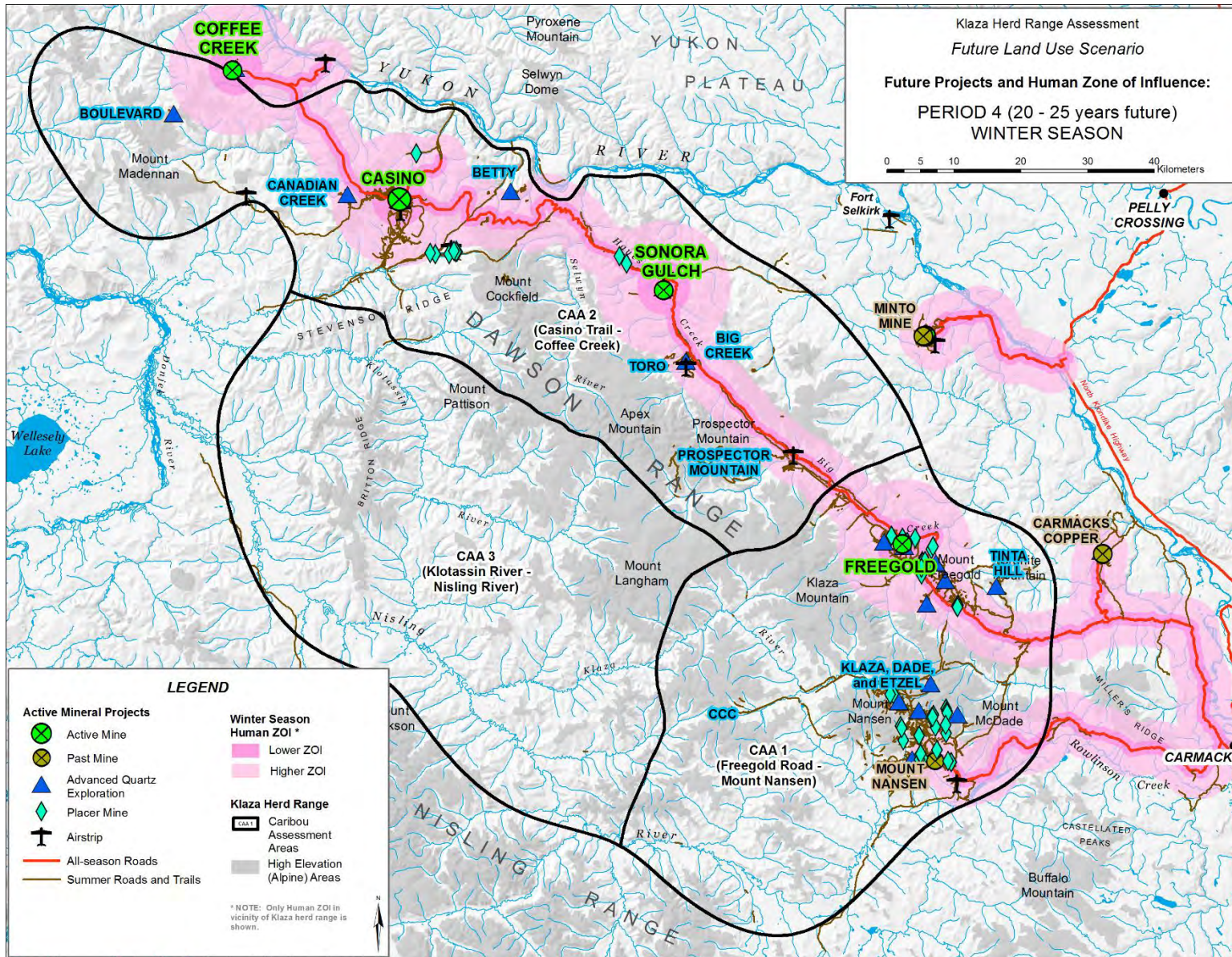
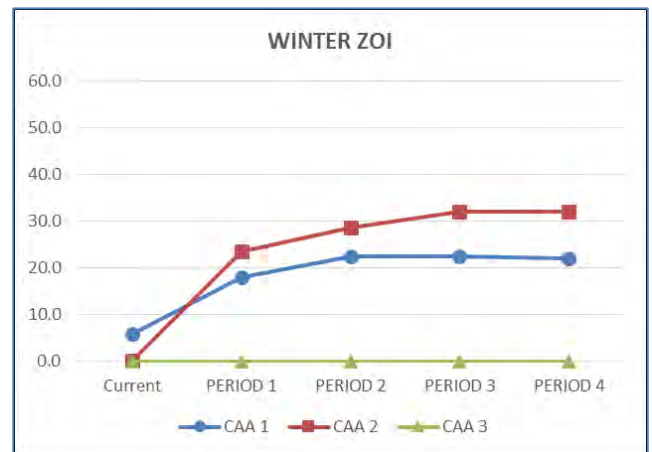
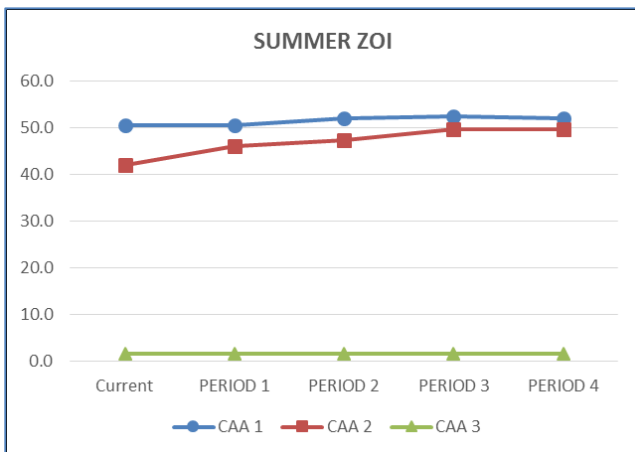


Figure 12. Potential future human ZOI resulting from Klaza caribou herd range land use scenario – Period 4 (20 to 25 years future), winter season.

**Table 5.** Potential area affected by human zone of influence (ZOI) in each CAA resulting from the Klaza caribou herd range future land use scenario.

Future Land Use Scenario			Freegold Road - Mount Nansen (CAA 1)		Casino Trail - Coffee Creek (CAA 2)		Klotassin River - Nisling River (CAA 3)	
PERIOD	SEASON	ZOI	Area (km2)	Area (%) CAA	Area (km2)	Area (%) CAA	Area (km2)	Area (%) CAA
CURRENT	SUMMER	Lower	718.0	23.1	559.1	13.4	20.6	0.6
		Higher	1,572.5	50.7	1,759.2	42.1	56.1	1.6
	WINTER	Lower	47.2	1.5	0.0	0.0	0.0	0.0
		Higher	186.1	6.0	10.2	0.2	0.0	0.0
PERIOD 1 (1 - 7 yrs)	SUMMER	Lower	718.2	23.1	673.2	16.1	20.6	0.6
		Higher	1,572.5	50.7	1,928.1	46.1	56.1	1.6
	WINTER	Lower	147.1	4.7	257.7	6.2	0.0	0.0
		Higher	563.2	18.1	987.1	23.6	0.0	0.0
PERIOD 2 (8 - 13 yrs)	SUMMER	Lower	725.0	23.4	692.4	16.6	20.6	0.6
		Higher	1,621.6	52.2	1,986.1	47.5	56.1	1.6
	WINTER	Lower	177.9	5.7	311.4	7.4	0.0	0.0
		Higher	696.4	22.4	1,203.1	28.8	0.0	0.0
PERIOD 3 (4 - 19 yrs)	SUMMER	Lower	729.8	23.5	711.0	17.0	20.6	0.6
		Higher	1,633.5	52.6	2,077.0	49.7	56.1	1.6
	WINTER	Lower	177.9	5.7	341.7	8.2	0.0	0.0
		Higher	696.4	22.4	1,343.4	32.1	0.0	0.0
PERIOD 4 (20 - 25 yrs)	SUMMER	Lower	729.8	23.5	711.0	17.0	20.6	0.6
		Higher	1,621.3	52.2	2,077.0	49.7	56.1	1.6
	WINTER	Lower	177.9	5.7	341.7	8.2	0.0	0.0
		Higher	683.5	22.0	1,343.4	32.1	0.0	0.0



**Figure 13.** Potential changes in the area of human zone of influence (ZOI) in each CAA during the summer and winter seasons resulting from the Klaza herd range future land use scenario.



### 4.2.1 CAA 2 (Casino Trail – Coffee Creek)

CAA 2 is expected to receive the largest increase in both summer and winter seasonal human disturbance in the Klaza herd annual range (**Table 5**). The scenario assumes the Freegold Road extension and Casino Project proceeds in Period 1, followed by conversion of the Coffee Creek and Sonora Gulch advanced exploration sites to active mines in Periods 2 and 3, respectively. Given the current high level of summer activity around many of the existing advanced exploration sites in this area, the added contribution of these new developments to the summer ZOI is relatively small, increasing, with an increase from the current amount of 13 to 42% to 17 to 50% in Period 4 (compare **Figure 3** to **Figure 11**).

In contrast, development of the all-season Freegold Road extension and three active mines along this road would result in a major increase in the level of ZOI during the winter period (compare **Figure 4** to **Figure 12**). Currently, there is almost no ZOI during the winter due to the relative inaccessibility of the area during this season. In Period 1, construction of the Freegold Road extension and Casino project results in an increase in winter ZOI to 6 to 24%. By the end of Period 4, this amount has increased gradually to 8 to 32%, as the Coffee Creek and Sonora Gulch properties become active mines.

### 4.2.2 CAA 3 (Klotassin River – Nisling River)

Currently, there are no advanced exploration or placer projects in CAA 3. The Klaza herd range future land use scenario assumes that none of the active mineral claims shown in **Figure 2** proceed to an advanced exploration project or an active mine. Given this assumption, the future amount of seasonal ZOI in the Klotassin River – Nisling River area does not increase above the currently very low value.

## 5 DISCUSSION

### 5.1 Key Findings

The Klaza herd range future land use scenario provides a framework to evaluate the potential effects of future mineral exploration and development activity on the Klaza caribou herd (these effects are discussed in the main Klaza herd range assessment report). Key findings are as follows.

#### 5.1.1 Increasing Human Disturbance

Given the level of mineral exploration interest and the number of advanced exploration/proposed projects, it is likely that the amount of human disturbance will increase above current levels in the coming decades. This increase will likely be largest in CAA 2 (Casino Trail – Coffee Creek), and will be most acute during the winter period.

Since 2009, the Dawson Range has experienced very high levels of human activity during the summer period, potentially affecting 50% of CAA1 (Freegold Road – Mount Nansen) and 42% of CAA 2 during the snow-free season (**Figure 3**). While there are a large number of exploration projects and road-accessible areas within the herd's range during the summer, there is currently a very low level of a human activity during the winter. If the Freegold Road extension proceeds as proposed and multiple mines are developed along this corridor, they will also be active during the winter period, resulting in all-season human access and activity (**Figure 12**). These effects will be greatest in CAA 2, with amount of winter ZOI

potentially increasing from the current value of near zero to affecting 32% of the area in 25 years. Large increases would also be expected in CAA 1, when the existing Freegold Road becomes an all-season corridor.

In areas with high levels of existing human summer activities (e.g., advanced exploration and active placer operations around Freegold Road or Mount Nansen in CAA 1), additional summer activity may not result in meaningful increases in human disturbance. Given the long-standing mineral properties and the seasonal summer activities in the Dawson Range, the conversion of these activities along with roads to all-season use is the main factor affecting increasing the amount of ZOI in the Klaza herd range.

### 5.1.2 Winter Season Human ZOI

Given the location of future potential mines and the proposed Freegold Road extension, increasing direct and indirect human disturbance will affect a disproportionately high amount of the Klaza herd winter range, particularly in CAA 2. In **Figure 3** to **Figure 12**, alpine areas greater than 1,200 m in elevation are shown in grey; these areas generally represent the potential summer range of the Klaza caribou herd. As illustrated on the maps, most new winter season human ZOI is anticipated to affect the areas below 1,200 m in elevation—the potential winter range of the Klaza caribou herd.

### 5.1.3 Remaining Unaffected Areas

If mineral exploration and development projects continue in locations similar to those assumed for this scenario, CAA 3 (Klotassin River – Nisling River) is anticipated to be the only remaining area generally unaffected by human activities in the Klaza herd annual range. Further, CAA 3 is expected to be the only large area of potentially remaining unaffected winter habitat, as much of CAA 1 and CAA 2 may be affected during the winter period.

## 5.2 Interpretation

The following points should be considered when interpreting the results of the Klaza herd range future land use scenario:

### 5.2.1 Future Land Use Uncertainty

- The Klaza herd range future land use scenario examines potential mineral exploration and development activity in the central Dawson Range in the coming 25 years. While the scenario is based on plausible events and proposed timelines of existing projects (e.g., Casino Project), the scenario represents one potential mineral exploration and development future for the central Dawson Range. All advanced exploration sites may not be active every year for the entire 25-year scenario period. All or some of the projects assumed to proceed to active mines may or may not occur, or may occur on a different timeline. Alternatively, different projects may proceed to a more advanced stage. While there is inherent uncertainty in attempting to forecast future land use conditions, the Klaza range scenario represents a plausible future situation for the Dawson Range, and one that is desired by the mineral exploration and development sector.

### 5.2.2 Levels of Future Disturbance

- The lower and higher ZOI values assigned to the different land use features (**Table 1** and **Table 2**) have a large effect on the amount of ZOI in each CAA (**Table 5**). At this time, it is not possible to state which values are more likely, or correct. The ZOI values represent defensible lower and upper bounds of human disturbance effects around land use features and activities supported by literature<sup>4</sup>.
- The ZOIs reported in this exercise do not consider helicopter-supported early mineral exploration activities (i.e., ZOIs were calculated only around known existing and potential future advanced exploration locations, many of which utilize summer airstrips for fixed-wing access). During the White Gold staking rush of 2009 to 2011, the amount of helicopter activity in the Dawson Range was substantial. Such levels of helicopter-supported activities may again occur in the future if another staking rush occurs.
- The ZOI values presented do not include the direct habitat disturbance effects of wildfire. Recent wildfire disturbance reduces the amount and quality of woodland caribou winter habitat for a period of at least 50 years. Recent wildfire disturbance would be additive to the seasonal human ZOIs reported in Section 4, and would primarily affect the lower elevation forested areas that comprise the majority of the Klaza herd winter range. The combination of human disturbance and recent wildfire will therefore result in a higher amount of cumulative disturbance on the winter range than indicated by human ZOI alone.
- In this scenario analysis, direct human-caused habitat disturbance has not been tracked (it was included as part of the total potential disturbance). While human ZOI around direct disturbances may be seasonal in nature and can potentially be reduced using timing windows or other operational practices, direct human footprint results in either a short or long-term reduction in the amount of caribou habitat. For features such as all-season roads, mine sites and tailings areas, this reduction may be relatively permanent leading to incremental, long-term habitat loss. In the Dawson Range, the direct habitat loss resulting from mineral exploration and development-related footprints is anticipated to be relatively small in comparison to their potential indirect effects on woodland caribou habitat effectiveness. However, recognizing the different effects of direct and indirect disturbance is an important consideration when developing management strategies to reduce impacts on the Klaza herd.

## 6 REFERENCES

Casino Mining Corporation. 2014. Casino project proposal for YESAB Executive Committee review. Volumes I-V. January 2014. Vancouver, BC.

Francis, S.R., and P. McNeil. 2014. Dawson Range cumulative effects pilot project. Appendix A: Future land use scenario. Final Report. Prepared by S. Francis and P. McNeil with input from Government of Yukon Corporate Response Team. February 2014.

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<sup>4</sup> Human ZOI values and supporting literature sources are discussed in detail in the main Klaza herd range assessment report.