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Mackenzie Valley Environmental Review Board
PO Box 938, Yellowknife, NT, X1A 2N7

March 10, 2017

RE: Canadian Zinc Corporation's Proposed All-Season Road- EA1415-01

Dehcho First Nations (DFN) have been a part of the land in their traditional territory since time immemorial and continue to have a strong connection to the land for travel, harvest and spiritual purposes. In 2003, DFN signed a Memorandum of Understanding with the Government of Canada to expand Nahanni National Park to protect more than 95 percent of the Greater Nahanni Ecosystem while leaving a small buffer of non-park land around Nahanni Butte and the existing interests of two mining companies – Canadian Zinc and Northern Tungsten –intact.

In 2000, the Nahaᑦ Dehé Consensus Team was formed and prepared an Ecological Vision for Nahanni National Park Reserve that states: *"Dene are inseparable from the land. Traditional subsistence harvest will continue to be an integral and sustainable part of the ecosystem and will occur in accordance with Dene laws and principles. Nahaᑦ Dehé will continue to be revered as a place of mystery, spirituality and healing."*

Concurrent with the park expansion, there has been continued interest from the Canadian Zinc Corporation (CZN) to develop and permit the Prairie Creek mine and road access through Nahanni National Park. With the development of the Prairie Creek mine are employment, business and training opportunities for Dehcho members. DFN supports communities in the Dehcho benefitting from mine operations and business opportunities. We also believe that the economic opportunities to the Dehcho need to be balanced with the need for a high environmental standard.

In 2014, Canadian Zinc Corporation (CZN) began the process of filing for an Environmental Assessment for the proposed All-Season Access Road. Dehcho First Nations has been involved in the review of CZN's proposed All-season Access Road from the beginning of the review process. DFN reviewed and commented on the Terms of Reference, reviewed the Developers

Assessment Report, filed Information Requests and attended and asked questions at the Technical sessions. We have been and will continue to participate in this process because it allows us an opportunity to examine the environmental impacts of the proposed road before it is built.

In past development projects in the Dehcho, DFN has raised concerns regarding potential adverse environmental effects, proposed mitigation measures to address adverse environmental impacts and reviewed any follow-up programs proposed by the proponent. Our position within the Environmental Assessment process has been guided by the principle that the potential benefits from development must be balanced against the potential impacts to the environment. DFN has consistently maintained the position that we expect a high environmental standard across our traditional territory.

We expect an evidence-based approach to this project. DFN wants fish, water and wildlife protected as much as possible. In practical terms DFN has concerns regarding:

- Impacts to the project from road width (4m) along the all-season road alignment.
- Impacts to grayling populations in Sundog Creek from the Sundog Creek realignment.
- Impacts to travel along the all-season access road due to avalanches
- Impacts to northern mountain caribou.
- Impacts to archaeological resources.

Thank you for the opportunity to submit a technical report for the Canadian Zinc All-Season Road alignment. If you have any questions, please contact Dahti Tsetso at 867-695-2355 or dahti_tsetso@dehcho.org.

Mahsi Cho,



Herb Norwegian
Grand Chief

1. Impacts to the project due to road width.

Developer's conclusion

CZN has committed to a minimum 4 m wide running surface width, and a 5 m wide running surface width where possible (the width would be no less than 4.9 m in the latter areas). There will be widenings at curves.

From All-North (2016) (All-North Information Request Round 2, Responses to Oboni Riskope Information Requests dated September 23, 2016, October 7, 2016, reply to question 2b:

"A 5 m wide running surface is the primary and preferred design specification for the road. A 4 m wide running surface will only be utilized in locations which have terrain limitations, such as excessive rock excavation (blasting) and a few short sections which maybe tight or parallel to a stream channel. All bridges will use an industry standard 4.3 m running width.

A number of approaches will be applied to mitigate the effects of a 4 m wide running surface:

- Opportunity exists in the detailed design stage to reduce the length of the 4 m sections, as proposed in the preliminary designs.
- Any horizontal curves located in 4 m sections will be designed with the required widening as specified in the Engineering Manual, which will override and increase the 4 m wide prescription.
- Speed restrictions will be placed and enforced on all narrower sections, tight corners, or line of sight limitations.
- Appropriate signage will be placed either side.
- Pull-outs will be placed in close proximity at either end.
- All mine traffic will follow strict use of radios, specifically important at critical sections such as speed reduced, narrow sections, and bridges.

Road located in challenging terrain such as heavy rock excavation, confining terrain, horizontal or vertical alignment challenges, significant stream crossings and bridges were identified early in the process. These locations became focus items during our field investigations, and full preliminary designs were completed reflecting the complexity of these locations. Below is a summary of sections identified to utilize a 4 m running surface:

5+400. An existing short road section tight to Prairie Creek.
6+200 is a bridge location.

23.0 to 23.7. Portions of this section will require significant rock excavation (blasting). Opportunity exists in the detailed road design to reduce the length of the 4 m running surface sections which contain significant rock excavation. Will also include a 500m section of 11% grade (from page 25, All-North Appendix 1-A).

25.0 to 26.0. Portions of this section will require significant rock excavation (blasting). Opportunity exists in the detailed road design to reduce the length of the 4 m running surface sections, which contain significant rock excavation. Crosses major talus rock slopes and major avalanche zones (from page 25, All-North Appendix 1-A).

28.0 to 28.6. Recent realignment to avoid slope stability issues and double crossing of Sundog Creek. The realigned section is located in close proximity to Sundog Creek and potential rock excavation.

There will be no other sections that should require a reduced running surface of 4 m.”

AllNorth (2016) “It is also important to understand that sections of the road that may be built to a 4 metre width (less than 1.1%) will have the following attributes:

- Widened where required (horizontal curves) to accommodate the flow of traffic and vehicle tracking.
- Full stabilized grade (the entire 4 m). Within these sections, blasted rock will primarily be the road base material providing a solid, compacted, and stabilized operating surface with excellent traction qualities.
- Incorporate further speed reduction zones to less than 1/3 of the speed, which would be driven on a standard highway.

Our approach is to operate at low speeds through sensitive or difficult terrain, implementing a comprehensive road maintenance program, and establishing and enforcing thorough operating procedures and controls to minimize the risk to property, environment, and life. It is not uncommon to see highways in northern B.C. with no shoulder, Highway 37 and Highway 77 for example with little to no reduction in general operating speeds.”

Statement from DFN on road width

It is the view of DFN that most significant way to protect water resources (from spills) and the safety of drivers along the All-Season Road alignment is to ensure that the plans for proposed road alignment includes a reduction in the possibility of a vehicle overturning.

Although a 4m-road width is proposed for a short section of the road align (1.1% of the road) – it represents a reduced road width. Of particular concern are areas along the 4m-wide road where the proposed road alignment also traverses hills and poor line-of-sight. The road width along the proposed CZN All-season road alignment must permit for safe vehicle manoeuvrability and maintain road continuity.

Both the *Design of Surface Mine Haul Roads – A Manual* (Kaufman and Auld, 1977) and *Guidelines for Mine Haul Road Design* (Tannant and Regensberg, 2001) recommend that a minimum width for the running surface for the straight sections of single and multi-lane roads can be determined can be determined from the following expression:

$$W = (1.5 L + 0.5)X$$

W= width of running surface (m)

L = number of lanes

X = vehicle width (m)

Given that the vehicle width of CZN's All-Season Access road is 2.6m, from the formula above it can be determined that the minimum running surface of CZN's All-season access road should be 5m. It is our opinion that a 4m road alignment increases the risk of vehicle overturning along the All-Season Access road and it is easily mitigated by increasing the road width. We expect that 4m may be acceptable along short stretches of the road with good line-of-sight, that are straight with no hills.

DFN's Recommendation

Road alignment should be expanded from 4m to 5m along the proposed road alignment where there are steep hills or where the line-of-sight is poor.

2. Risks to the Vehicle Traffic along the road due to Avalanches

Developer's position

From Alpine Solutions Avalanche Services (2012) *Canadian Zinc Preliminary Snow Avalanche Risk Assessment for Winter Road*

"A complete risk assessment for each individual scenario involving avalanches cannot be undertaken without further details regarding traffic frequency, and location of fixed infrastructure (bridges). However, considering the preliminary details which include:

- proposed active winter road use schedule, and
- extended length of road affected by avalanche paths, risk from avalanches to the winter road is estimated to vary between low and high, depending on annual snowpack and climate conditions."

Alpine Solutions (2012) states that "Large avalanches (Size 3 and 4) would only be expected with frequency on the order of once every 3 years or less often, and would typically only be expected in the spring when the snowpack is near its maximum depth.

Potential consequences of avalanches reaching the winter road include traffic delays due to road blockage, potential vehicle damage, occupant injury or fatality, and mine concentrate spillage. In addition any fixed infrastructure (such as bridges) located in avalanche areas may be at risk if they are not designed for avalanche impact. Associated consequences may include economic losses resulting from the above, and impact to company reputation."

CZN has committed to following up on the recommendations in the (Alpine Solutions) report (re avalanches) at the appropriate time in advance of winter road construction.

DFN's Position

At this stage in the Environmental Assessment, there has been no specific mitigation measures designed for avalanches and it has been deferred to the detailed design phase of the project. DFN's position is essentially the same as the Alpine Solutions report that avalanche risk to the road varies from low to high depending on how mitigation measures are applied.

We also have concerns that the inter-annual variability of snow depth and temperature could increase the avalanche risk during the winter haul period.

DFN's Recommendations

1.) Detailed commitments from CZN that reflects the information provided in the Alpine Solutions (2012) report and provides an adequate timeline for regulators to review the information. Specifically, DFN recommends MVEIRB include the following written commitments in the commitments table:

CZN commits to provide the following information, 6 months prior to constructing the winter road:

- Road layout on attached avalanche hazard maps will be reviewed and confirmed once the road alignment is finalized.
- A helicopter based reconnaissance will be completed in order to refine avalanche path locations and hazard areas. The helicopter based access would allow for ground based assessments in select areas. This reconnaissance could be completed during summer or winter season.
- If a more detailed risk assessment is required, a linear risk analysis should be undertaken. A typical method which can be used to compare with other industrial roads is the 'Avalanche Hazard Index' (Schaerer, 1984)
- An avalanche hazard management plan will be prepared for the Prairie Creek winter road. The plan should specify all measures employed to reduce risk to vehicles and occupants. In addition the plan should include an emergency response plan.
- If structures such as bridges are to be installed at creek and river crossings near avalanche paths along the mountain segment of the road, an assessment of potential avalanche impact should be undertaken.
- If mine activities are proposed to occur in valleys and slopes surrounding the immediate minesite area, an avalanche risk assessment should be prepared for those activities.

2.) Incorporate potential inter-annual variability of snow depth and temperature into the mitigation measures

From Alpine Solutions (2012): "Considering avalanches are not expected to be frequent during December through February, it is unlikely that an avalanche technician would be required to be on site for this period. However, during spring daily weather and snowpack analysis may be required to predict timing of avalanche events."

DFN recommends that CZN/Alpine Solution provide mitigation measures surrounding conditions that may cause an increased avalanche potential in December through February. We note that there is inter-annual variability in how much snow is present in December through February and we frequently experience unusual warming events during these months – both of which have the potential to impact the avalanche potential along the All-Season Road Alignment.

DFN specifically recommends:

- CZN provide planning for detecting or forecasting avalanche hazards from December to February along the All-Season Road alignment.
 - CZN provide mitigation measures on how they will deal with high avalanche hazards (if high from December to February). For example, will weather and snowpack analysis be required to predict the timing of avalanche events (as stated in Alpine Solutions (2012)) under certain snowpack or temperature conditions.
- 3.) DFN recommends that CZN add a commitment to the avalanche section to consider/assess how blasting rock to construct the road will alter the avalanche paths along the All-Season Road alignment.

3. Sundog Creek realignment and impacts on grayling population

Developer's position:

CZN's design concept presented to MVEIRB in March 2016 is to realign the Sundog Creek channel from KP 35.5 to 36.9 where quasi-stable conditions exist. A well-defined alternative flow path exists that does not impinge on the proposed road alignment and it is proposed that the stream be realigned to follow the alternative path flow. This can be accomplished by deepening the alternative flow path to provide comparable hydraulic capacity to the existing channel and diverting the flow to the new alignment. The existing channel would then be permanently abandoned and available for road construction, although the road bed is expected to occupy a portion of the channel (from Tetra Tech EBA, March 17, 2016 letter to Canadian Zinc Corporation RE: Sundog Creek Realignment Reach, KP 35-38).

CZN considers the reduction in fish population to be low due to the Sundog Creek realignment. The rationale for this argument is that realignment of the creek will result in no-net loss of fish and fish habitat for grayling and slimy sculpin (Hatfield Consultants, 2015).

DFN's position:

DFN remains concerned about the potential impacts to fish and fish habitat resulting from the Sundog Creek realignment. We are uncertain if the impacts to fish and fish habitat along the Sundog Creek could be considered significant. The excavation of the Sundog Creek realignment has the potential to release fine sediments in the channel of Sundog Creek and affect fish and fish habitat downstream of the proposed realignment.

We are looking for more information and will be asking questions regarding the Sundog Creek realignment from Department of Fisheries and Oceans Canada and Canadian Zinc Corporation during the Technical Hearings for the project.

4. Caribou - Calculations for the disturbance calculations of the proposed All-Season Road Alignment

Developer's Conclusions

In CZN's DAR Addendum Appendix E Vegetation and Wildlife and Wildlife Habitat Sections ([PR#102](#), p.18-19), it is recognized that habitat fragmentation and degradation of boreal forest in Canada has led to declining Boreal caribou populations. While the overall range in the NWT has relative integrity, Boreal caribou are listed as Threatened under the NWT (2014) and federal (2003) Species at Risk Acts because of their small population sizes and expected threats to habitat (e.g. forest fires and development activities).

The Boreal caribou population estimates in the Dehcho showed decline from 2005 to 2010, with adult female annual survival rate ranging from 62-93% (Larter and Allaire 2010). A specific decline in the South Dehcho was reported as of 2015 (Larter and Allaire 2015). Current population estimates are unknown, but caribou densities in the north and southwest Dehcho have been estimated at 2 caribou per 100 km², deriving a population of 2,318 in the area (Species at Risk Committee 2012).

CZN's summary tables in Section 6 of DAR Addendum Appendix E ([PR#102](#)) ranks a number of criteria of various effects (e.g. duration, frequency, reversibility, certainty) on Boreal caribou as 'Moderate' or 'High', and Overall Significance as 'Low' (e.g. habitat loss and fragmentation, habitat effectiveness, abundance and occurrence, energetics and body condition). CZN have claimed that "the proposed project is not likely to have a significant impact on Boreal caribou population and abundance" (response to Round 1-MVEIRB-IR-16, [PR#186](#)).

CZN maintain that winter road disturbance has already been assessed by the Review Board in EA0809-002, and should be subtracted from the All Season Road Boreal caribou habitat disturbance calculations. CZN currently estimate that, using a 500 m buffer around the Project footprint, 1,700 ha of Boreal caribou habitat will be impacted (response to Round 1-MVEIRB-IR-16, [PR#186](#)).

DFN's Conclusions

DFN believes that the GNWT's disturbance calculation of 5,590 ha for the preferred 160405 Alignment Option is appropriate (Round 2-GNWT-IR-4, [PR#320](#)).

Evidence and Rationale

It is clear that portions of the proposed All Season Road pass through Boreal caribou range ([PR#329](#)). In the 2009 Addendum to the Traditional Knowledge Assessment of the Prairie Creek Mine Operation states that "the mine haul road runs directly through [the] lowland area [between Second Gap and the Liard River] in a meandering pattern, through country that harbors mineral licks and over-wintering habitat for woodland caribou" ([PR#18](#), p.4). CZN's

response to Round 1-MVEIRB-IR-16 ([PR#186](#)) acknowledges advice from the GNWT that “based on information provided by Nahanni Butte at recent Boreal caribou range planning meetings, the area around the southern portion of the access road may support low densities of Boreal caribou.” The GNWT have also noted that it has no collar data on the west/north side of the Liard River near the All Season Road ([PR#171](#)).

Though CZN cite the Boreal Recovery Strategy (Environment Canada 2012) suggestion that the Boreal caribou population in the NWT is self-sustaining with 31% habitat disturbed (including fire and anthropogenic), more recent information indicates that disturbed habitat has increased to 34%, largely due to new fires, with generally more habitat disturbance in the southern portion of the range (GNWT 2016). Boreal caribou in this area are therefore at increasingly greater risk as their range approaches the self-sustaining threshold of >65% undisturbed habitat.

Regarding disturbance, calculations made in EA0809-002 has no bearing on the present EA1415-01. The full footprint is needed in order to consider potential effects of the road on caribou, its significance and potential mitigation. The proposed footprint for the winter road should not be subtracted from the disturbance calculation of 5,590 ha for the All Season Road.

DFN's Recommendation

DFN believes that the GNWT's disturbance calculation of 5,590 ha for the preferred 160405 Alignment Option is appropriate (Round 2-GNWT-IR-4, [PR#320](#)).

5. Boreal and Northern Mountain Caribou - Commitments

Developer's Conclusions

In its 2016 Updated Draft WMMP, CZN committed to implementing the following specific caribou monitoring activities to provide the following real-time information during year-round mine operations and hauling activities, from the Golder 2012 Draft WMMP (both drafts of the WMMP in [PR#267](#)):

- Information on caribou numbers, frequency of occurrence, and distribution in the Project area;
- Location of caribou and caribou aggregations in close proximity to mine infrastructure and the airstrip;
- Response of caribou to aircraft traffic in the vicinity of the Mine site; and
- Location of caribou and caribou aggregations in close proximity to the access road during winter concentrate hauling operations.
- Wildlife Monitors will conduct ground-based surveys of the access road, mine infrastructure sites, and the airstrip to identify caribou aggregations in the Project area and assess behaviour;
- A radio call-in procedure will be implemented so that observations of caribou along the access road can immediately be relayed to the Road Operations Supervisor so that traffic alerts can be issued. Observations recorded by drivers during hauling will provide information about caribou crossing patterns and movement corridors along the access road; and
- A procedure will be implemented so that caribou observations made by aircraft pilots during transport of crews and materials will be reported to the Wildlife Monitors. Observations recorded during air transport will provide additional information about presence of caribou in the vicinity of the mine site and access road.

CZN also committed that as part of an adaptive management strategy, if the above-noted caribou monitoring indicates a lack of success of mitigation actions, then mitigation actions will be reassessed and modified following consultation with First Nations, GNWT ENR, and Parks Canada.

Recommendation

CZN has agreed to the following commitments and mitigations over the course of EA1415-01 (and agree to carry some over from EA0809-002) relating to caribou (both Boreal and Northern Mountain) that must be enshrined within the final WMMP and other relevant plans and policies. DFN recommends MVIERB update the commitments table to list the specific commitments made by CZN to mitigate the impacts of the project on caribou:

Proposed DAR mitigation *Categories derived from Boreal Caribou Recovery Strategy (Environment Canada 2012) Possible Mitigation Techniques (see PR#186).	
DAR Mitigation	DFN Comments
Development footprint/habitat disturbance	
<ul style="list-style-type: none"> ▪ Project generally follows the approved winter road to the extent possible (10.2 km of re-alignment is the most current proposed route within Boreal Caribou range) ▪ Project designed to utilize borrow material within the proposed road right-of-way, to the extent possible ▪ Temporary camps to use borrow sources and existing camp locations, where possible ▪ Reclaim borrow sources when no longer needed 	DFN agrees that the proponents proposed mitigations are necessary and help to mitigate potential effects.
Preservation of biophysical attributes	
<ul style="list-style-type: none"> ▪ Project inherently designed to avoid peatlands, lowlands, and open water habitats, to the extent possible ▪ Project re-alignment near the east toe of the Nahanni Range to Nahanni Butte following stakeholder advice to avoid Boreal Caribou habitat in the lowlands 	
Minimization of disturbance by adapting shape	
<ul style="list-style-type: none"> ▪ To the extent that the proposed all season road can adapt its shape, the Project: ▪ Reduces road access into borrow sources by utilizing material within and immediately adjacent to the road right-of-way (only 2.5 ha of borrow source roads proposed) ▪ Reduces road access by utilizing existing borrow sources for temporary construction camp locations 	
Prevention of boreal caribou harassment	
<ul style="list-style-type: none"> ▪ Low traffic volumes (approximately 15 haul trucks per day) ▪ Low traffic speeds to substantially reduce noise or other associated potential effects 	

<ul style="list-style-type: none"> ▪ If caribou reported beyond 500 m of the Project footprint, traffic are to be reduced to half the posted maximum speed limit, 30 km/hr, within 1 km of the sighting or as soon as the animal is sighted ▪ If caribou reported on the road or within 500 m of the Project footprint, traffic or activity will cease at least 500 m from (or at first observation of) the animal(s) and all headlights turned off until the animal moves off at least another 100 m from the road or 5 minutes after last visual. Once traffic resumes, speed reduced to half the posted speed limit within 1 km of the sighting ▪ Confine other Project-related activity to two transfer facilities approx. 70 km apart (straight line distance)) ▪ Concentrate construction activities temporally and spatially by adopting a sequential development strategy as much as possible (including blasting, if required) 	
Pollution mitigation	
<ul style="list-style-type: none"> ▪ Industry standards (i.e., GNWT dust suppression guidelines, Northern Land Use Guidelines for roads and pits/quarries, and spill contingency planning guidelines) to be applied ▪ Measures to avoid contaminant loading identified in the Contaminant Loading Management Plan to be applied ▪ Section 9 of the DAR outlines spill response procedures 	
Disturbance Timing	
<ul style="list-style-type: none"> ▪ If blasting is required within Boreal Caribou range, blasting prohibited from May 1 to July 15 and minimized from December to April should it be deemed necessary for construction 	
Access Management (prevention of additional disturbance in opened areas)	
<ul style="list-style-type: none"> ▪ Operation of a private barge on the Liard River for truck traffic, and this would not be available to non-residents ▪ Install signage before the Liard River advising the barge is operated as a private crossing to discourage non-mine related traffic ▪ Restrict the use of the Prairie Creek Mine access road by non-mine related traffic to the extent possible using a check-point station 	

<p>(manned by NDDDB members) after the Liard River crossing</p> <ul style="list-style-type: none"> Manage the small portion of the winter road not used for the all season access to exclude non-Project related travel of the corridor, if necessary Maintain and or manage disturbed areas to facilitate natural encroachment of native species 	
Prevent corridor use by predators	
<ul style="list-style-type: none"> Manage the small portion of the winter road not used for the all season access to minimize predator travel and exclude non-Project related travel of the corridor, if necessary Maintain and or manage disturbed areas to facilitate natural encroachment of native species 	
Mortality management techniques (habitat restoration, killing of predators)	
<ul style="list-style-type: none"> Not considered for the proposed all season road 	
Updated Commitments Pertaining to Wildlife and Caribou – October, 2016 (in PR#370)	
A no hunting policy for all Project employees and contractors while working and/or at the Mine site.	
A wildlife and wildlife habitat mitigation and monitoring plan that includes annual engagement with members of the Naha Dehe Dene Band to monitor measurable parameters of effects.	As committed to in EA0809-002 ¹ , such a plan will be updated during the permitting process and considered a 'living' document, and further changes will be considered as necessary during operations. Such changes will be discussed in the forum of the Technical Advisory Committee (TAC). CZN also committed in EA0809-002 to include LKFN and other First Nation representation on the TAC, and as such as follow up to Round 2-DFN-IR-1, PR#370 , DFN would like to request formal inclusion on the TAC. DFN also recommends that the next iteration of the WMMP continue to be broadened to

¹ CZN have indicated that they will adopt those commitments made for EA0909-002 as appropriate. These commitments are summarized in Table 3-1 of the Consolidated Project Description dated February 12 (included in [PR#370](#) EA1415-01 Round 2 Information Requests Review Comment Table).

	ensure the inclusion of proactive, science and TK-based monitoring practices, with less emphasis on incident and sighting documentation alone.
Policy giving wildlife the right-of-way, obligating drivers to stop (when safe to do so) for wildlife seen on or immediately adjacent to the road, to allow them to move away.	
Policy that all Project-related transportation activities are to give the right-of-way to any wildlife that such activity may encounter	
Develop standard aircraft procedures for flying into and departing from the proposed airstrip to accommodate wildlife, if present on or near the airstrip.	As committed to in EA0809-002, the Flight Impact Management Plan will be reviewed and updated during the permitting process, including flight paths to and from the mine considered according to the recommended guidelines for flying in caribou and sheep country. A procedure was also committed to so that caribou observations made by aircraft pilots during transport of crews and materials will be reported to the Wildlife Monitor.
Maintain a minimum flight altitude of 600 m except during take-off and landings.	
Dust suppression strategies (e.g., water or approved dust suppressant products) in accordance with the GNWT dust suppression guidelines.	
Follow the existing draft Contaminant Loading Management Plan and soil sampling along the road bed both before and during haul operations.	
An education program of wildlife related policies and mitigation to all Project employees and contractors, including a bear awareness program to ensure employees and contractors are informed of bears and other potentially dangerous wildlife and the level of risk.	
An alert system to warn personnel of Woodland Caribou and other sensitive wildlife in the local area by relaying sighting	

information to vehicles/aircraft and equipment operators and on-site personnel.	
Wildlife sighting logs to be completed by all Project employees and contractors for wildlife sightings (e.g., Dall's Sheep, caribou, Wood Bison) with respect to species, location along the access road/ airstrip, numbers, and reaction to Project activity. If a problem area is identified, corrective measures will be considered.	
ENR's Woodland Caribou Best Management Practices for Industrial and Commercial Activities (once developed) to be incorporated into the wildlife monitoring program, where feasible, to manage or mitigate habitat impacts and sensory disturbances on Woodland Caribou.	<p>In its 2016 Updated Draft WMMP, CZN also committed to implementing the following specific caribou monitoring activities to provide the following real-time information during year-round mine operations and hauling activities, from the Golder 2012 Draft WMMP (both drafts of the WMMP in PR#267):</p> <ul style="list-style-type: none"> ▪ Information on caribou numbers, frequency of occurrence, and distribution in the Project area; ▪ Location of caribou and caribou aggregations in close proximity to mine infrastructure and the airstrip; ▪ Response of caribou to aircraft traffic in the vicinity of the Mine site; and ▪ Location of caribou and caribou aggregations in close proximity to the access road during winter concentrate hauling operations. ▪ Wildlife Monitors will conduct ground-based surveys of the access road, mine infrastructure sites, and the airstrip to identify caribou aggregations in the Project area and assess behaviour; ▪ A radio call-in procedure will be implemented so that observations of caribou along the access road can immediately be relayed to the Road Operations Supervisor so that traffic alerts can be issued. Observations recorded by drivers during hauling will provide information about caribou crossing patterns and movement corridors along the access road; and

	<ul style="list-style-type: none"> ▪ A procedure will be implemented so that caribou observations made by aircraft pilots during transport of crews and materials will be reported to the Wildlife Monitors. Observations recorded during air transport will provide additional information about presence of caribou in the vicinity of the mine site and access road. <p>CZN also committed that as part of an adaptive management strategy, if the above-noted caribou monitoring indicates a lack of success of mitigation actions, then mitigation actions will be reassessed and modified following consultation with First Nations, GNWT ENR, and Parks Canada.</p>
Snow removal practices along the access road and airstrip to manage high snow banks, so that wildlife can readily move off as vehicles/aircraft approach.	
A structure for reporting human-dangerous wildlife encounters at the TTF and resulting incidents to inform Mine management and ENR staff.	
A Waste Management Plan that prohibits littering, purposely feeding wildlife, and storing attractants accessible to wildlife. Incinerate all waste foods and human garbage consistent with current industry good management practices to minimize wildlife attraction to the local area. Adaptive management will be applied to waste management practices. If wildlife are found to be attracted to the site (i.e., problem wildlife) additional management practices, if required, will be adopted.	
Fuel storage facilities that meet industry standards for tank construction, location and spill containment	
Appropriate materials management systems will minimize the risk of accidental spills or leakage of concentrate, diesel fuel/ hydrocarbons, and other hazardous materials being shipped to the mine site. This includes ensuring hydrocarbon and chemicals that are	

hailed along the access road or stored at the TTF are in industry standard containers with appropriate spill containment and management measures in place.	
Staff trained on the existing spill management plan and procedures to quickly respond to an accidental spill. The plan will include provision for rapid deployment of cleanup crews and for contaminant and cleanup of spilled material and contaminated surfaces.	
Managing the small portion of the winter road not used for all season access to prevent predator and non-Project related travel of the corridor, if necessary.	
Preservation of natural drainage patterns along the haul road to maintain the natural function and processes of peatland habitats adjacent to the haul road.	
Non-mine vehicles, including all-terrain vehicles (ATVs) and snowmobiles will be prohibited on site.	
Adherence to standard industry best practices during construction.	
Discuss issues and considerations regarding wildlife populations and effects during the Technical Advisory Committee meetings proposed by CZN in EA0809-002.	
Report annual updates and results of the Wildlife Mitigation and Management Plan, Controlled Road Use Plan, and inspections and enforcements.	
Reporting and evaluating wildlife sightings along the access road and airstrip, and if a problem area is identified, corrective management options for traffic and Project-related activities will be considered.	
Prohibit hunting, trapping, harvesting, and fishing by site employees and contractors.	
The appropriate regulatory agencies (i.e., GNWT ENR and Parks Canada) will be contacted to receive additional direction regarding new issues that arise.	

Provide the Dehcho Land Use Planning Committee (and others as requested) the post construction digital footprint of the all season access road and associated facilities to incorporate into ongoing cumulative effects monitoring across the Dehcho.	DFN request that CZN provide it with the post-construction digital footprint also.
Amend the existing draft Wildlife Mitigation and Monitoring Plan, as necessary, to include the monitoring of measurable parameters of effects.	
Blasting is prohibited if caribou are observed within 1 km of blast site until animal moves out of the area.	CZN has committed to a wildlife reconnaissance (to be completed by the CZN Environmental Monitor) by scanning adjacent slopes, ponds, and surrounding areas with binoculars prior to blasting, if blasting should occur (TetraTech EBA Wildlife Veg IR1 responses, PR#186).
If caribou are reported on the road or within 500 m of it, traffic or activity will cease at least 500 m from (or at first observation of) the animal(s) and all headlights turned off until the animal moves off at least 100 m away from the road or 5 minutes after last visual. Once traffic resumes, speed reduced to half the posted speed limit, 30 km/hr, within 1 km of the sighting.	As noted in the CZN Commitments Table (PR#296), the 500 m buffer extends to the mountain range due west of the Prairie Creek Mine site where caribou tracks and cratering were reported by Parks Canada. The 500 m buffer is also to apply to the entire Project footprint, and not just the road.
If caribou are reported beyond 500 m of the road, traffic speeds are to be reduced to half the posted speed limit, 30 km/hr, within 1 km of the sighting.	
Additional commitments from EA0809-002 Consolidated Project Description – February 2012² (in PR#370)	
For caribou, wood bison, grizzly bear, wolverine, peregrine falcon, shorteared owl, horned grebe, rusty blackbird, olive-sided flycatcher, and common nighthawk, any mortality directly relating to the operation of the mine site or access road will trigger a review of mitigation strategies.	

² CZN have indicated that they will adopt those commitments made for EA0909-002 as appropriate.

Dead wildlife encountered in proximity to the mine site and access road will be recorded and geo-referenced.	
Appropriate collaborative monitoring initiatives with First Nations, Parks Canada and other regulatory agencies will be supported.	
All relevant observations of wildlife (particularly of Dall's sheep, caribou, grey wolf, wolverine and grizzly bear) will be reported to mine environmental staff.	
All vehicles will be equipped with two-way radios. Wildlife sightings along the access road will be geo-referenced and reported to road supervisors.	
A radio call-in procedure will be implemented so that observations of caribou along the access road can immediately be relayed to the Road Operations Supervisor.	
A procedure will be implemented so that caribou observations made by aircraft pilots during transport of crews and materials will be reported to the Wildlife Monitor.	
Wildlife monitors will conduct ground surveillance during the initial mine start up and production period.	
Wildlife Monitors will conduct ground-based surveys of the access road, mine infrastructure sites, and the airstrip to assess caribou presence and identify caribou aggregations in the Project area.	
Summer maintenance work on the all season road will be voluntarily restricted to the period July-September.	
Wildlife Monitors will contribute to a detailed quarterly report of wildlife observations and incidents that occurred during the monitoring period. Reports will be submitted to First Nations, GNWT ENR, Environment Canada and Parks Canada.	

6. Northern Mountain Caribou

Potential for adverse impacts on Northern Mountain Caribou, including a possible small resident population in close proximity to the All Season Road.

Developer's Conclusions

CZN maintain that "the Mine and all-season road are in an area where few Northern Mountain Caribou occur (reported as "trace occurrence") ([PR#297](#), Updated Draft Wildlife Mitigation and Monitoring Plan (WMMP), p.22), citing ENR (2016) as their primary reference, paired with surveys and anecdotal observations for CZN.

CZN's summary tables in Section 6 of DAR Addendum Appendix E ([PR#102](#)) ranks the magnitude of various effects on Northern Mountain Caribou as low, and Overall Significance as Low (e.g. habitat loss and fragmentation, abundance and occurrence, energetics and body condition).

DFN's Conclusions

DFN does not support CZN's conclusion that there is only trace occurrence of Northern Mountain Caribou in the project area. DFN believes that there is a potential that there could be adverse impacts on Northern Mountain Caribou due to the All-Season Road.

Evidence and Rationale

Parks Canada Agency (PCA) has stated "Wildlife studies in the project area, albeit limited, consistently report caribou in the project area. Information from hunting outfitters, park staff observations, remote camera images, and recent satellite collar information confirm significant numbers of caribou in the project area and their presence year round" ([PR#370](#), Round 1-PCA-IR-2).

PCA's Preliminary Data Report – Prairie Creek Caribou Research ([PR#159](#)) indicates caribou occurrence in proximity to the mine site and access road, with 3 out of 18 collared female caribou (17%) appearing to reside most of the year in the project area, including crossing the proposed All Season Road.

Though CZN appear to consider abundance and occurrence effects constrained to within 1-2 km of the All Season Road ([PR#102](#), DAR Addendum Appendix E, p.167), other studies have found apparent reduced abundance within 18-30 km of the Dempster Highway in the Yukon (Johnson and Russell 2014), delays of caribou crossing a mine haul road in Alaska (Wilson et al. 2016), and an All Weather Access Road in Nunavut acting as a partial barrier to caribou movement (Agnico Eagle 2016).

Recommendation

DFN believes that there is a potential that there could be adverse impacts on Northern Mountain Caribou due to the All-Season Road. In order to prevent significant adverse impacts on Northern Mountain Caribou, DFN recommends that MVEIRB adopt a measure requiring a systematic monitoring program.

DFN supports PCA's request for a commitment from CZN to a systematic monitoring program for Northern Mountain Caribou, including aerial surveys to provide a population index and composition during rut, and possible additional seasonal ungulate surveys ([PR#273](#), GoC Responses to Technical Session Undertakings 10 & 15). CZN have recognized that PCA is better equipped to develop and continue such surveys and monitoring, and offered to provide logistical and monetary support ([PR#297](#), Updated Draft WMMP, p.23).

DFN would also like a systematic monitoring program to include local members. The program should be designed to build the community capacity in monitoring in a manner that is meaningful. The program should also enable local members to share their knowledge, so that both western science and traditional knowledge informs the program and any resulting management decisions. DFN would expect the proponent to help fund the involvement of local members in this program.

7. Access management

Impact

The proposed access road has the potential to affect harvestable species abundance and distribution, and change harvesting pressure and harvesting areas ([PR#297](#), Updated Draft WMMP, p.21)

Developer's Conclusions

CZN's intention had been to apply to INAC for a 'Permission to Occupy' (PTO) for the portion of the road crossing Indian Affairs Branch Lands, as a possible location to set up an access control mechanism to limit vehicle traffic along the All Season Road to mine traffic only and use by residents of Nahanni Butte. CZN have also committed to operating a checkpoint west of the Liard River to address concerns that unauthorized users could gain access via the river (CZN response to Round 2- MVEIRB-IR-3, [PR#370](#)).

DFN's Conclusions

DFN is of the view that public access to the road should be limited to the extent possible to prevent increased harvesting pressure on wildlife.

Recommendation

DFN hopes that a mechanism is found to limit access to the road. As a supporting tool and to account for potential bypassing of any checkpoints put in place, we once again recommend that CZN install remote camera stations along the road to monitor and quantify how many people are using the road other than CZN employees or contractors (Round 1-DFN-IR-19, [PR#200](#)).

DFN proposes that Canadian Zinc works with the community of Nahanni Butte to set up a program to patrol access along road during the harvesting season. Local members are best positioned to help observe, record and report any activities that are unfavorable to the local community. DFN believe a program built in collaboration with the local First Nation would help address this gap.

8. Impacts to Cultural Heritage

The proponents' initial position with respect to Cultural Heritage was that sufficient work had been done in previous Canadian Zinc environmental assessments (DAR, [PR#55](#)). The proponent also proposed that Nahanni Butte Dene Band members would accompany road workers to watch for signs of heritage resources. A number of Parties have previously questioned the efficacy of that approach, in particular during the June 14th technical sessions held in Yellowknife ([PR#232](#)).

In the technical sessions, GNWT staff clarified that Canadian Zinc's proposed approach would not meet requirements by the legislation / regulations (Tech Sessions, [PR#232](#)). Specifically, in order to obtain an archaeological permit, a primary investigator with sufficient professional training and credentials would be required. Canadian Zinc subsequently agreed to contract an Archaeological Overview Assessment (AOA), which was completed by Lifeways of Canada Limited and submitted to the Board on November 29th, 2016 ([PR#379](#)).

The authors of the AOA identified several areas that will be disturbed through construction at which there is likely high potential for cultural heritage resources. The authors recommended that an Archaeological Impact Assessment (AIA) be conducted preconstruction (p.9). Specifically, the AIA "should focus on the infrastructure associated with the Project, especially the borrow sources, camps, staging areas, drainage crossings and areas that were not included in the previous studies or identified specifically during consultation with Nahanni Butte Dene", in particular:

- Between Highway 7 and Wolverine Pass- proposed borrow sources and water crossing
- From Wolverine Pass to Sundog Creek (Figure 2 Maps 5 to 7) the borrow sources, drainage crossing, Wolverine Pass, and flat areas along the drainage valleys
- From Sundog Creek to the Prairie Mine Site – those areas identified as having elevated potential, and only where new disturbance will occur.

The AOA also recommended that cultural resource protection plan be developed. The report reads:

"Once the AIA has been completed, irrespective of the results, a Cultural Resource Protection Plan will be developed. The plan will build on the heritage resource booklet and will include illustrated descriptions of site types that are common to the Project area with examples from the AIA or previous research.

Once the AIA is completed, in the unlikely event that cultural material is uncovered during the construction of the Project, work should stop temporarily and depending on the jurisdiction involved, either Parks or the PWNHC be contacted to discuss how to proceed."

Developer's Conclusions

Although DFN presumes that the proponent will heed its consultants' recommendations with respect to cultural resources, this commitment has not been clear to date.

DFN's conclusions

Cultural heritage resources provide valuable insights into the lives of Dehcho ancestors and tell rich stories about their skills, practices and land occupancy. AOAs followed by AIAs and cultural resource protection plans have therefore become a minimum standard expected by a proponent when a proposed disturbance will jeopardize potential cultural resources on public lands.

Evidence and rationale

Dehcho First Nations have traditionally used the areas which would be disturbed by the footprint of the proposed all-season road, as noted in the Addendum to the TK Assessment of the Prairie Creek Mine: "Given that the ancestors of the Nahæâ Dehé people are known to have traveled overland to a greater extent than via waterways, the mountain passes that provide easy access into and between valleys are potential areas for pre-historic and historic artifacts" ([PR#18](#)).

Recommendation

DFN would like the proponent to make clear commitments regarding completion of an AIA and cultural resource protection plan and hopes that the Review Board will ensure that these are binding in its final decision. DFN would also like clear commitments that this process will include local members and their knowledge.

The AIA should include pedestrian studies of all high potential areas and should be of sufficient scope with sufficient resources that likely heritage resources will be identified (such rigor could be addressed through the archaeological permitting process).

Given that the results of the AIA could therefore result in significant modifications to the project, it should be completed during the upcoming field season with planning, contracting and permitting starting as soon as possible to ensure that the relatively short field season is not missed.

DFN will be asking questions at the technical hearing to better understand how cultural resource plans can be developed to effectively protect cultural resources and to clarify timing and sequence of Canadian Zinc commitments.

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