Caribou Range Assessment and Technical Information

APPENDIX B:
Human Development Features and Zone of Influence Assumptions and References

1. Background

In the Bathurst Caribou Range Plan (BCRP), human disturbance is defined as the area directly affected by human land use features (i.e., the development footprint) and its surrounding zone of influence (ZOI). Land use features such as roads, settlements and mine sites represent development footprints that directly result in habitat loss or alteration because of the space they occupy on the land. The ZOI is an associated area around the direct footprint that corresponds with an avoidance response (Johnson et al. 2005, Boulanger et al. 2012, Johnson and Russell 2014), where animals shift their distribution away from a development, alter behaviour in the vicinity of a facility, or change the types or quality of habitats used (Johnson and St. Laurent 2011). For barren-ground caribou a ZOI has been observed based on lower caribou abundance within a certain distance of established diamond mines than would be expected given available habitat (Boulanger et al. 2015, Caribou Zone of Influence Technical Task Group 2015). Some of the factors that are thought to influence caribou behavior or habitat use within the ZOI are sensory disturbances such as noise, dust, odors, and the visual stimuli from lights and viewscape – buildings, people, vehicles, and equipment. Thus, some implications of the indirect effect of a ZOI on caribou include the following:

- areas adjacent to development footprints are avoided or used less frequently resulting in reduced habitat availability;
- time spent feeding and intensity of feeding may be reduced concomittant with increased levels of activity (running and walking), which result in higher energetic costs to caribou leading to indirect population effects); or
- mortality risk may increase (direct population effect) in the case of roads and hunting access.

The area directly affected by human land use features is calculated directly from GIS mapping. Human land use features can be considered as either linear or areal (polygonal) features. Polygonal features include settlements, mine sites, gravel pits, and similar. Linear features include all-season roads, winter roads, trails, and electrical transmission corridors.

The ZOI around development footprints is the area indirectly affected by human activities, and is more difficult to define. The distance a ZOI may extend around a feature, and its effect on wildlife, varies depending on the nature of the development feature and the level of activity associated with the feature. Nonetheless, accounting for the ZOI around different development features is an important aspect of considering the total disturbance and cumulative effect of development footprints on wildlife. In GIS mapping, ZOI is estimated as a buffer of a defined distance around the development features.

2. Human Development Features and ZOI Extents

The ZOI extents used to represent indirect effects around the different linear and polygonal features contained in the Bathurst Caribou Range Plan GIS database are listed in **T**able 1 and Table 2, respectively. The ZOI around different feature types was estimated based on a literature review and values used in recent environmental assessments (e.g., Kiggavik Project Effects; Gahcho Kué Developer's Assessment Report; Golder Associates 2014b). References and a discussion of each human development feature and its assigned ZOI are provided. ZOI discussions are adapted from Russell (2014) and Golder Associates Ltd. (2014b) and attached for reference.

The NWT Cumulative Impact Monitoring Program (CIMP) database (CIMP 2015) was the main input for the Bathurst Caribou Range Plan GIS database. Given this, a large number of human development features have been identified, and each required estimates of their potential ZOI on barren-ground caribou. Average ZOI extents for different feature types have therefore been used, based on reported values and supportable rationale.

To avoid double-counting, ZOI buffers were applied to footprints in a hierarchy (Table 3), based on the following considerations:

- features with the largest ZOI assumptions occurred at the top of the hierarchy to reflect the relative magnitude of influence on caribou;
- polygonal features were ranked higher than linear features (with the same ZOI assumption), because the ZOIs assumptions reflect disturbance activities, which would likely be more consistent over time at a small polygonal feature compared to activity along a road. Also, from a practical perspective, the dissolve function in the GIS is simpler when a polygonal feature is ranked higher, because it eliminates the situation where a road (and associated ZOI) would bisect a polygonal feature if it happened to run through it.
- There would be many exceptions to these base assumptions, especially if one were to incorporate a feature-specific description of the intensity of activity associated with a polygonal or linear feature. However, for this landscape-level tracking exercise, in the absence of site-specific data and associated caribou responses, it was more appropriate to consider the hierarchy of feature-types at a strategic level, and not attempt to generate specific assumptions for each feature on the landscape.

Table 1. Linear Human Development Features and ZOI Extents

Feature Code	Feature Name	Feature Width (m)	Feature Description	ZOI (km)	ZOI Discussion
AR	**All-Season Access Road**	10	Any all-season road, including industrial access roads and roads in and around Settlements.	5	**4 km** ZOI around all-season roads identified by Vistnes and Nelleman (2001), Nelleman et al. (2003) and Weir et al. (2007). Abundance of calving barren-ground caribou less than expected within **4 km** of roads (Cameron et al. 2005). **1.5 km** ZOI used in Back River Project (Rescan 2013). Johnson and Russell (2014) found that Porcupine caribou demonstrated a definitive avoidance response to Main Roads and estimated a zone of influence of 30 km during 1985–1998 followed by a reduced distance of 18.5 km during 1999–2012. Data suggested that disturbance decreased over time or caribou became habituated to the footprint or associated disturbance activities. AR includes roads around Settlements; therefore 5 km average ZOI selected.
EC	**Major Electrical Transmission Corridor**	30	Major electrical transmission corridors (e.g., Snare Lake, Bluefish and Taltson transmission lines).	4	Major transmission lines found to have **4 km** ZOI for barren-ground caribou (Vistnes and Nelleman 2001; Nelleman et al. 2003). Meliadine Project (Golder Associates Ltd. 2014) and Gachu Kué Project (Golder Associates Ltd. 2010) ZOIs ranged from **0 to 5 km**. Average 4 km ZOI selected.
HW	**Public All-Season Paved Highway**	60	NWT Highways #3 and #4.	5	Same references as AR, All-season Access Road. 5 km average ZOI selected.
MAR	**All-Season Mainline Access (Haul) Road**	20	Major all-season industrial haul roads (e.g., currently Ekati Misery Road and proposed future haul roads such is IZOK and BIPAR corridors in Nunavut).	5	Same references as AR, All-season Access Road. Observed lower probability of occurrence of caribou within **6-14 km** of combined mines and roads (Boulanger et al. 2012). 5 km average ZOI selected.

Feature Code	Feature Name	Feature Width (m)	Feature Description	ZOI (km)	ZOI Discussion
WR	**Winter Road**	12	All winter roads <u>except</u> the Tibbit-Contwoyto Lake Winter Road. Winter roads are seasonal features that exist only during the January-early April period.	1	**200 m** ZOI used for Back River Project (Rescan 2013). **5 km** ZOI used for Meliadine Project (Golder Associates Ltd. 2014) and Gachu Kué Project (Golder Associates Ltd. 2010). Johnson and Russell (2014) observed that Porcupine caribou showed relatively little avoidance of wells, trails, winter roads, and seismic lines once they achieved a distance of 6 km during 1999–2012 and 11 km during 1985–1998. For this disturbance type, the data suggested a habituation or vegetation recovery effect that reduced the zone of influence by nearly 50%; although, this relationship was imprecise. <u>WR includes many different winter road types ranging from lower to higher use intensity; therefore 1 km average ZOI selected</u>.
WR_TC	**Tibbitt to Contwoyto Winter Road**	40	The main Tibbit to Contwoyto Lake Winter Supply Road. This is a seasonal feature that exists only during the January-early April period.	4	Same references as WR, Winter Road. <u>Given the high level of seasonal industrial truck traffic (and potentially public use) on Tibbit to Contwoyto Lake Winter Road, a 4 km average ZOI was selected (more than WR, less than HW)</u>.

Table 2. Polygonal Human Development Features and ZOI Extents

Feature Code	Feature Name	Feature Description	ZOI (km)	ZOI Discussion
AIRSTRIP	Airstrip	Airstrip	5	No literature references available. Most airstrips are associated with Camps, Mineral Exploration, Settlements, or similar; therefore 5 km ZOI selected.
CAMP	Camp	A variety of camp types (mineral exploration, lodges, outfitting, highway, research, etc.)	5	**4 km** ZOI identified for tourism and recreation camps by Vistnes and Nelleman (2001) and Vistnes et al. (2008). **5 km** ZOI used for outfitting camps in Gahcho Kué Project (Golder Associates Ltd. 2010). **5 km** ZOI applied to mineral exploration camps/sites in Gahcho Kué Project (Golder Associates Ltd. 2010) and Meliadine Project (Golder Associates Ltd. 2014). The most common Camp type identified in mapping database is mineral exploration camp; therefore 5 km ZOI selected.
COMM	Communications	Communications towers	1	No literature references available. Communication towers are point features with limited human activity. 1 km ZOI selected.
GEN_IND	General Industrial	General industrial features from CIMP database (culverts, staging areas, storage, etc.)	1	No literature references available. The General Industrial feature class contains a range of feature types. Most are located adjacent to existing All-Season Roads or Settlements. 1 km ZOI selected.
MIN_EXPL	Mineral Exploration	Mineral exploration activities (drilling, trenching, etc.)	5	**5 km** ZOI applied to mineral exploration camps/sites in Gahcho Kué Project (Golder Associates Ltd. 2010) and Meliadine Project (Golder Associates Ltd. 2014), with 5 km ZOI applied to all active exploration permits for the entire 5-year period, over the entire year. 5 km ZOI selected.

Feature Code	Feature Name	Feature Description	ZOI (km)	ZOI Discussion
MINE_ACTIV	Minesite (Active)	Active minesites (e.g., Ekati, Diavik, Snap Lake, etc)	14	Observed lower probability of occurrence of caribou within **6-14 km** of combined mines and roads (Boulanger et al. 2012). Hypothetical **15 km** ZOI around active mines used by Johnson et al. (2005). The Back River Project considered two ZOIs at **4 km** and **14 km** (Rescan 2013). The Meliadine Project considered a three ZOI range with variable disturbance coefficients 0-1, 1 to 5, 5 to 14 km based on Boulanger (2012) (Golder Associates Ltd. 2014). The Gacho Kué Project assumed a **15 km** ZOI was applied to all active mine sites regardless of the size of the footprint or the level of activity for each mine (Golder Associates Ltd. 2010). Average 14 km ZOI selected.
MINE_PAST	Minesite (Past or Closed)	Past Minesites under care and maintenance or being actively reclaimed/remediated (e.g., Lupin, Jericho, Tundra, etc.)	5	No literature references available. Past Minesites are assumed to have levels of human activity and potential aerial traffic similar to Mineral Exploration or Camp features. Average 5 km ZOI selected.
MISC	Miscellaneous	Miscellaneous/uncertain features from CIMP database (most are located along highways)	1	No literature references available. There are relatively few Miscellaneous features in the Bathurst range. 1 km ZOI selected.
PORT	Marine Port	Proposed marine ports or laydown areas associated with potential future mineral development projects in Nunavut (e.g., Grays Bay-Izok, Bathurst Inlet).	5	No literature references available. Future Marine Ports along the Nunavut Arctic coast are assumed to have similar levels of activity as Mineral Exploration sites or Camps. Depending on season of use and shipping methods, they may receive limited human activity for much of the year. 5 km ZOI selected.
POWR_GEN	Power Generation Facility	Major hydro dams and associated power generation facilities (e.g., Snare River, Bluefish River and Taltson)	5	No literature references available. Nelleman et al. (2003) found reduced caribou use up to **4 km** ZOI from hydro reservoirs. Gacho Kué Project (Golder Associates Ltd. 2010) and Meliadine (Golder Associates Ltd. 2014) used a **1 km** ZOI for on-site power plants. Major hydro facilities have Airstrips, Major Electrical

Feature Code	Feature Name	Feature Description	ZOI (km)	ZOI Discussion
				Transmission Lines, and may receive a relatively high level of human activity. Assumed to be similar to Airstrips or Mineral Exploration; therefore 5 km ZOI selected.
QUARRY	Quarry	Sand, gravel or rock quarries	5	No literature references available. Assumed to be similar to Mineral Exploration or small-scale mining activities; therefore 5 km ZOI selected.
SETTLEMENT	Settlement	Permanent settlements (communities and municipal areas)	15	**15 km** ZOI used by Gahcho Kué Project (Golder Associates Ltd. 2010) and Meliadine Project (Golder Associates Ltd. 2014). Although most communities were on the periphery of the winter range, Johnson and Russell found an avoidance distance of ~34.5 – 38 km to settlements by collared Porcupine caribou. Settlement ZOI is assumed to be extensive due to potential high harvest pressure and multiple land uses; therefore 15 km ZOI selected.

Table 3. Hierarchy for ZOI buffers, with ZOIs identified above superseding those listed below.

Feature Type	FCODE	Description	ZOI (km)	Comments
POLYGONAL	SETTLEMENT	Settlement	15	Permanent feature type with largest ZOI
POLYGONAL	MINE_ACTIV	Minesite (Active)	14	Active minesite has 2nd largest ZOI
POLYGONAL	POWR_GEN	Power Generation Facility	5	Likely has continual year-round activity
POLYGONAL	PORT	Marine Port	5	Open water season, and shoulder seasons
POLYGONAL	MIN_EXPL	Mineral Exploration	5	May be seasonal, but no overlap with preceding two feature types
POLYGONAL	QUARRY	Quarry	5	Seasonal
POLYGONAL	CAMP	Camp	5	Seasonal or infrequent use (depending on project)
POLYGONAL	AIRSTRIP	Airstrip	5	Infrequent use
POLYGONAL	MINE_PAST	Minesite (Past or Closed)	5	Gravel pit or source of aggregate
LINEAR	HW	Public All-season Paved Highway	5	Highway from Behchoko through Yellowknife to WR_TC
LINEAR	MAR	Mainline All-season Access (Haul) Road	5	Haul road with regular use
LINEAR	AR	All-season Access Road	5	Mainly settlement roads and mine access roads
LINEAR	EC	Major Electrical Transmission Corridor	4	Continual transmission of electricity (may be detected by caribou)
LINEAR	WR_TC	Main Tibbitt to Contwoyto Winter Road	4	Haul traffic, but used in winter only
POLYGONAL	COMM	Communication Tower	1	Likely regular maintenance
POLYGONAL	GEN_IND	General Industrial	1	Seasonal with regular maintenance
POLYGONAL	MISC	Miscellaneous	1	Unknown
LINEAR	WR	Winter Road	1	Winter use only

3. Influence of ZOI Assumptions on Total Disturbance

Although ZOI has been empirically defined as an area of reduced caribou occupancy around a human footprint (Johnson et el. 2005, Boulanger et al. 2012, Johnson and Russell 2014), there is considerable variability and uncertainty in the dynamic behavioral and ecological processes that may drive the observed patterns of occurrence. For caribou, a footprint-specific ZOI likely varies over time and space. The ZOI is dependent upon multiple factors including variable disturbance intensity associated with human activity, as well as intrinsic behavioral responses by caribou that change seasonally and integrate previous experiences and innate dynamic responses of individuals and groups.

In the BCRP, the ZOI is used as part of a heuristic approach for scaling the combined effects of different footprints in to a spatial indicator that represents the potential total disturbance that results from human activity in a landscape. The application of ZOI to multiple human footprints is fundamentally a GIS map-based method for tracking cumulative area of spatial disturbance at a landscape scale and is dependent on the direct footprint and footprint-specific ZOI assumptions.

Because of concerns that projected levels of disturbance on the Bathurst range were strongly influenced by assumptions regarding industrial footprints, we undertook a basic sensitivity analysis of ZOI assumptions for active mines. The purpose of the sensitivity analysis was to compare projected levels of total disturbance resulting from three different development scenarios with different assumptions for the ZOI of active mines. The development scenarios are defined as Case 1 (declining development), Case 2 (continuing development), and Case 3 (increasing development). The three development scenarios are summarized in Section 3.1.4.3 of the main Caribou Range Assessment and Technical Information Report.

The analysis was conducted as a GIS desktop exercise, which varied the ZOI assumption for active mines. The base assumption was that an active mine had a 14 km ZOI, which was detected by Boulanger et al. (2012) around the Ekati and Diavik mine complex. In the sensitivity analyses, ZOI assumptions for active mines were systematically set at 5 km, 10 km, and 20 km respectively. The total disturbance associated with each of the industrial development scenarios was then compared across the different ZOI assumptions for active mines.

3.1 Influence of ZOI Assumptions for an Active Minesite on Total Disturbance

Figure 1 shows a visual comparison of the changes in total footprint disturbance at 6-year intervals that were defined for each of three development scenarios over their 24-year duration. The figure shows total footprint with the base assumption that active mines have a ZOI of 14 km, and illustrates the proportional reduction in the total footprint of an active mine once it becomes inactive and has an assumed ZOI of 5 km. Figure 1 shows a progressive increase in total footprint across the development scenarios with Case 3 having the greatest amount of disturbance. Patterns of footprint development occur primarily in RAA1, RAA2, and RAA3 (listed from north to south), with RAA4 and RAA5 in the west and east respectively depicting comparatively low amounts of development. Relative to the current footprint at T1, the relative increase in footprint is greatest for RAA1 under the Case 2 and Case 3 scenarios. In comparison, under the Case 2 and Case 3 development scenarios, the trajectory of total footprint development increases within RAA4, and remains similar in RAA2.

These basic trends are similarly shown in Figure 2 and Figure 3. In Figure 2, the influence of different ZOI assumptions for active mines on total footprint is shown for each RAA across the three development scenarios. In comparison, Figure 3 shows the influence of the active mine ZOI assumptions on the active mine footprint, and its relative contribution to the total footprint within an RAA. Figures 2 and 3 clearly show that total footprint increases when a large ZOI is assumed for active mines. Relative to projected total footprint levels, the influence of the active mine ZOI assumption is greatest in RAA1, because it currently does not have any active mines in it and its current footprint is the lowest compared to RAA2 and RAA4. Therefore, with projected development under Case 2 and Case 3 scenarios, the ZOI assumptions for active mines in RAA1 have a proportionally large influence on the trajectory for total disturbance. Relative to the contribution of active mines to current footprint levels and projected footprint trajectories, ZOI assumptions for active mines would appear to have greater implications to potential disturbance in RAA2 compared to RAA4. The reason for this assertion is that active mining contributes proportionally more to total disturbance in RAA2 than in RAA4. Although RAA4 has the highest levels of disturbance compared to RAA1 and RAA2, human settlements and all season roads contribute proportionally more to total disturbance than active mines (based on a 14 km ZOI assumption).

The sensitivity analysis of active mine ZOI values reinforces the basic premise that a larger ZOI will result in a large potential amount of disturbance on a landscape. The sensitivity analysis also highlights the relative importance of current and projected future levels of active mine development within an RAA to understand how it may influence total disturbance. An important caveat is that a plausible assumption for ZOI active mines or any other footprint type, may be used to project future disturbance levels at a landscape scale, but is not intended to be a project-specific assessment tool.

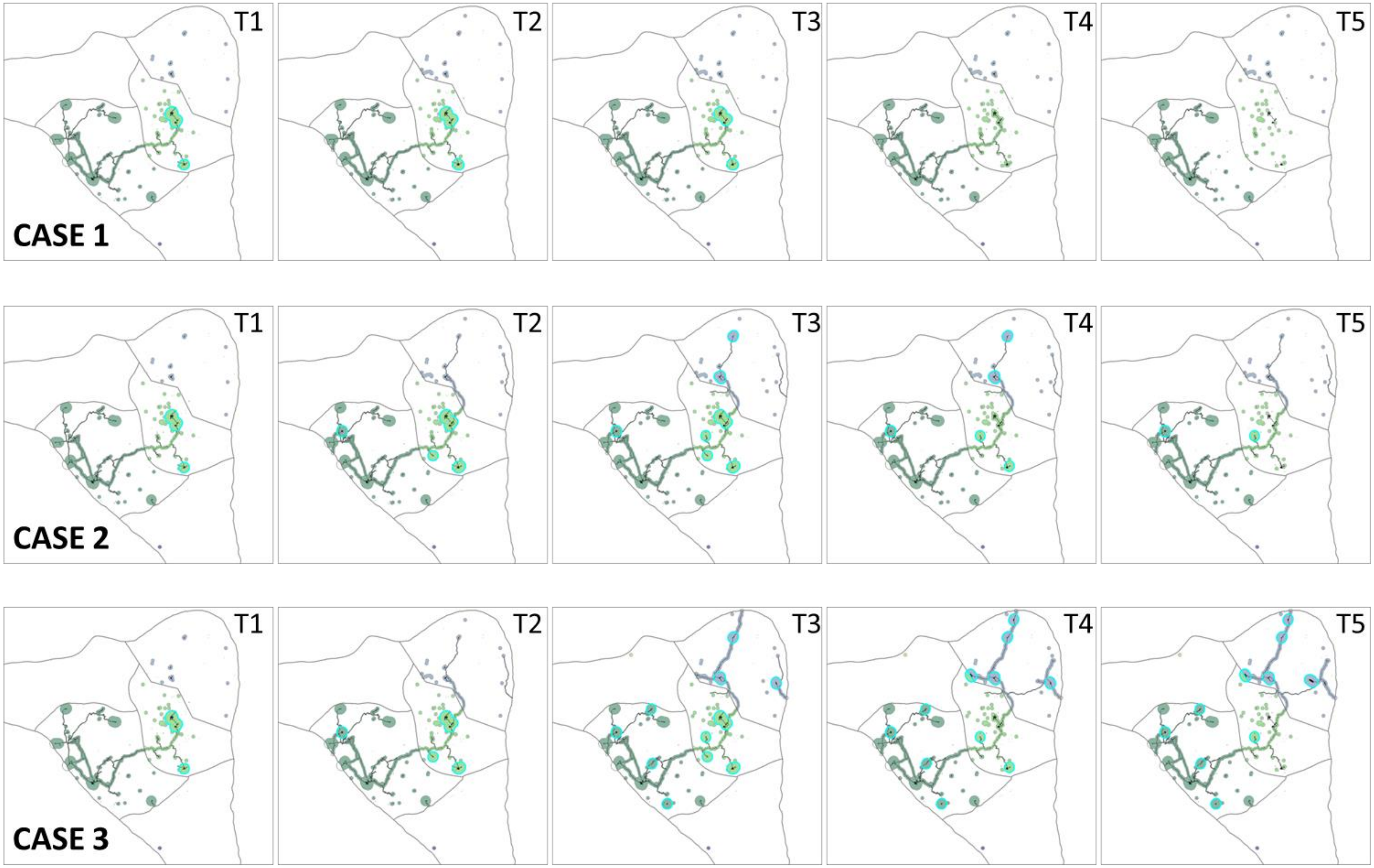

Figure 1. Graphical representation of three development scenarios on the Bathurst range. Case 1, Case 2, and Case 3 are based on “declining”, “continuing” and “increasing” amounts of industrial disturbance, respectively. Total disturbance (footprint plus ZOI buffers) are depicted at each timestep (T), where T1 is present day, and subsequent timesteps occur at 6-year intervals. Range Assessment Areas (RAAs) are depicted within the historic annual range of the Bathurst herd, and active minesite with a base ZOI assumption of 14 km are highlighted in light blue.

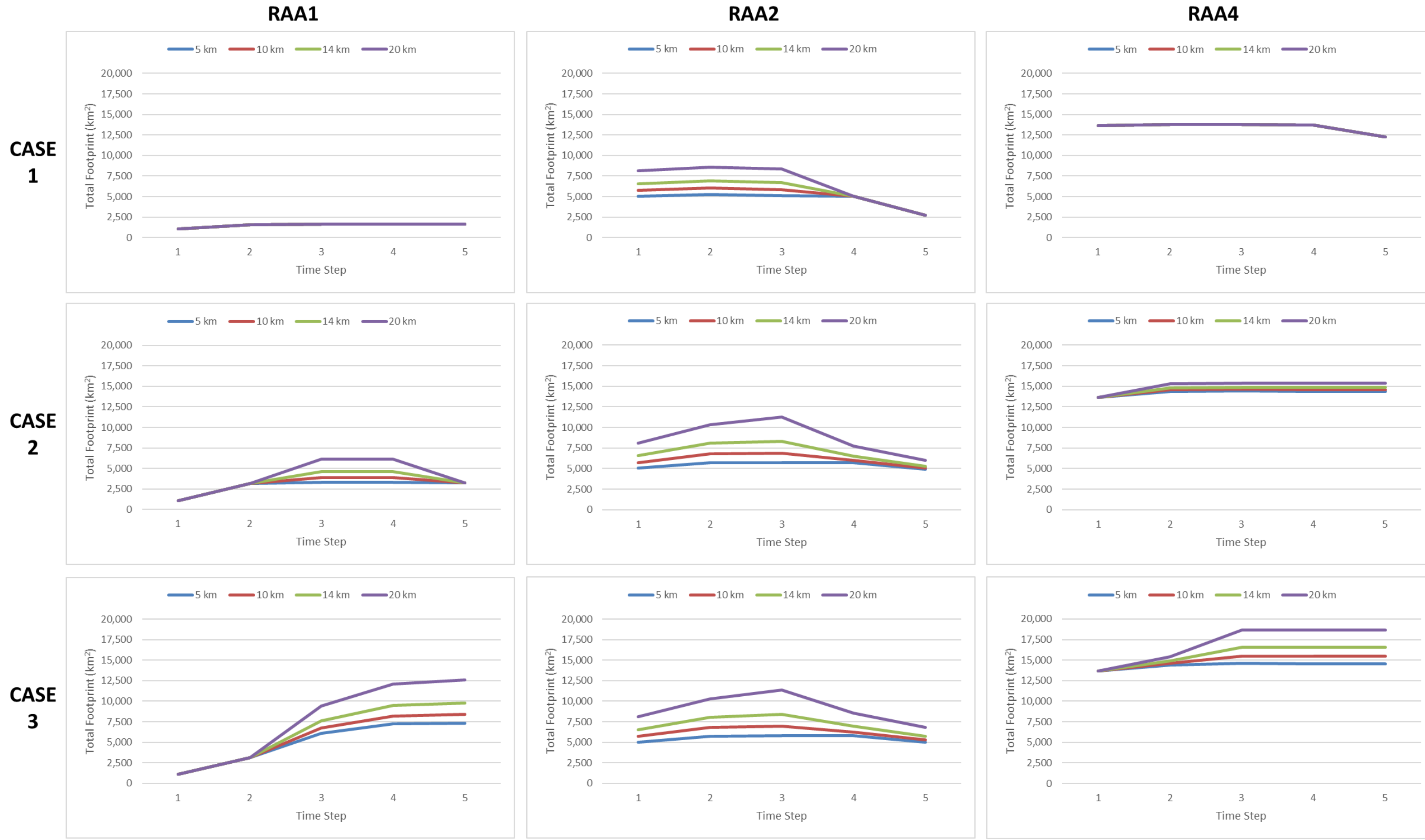

Figure 2. Projected total footprint area (km^2) in Range Assessment Areas (RAAs) resulting from three development scenarios (Case 1, 2 and 3) with assumptions for the zone of influence for active mines that included 5, 10, 14, and 20 km spatial buffers respectively.

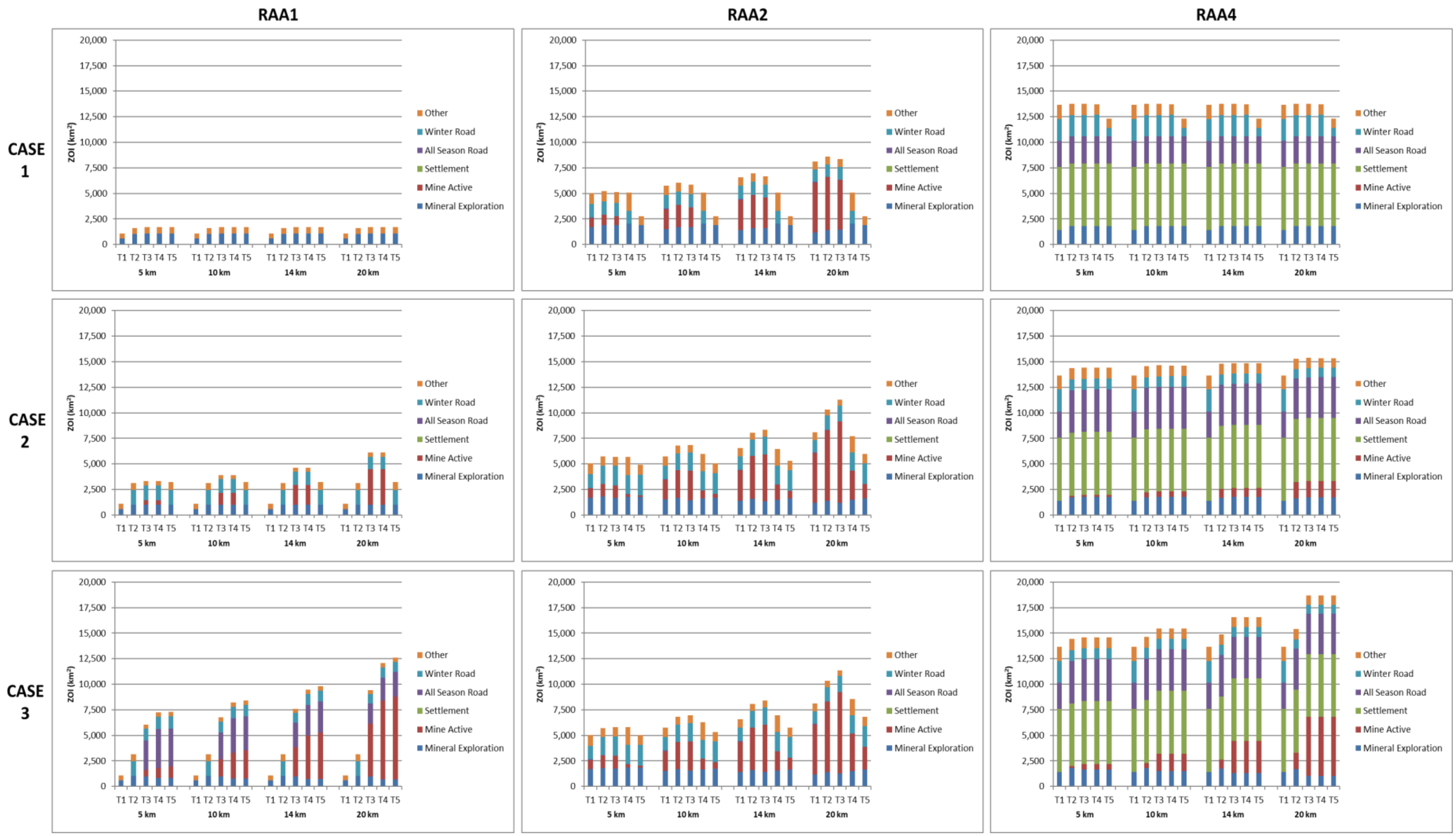

Figure 3. Composition of projected total footprint area (km^2) in Range Assessment Areas (RAAs) resulting from three development scenarios (Case 1, 2 and 3) and the relative influence of assumptions for the zone of influence for active mines that included 5, 10, 14, and 20 km spatial buffers respectively.

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Disturbance activity	ZOI (km)	References		Notes
		Published literature	Similar environmental assessments	
MU — Municipalities (Polygon)	15	Hypothetical **1,000 m** (Johnson et al. 2005), but no disturbance coefficients identified.	Meliadine FEIS (Golder Associates Ltd. 2014) and Gahcho Kué (De Beers Canada Inc. 2010) used a **15 km** extent with variable disturbance coefficients from 0.05 to 0.75	Presume community ZOI is extensive due to likely high harvest pressure and other land uses (e.g., traffic, noise). Use ZOI similar to other likely high disturbance activities; extend to 15 km, precedent set for Meliadine FEIS.
ASR — All Season Roads WR — Winter Road (Line)	4 (ASR) 0.2 (WR)	**4 km** (Vistnes and Nellemann 2001, Nellemann et al. 2003, Weir et al. 2007); Hypothetical 95% (i.e., DC = 0.05) reduction with **1 km** radius of operating mine road (Misery road, (Johnson et al. 2005); Abundance of calving caribou less than expected within **4 km** of a road (Cameron et al. 2005).	Hypothetical: All weather <u>construction</u>: **4 km** radius (Rescan 2013); All weather <u>operations</u>: **1.5 km** (Rescan 2013); Winter Road: **200 m** (Rescan 2013); ZOI extended to 5 km for the Meliadine Project (Golder Associates Ltd. 2014) and the Gahcho Kué project (De Beers Canada Inc. 2010) with variable disturbance coefficients from 0.05 to 0.75.	
EX — Exploration (Point)	5	Mineral exploration sites affected a *hypothetical* 50% reduction [i.e., DC = 0.5] in the value of habitats found within a 10 km radius of the assumed development site, and a 25% reduction [i.e., DC = 0.75] within a 5 km zone around that buffered area [**total 15 km**] (Johnson et al 2005, pg. 16).	For the Meliadine and Gahcho Kué Project assessments, exploration projects were assumed to have a **500 m** radius footprint (Golder Associates Ltd. 2014; De Beers Canada Inc. 2010b). Also for both projects, a **5 km** ZOI was applied to all active exploration permits for the entire five-year period, and over the entire year.	The CEA for the Back River Project did not include exploration projects as disturbance activities. A review conducted by Areva showed that exploration footprints likely to represent a 7.4 ha area (~154 m radius)
MI — Mining (Polygon or Point)	14	Observed lower probability of occurrence of caribou within **6–14 km** around combined mines and road (Boulanger et al. 2012). Hypothetical (not modelled) **15 km** ZOI (Johnson et al. 2005). Caribou numbers decreased within 6 km of mine centre in late winter through calving seasons (Weir et al. 2007).	The Back River Project considered two ZOIs at **4 km** and **14 km** (Rescan 2013). The Meliadine Project considered a three ZOI range with variable disturbance coefficients 0-1, 1 to 5, 5 to 14 based on Boulanger (2012) (Golder Associates Ltd. 2014). The Gacho Kué Project assumed a **15 km** ZOI was applied to all active mine sites regardless of the size of the footprint or the level of activity for each mine (De Beers Canada Inc. 2010).	
ERG — Energy corridors Point (plant); line(transmission)	4	Transmission lines: **4 km** ZOI (Vistnes and Nelleman 2001 and Nelleman et al 2003)	Meliadine (Golder Associates Ltd. 2014); Gacho Kué (De Beers Canada Inc. 2010) used a **500 m** radius footprint and a 1 km ZOI for power plants, and a **200 m** footprint for transmission lines. A ZOI ranged from **0** to **5 km** with variable disturbance coefficients from 0.05 to 0.75.	
TR — Tourism (e.g. guide and outfitting) Point	4	**4 km** ZOI (Vistnes and Nelleman 2001 and Vistnes et al 2003); 10% i.e., DC = 0.9) reduction in areas influenced by outfitters in a **500 m** buffer (Johnson et al. 2005).	Not considered in cumulative effects for Meliadine or Back River CEAs. Gahcho Kue used a **200 m** radius footprint and a **5 km** radius ZOI with a DC of 0.1 (De Beers Canada Inc. 2010).	Accounts for seasonality and presumed quota (i.e., managed) harvest around outfitter camps.
TR — Traditional Harvest and Land Use	na	Johnson et al. (2005) noted specifically that they did not consider responses to subsistence harvest.	Not considered in cumulative effects for Meliadine, Gacho Kué or Back River CEAs	Not a spatial reference, background conditions

Golder Associates (2014b). Table 12.4-15 (for reference).

Table 12.4-15 Extent and Disturbance Coefficients for Development Footprints and Associated Zones of Influence for Caribou Seasonal Resource Selection Functions

Disturbance Type	Feature Type	Footprint		Concentric Zone of Influence #1		Concentric Zone of Influence #2		Concentric Zone of Influence #3	
		Extent (m)	Disturbance Coefficient	Range[a] (km)	Disturbance Coefficient[b]	Range[a] (km)	Disturbance Coefficient[b]	Range[a] (km)	Disturbance Coefficient[b]
Campgrounds	Point	250	0.00	n/a		n/a		n/a	
Community	Polygon[c]	Actual	0.00	0 to 1	0.05	1 to 5	0.50	5 to 15	0.75
Communications	Point	250	0.00	0 to 1	0.90	n/a		n/a	
Contaminated Site High and Medium Priority for Action[d]	Point	250	0.00	n/a		n/a		n/a	
Fuel Storage	Point	250	0.00	n/a		n/a		n/a	
Mine	Polygon[c]	Actual	0.00	0 to 1	0.05	1 to 5	0.50	5 to 15	0.75
Mineral Exploration	Point	500	0.00	0 to 1	0.50	1 to 5	0.75	n/a	
Power Plant	Point	500	0.00	0 to 1	0.50	n/a		n/a	
Quarrying	Point	250	0.00	0 to 5	0.75	n/a		n/a	
Staging Area	Point	250	0.00	0 to 5	0.75	n/a		n/a	
Tourism (lodge)	Point	250	0.00	0 to 5	0.10	n/a		n/a	
Transmission and Power Lines	Line	250	0.25	0 to 1	0.50	1 to 5	0.75	n/a	
All-season Roads and Highways	Line	250	0.00	0 to 1	0.05	1 to 5	0.75	n/a	
Winter Road	Line	250	0.00	0 to 1	0.05	1 to 5	0.75	n/a	
Winter Road Portage	Line	250	0.00	n/a		n/a		n/a	
Miscellaneous (Bridge, Culvert)	Point	250	0.00	0 to 1	0.90	n/a		n/a	

a) From edge of actual or hypothetical footprint.
b) Disturbance coefficient (applied as a multiplier to cell RSF value), based on assumed disturbance.
c) Footprints were delineated from remote sensing imagery.
d) As defined by the Federal Contaminated Sites Inventory (TBCS 2013).
n/a = Not applicable; km = kilometre; m = metre.