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ISSUED FOR USE  
FILE: Y14103320-01.007  
Via Email: david@canadianzinc.com

**Attention:** David Harpley  
VP Environmental & Permitting Affairs

**Subject:** Response to the Wildlife and Vegetation Information Requests for the  
Developer's Assessment Report, Environmental Assessment, EA1415-01 REV 02  
Proposed All Season Road Access to Prairie Creek Mine, NT

## 1.0 INTRODUCTION

Tetra Tech EBA Inc. (Tetra Tech EBA) prepared a Vegetation and Wildlife and Wildlife Habitat Assessment Report for a proposed all season road from Northwest Territories Highway 7 (near Nahanni Butte) to the Prairie Creek Mine (the Project). This assessment report was submitted as an appendix to the Developer's Assessment Report (DAR), and a revised version as an appendix to the DAR Addendum, to support Canadian Zinc Corporation (CZN) in securing approval from the Mackenzie Valley Review Board (MVRB) (the Board). Several agencies and the Board have responded with Information Requests (IRs) for further confirmation and explanation of the Vegetation and Wildlife and Wildlife Habitat Assessment Report.

This letter summarizes our response to specific IRs.

## 2.0 MVRB INFORMATION REQUESTS

### 2.1 IR #16.1: Boreal Caribou

**Comment:** Boreal caribou are a species at risk in the NWT. Boreal caribou are present along the eastern portion of the Prairie Creek all season access road. The effects on boreal caribou are predicted to be adverse, moderate in magnitude, geographical extent and reversibility, and high in duration, frequency and certainty. It is unclear, however, what the actual effect of these impacts on boreal caribou abundance and distribution will be.

**Recommendation:** Are the recommendations in the Boreal Caribou Recovery Strategy (2012) reflected in the design and effects assessment of this project? If so, how? If not, why not?

**Response:**

Yes. The Recovery Strategy (Environment Canada 2012)<sup>1</sup> reports that the single Boreal Caribou population in the Northwest Territories is self-sustaining, with 31% of the habitat disturbed (including fire and anthropogenic; which totals roughly 13,691,629 ha disturbed habitat). The Recovery Strategy indicates that a stable or positive population growth can be maintained with this level of habitat disturbance. The proposed Project directly affects 53.3 ha of habitat compared to the 30,474,917 ha total Northwest Territories Boreal Caribou critical habitat range. Even with a 500 m buffer surrounding the Project footprint (as outlined in the Recovery Strategy) to measure indirect habitat loss, the proposed Project contributes very little change (approximately 1,700 ha or 0.006%) to the overall population's critical habitat.

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<sup>1</sup> Environment Canada. 2012. Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada. *Species at Risk Act Recovery Strategy Series*. Environment Canada, Ottawa. xi + 138 pp.

Mitigation committed to in the DAR (Table 1) follows the Boreal Caribou Recovery Strategy's Appendix I (Mitigation Techniques to Avoid Destruction of Critical Habitat).

**Table 1: Proposed DAR mitigation relative to suggestions from Boreal Caribou Recovery Strategy (Environment Canada 2012).**

DAR Consideration	Recovery Strategy Suggested Examples of Possible Mitigation Techniques	DAR Mitigation
Yes	<ul style="list-style-type: none"> <li>Minimize the footprint of development, consider locations where habitat is already disturbed</li> <li>restore habitat to provide continual availability of undisturbed habitat over time</li> </ul>	<ul style="list-style-type: none"> <li>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)</li> <li>Project designed to utilize borrow material within the proposed road right-of-way, to the extent possible</li> <li>Temporary camps to use borrow sources and existing camp locations, where possible</li> <li>Reclaim borrow sources when no longer needed</li> </ul>
Yes	<ul style="list-style-type: none"> <li>Avoid destruction of biophysical attributes</li> </ul>	<ul style="list-style-type: none"> <li>Project inherently designed to avoid peatlands, lowlands, and open water habitats, to the extent possible</li> <li>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</li> </ul>
Yes (to the extent possible)	<ul style="list-style-type: none"> <li>Minimize disturbance by adapting its shape (small polygon vs. linear)</li> </ul>	<ul style="list-style-type: none"> <li>To the extent that the proposed all season road can adapt its shape, the Project:</li> <li>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)</li> <li>Reduces road access by utilizing existing borrow sources for temporary construction camp locations</li> </ul>
Yes	<ul style="list-style-type: none"> <li>Mitigation of noise, light, smells, vibrations to prevent harassment of boreal caribou</li> </ul>	<ul style="list-style-type: none"> <li>Low traffic volumes (approximately 15 haul trucks per day)</li> <li>Low traffic speeds to substantially reduce noise or other associated potential effects</li> <li>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</li> <li>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</li> <li>Confine other Project-related activity to two transfer facilities approx. 70 km apart (straight line distance))</li> </ul>

**Table 1: Proposed DAR mitigation relative to suggestions from Boreal Caribou Recovery Strategy (Environment Canada 2012).**

DAR Consideration	Recovery Strategy Suggested Examples of Possible Mitigation Techniques	DAR Mitigation
		<ul style="list-style-type: none"> <li>Concentrate construction activities temporally and spatially by adopting a sequential development strategy as much as possible (including blasting, if required)</li> </ul>
Yes	<ul style="list-style-type: none"> <li>Mitigate pollution through scrubbers or other techniques. Some types of pollution may be especially of concern (e.g., air pollution that increases acidity may affect lichens on which boreal caribou depend for food)</li> </ul>	<ul style="list-style-type: none"> <li>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</li> <li>Measures to avoid contaminant loading identified in the Contaminant Loading Management Plan to be applied</li> <li>Section 9 of the DAR outlines spill response procedures</li> </ul>
Yes	<ul style="list-style-type: none"> <li>Certain types of disturbance could occur only in seasons when boreal caribou are not using the area or do not respond negatively to the activity</li> </ul>	<ul style="list-style-type: none"> <li>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</li> </ul>
Yes	<ul style="list-style-type: none"> <li>New access roads in previously undisturbed areas may induce further disturbance by opening territory to more development, recreational users, etc. This could be prevented by an access management plan that could include limiting access, decommissioning roads, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Operation of a private barge on the Liard River for truck traffic, and this would not be available to non-residents</li> <li>Install signage before the Liard River advising the barge is operated as a private crossing to discourage non-mine related traffic</li> <li>Restrict the use of the Prairie Creek Mine access road by non-mine related traffic to the extent possible using a check-point station (manned by NDDB members) after the Liard River crossing</li> <li>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</li> <li>Maintain and or manage disturbed areas to facilitate natural encroachment of native species</li> </ul>
Yes	<ul style="list-style-type: none"> <li>Impact may be reduced by using techniques that prevent use of corridor by predators (no compaction of snow, immediate replanting of trees, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>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</li> <li>Maintain and or manage disturbed areas to facilitate natural encroachment of native species</li> </ul>
No	<ul style="list-style-type: none"> <li>Mortality management techniques may be considered where the killing of predators would be a final, necessary option implemented temporarily, along with habitat restoration</li> </ul>	<ul style="list-style-type: none"> <li>Not considered for the proposed all season road</li> </ul>

## 2.2 IR #20: Effects Assessment – Traditional Harvesting

**Comment:** The DAR (Appendix 7, p82-83) suggests that wildlife may be disturbed by project activities with energetic consequences to their health and survivability. It then describes the likelihood of these effects on wildlife, considering only a “small number of individual harvest animals [that] may be expected to be present in the vicinity of the all season access road and associated infrastructure year round”. This assessment appears to omit the disturbance and energetic effects on wildlife that are either migratory or have a habitat range that is only partially within the vicinity of the all season access road.

**Recommendation:** Please describe the anticipated impacts on all harvested species from disturbance and displacement caused by the Project. This description will include but is not limited to a discussion on impacts to migratory species or those whose habitat range is only partially (either temporally or geographically) within the vicinity of the all season access road.

**Response:** Based on the page number associated with this IR, we understand this question arose from the former Vegetation and Wildlife and Wildlife Habitat section of the Developers Assessment Report (dated February 2015), which was replaced by an updated version of this same report (dated September 2015). The updated report version completely replaces the former report.

Information relating to this IR is considered in the updated report version, sections 6.5 (Effects on the Abundance and Occurrence of Harvested Species, pages 103-114), 6.6 (Effects on Dispersal and Local Movements, pages 115-121), and 6.7.1 (Effects to Energetics and Body Condition, pages 121-127). The assessment of Trumpeter Swans (Section 7.0) may be used as a conservative surrogate to potential spring and fall waterfowl staging areas.

## 2.3 IR #22: Effects Assessment

**Comment:** In describing its effects assessment methodology for a number of valued components including species at risk, wildlife and vegetation, CanZinc defines the thresholds that delineate low, moderate and high criteria of effects (e.g. duration, geographic extent, magnitude, etc.) (Table 3-1). It also defines low, moderate and high levels of overall significance (Table 3-2). However, it does not describe how these two levels of assessment are related to each other. For example, Table 6-4 “Project Effects on Predicted Habitat Fragmentation and Movement”, identifies the level of effect (low, moderate or high) for each of the effect criteria for a number of species. Despite there being many more moderate and high rated effects than low for individual species, the overall significance was characterized as low. It is unclear to the Review Board what methodology was used to derive overall significance from effects on individual species. It is also unclear if and how this methodology was used consistently among effects assessments.

**Recommendation:** Describe the methodology that connects the individual species effects assessments with the overall significance determination for each assessment in Section 6 of Appendix 7. Confirm that a consistent methodology to derive overall significance was used for each effects assessment in this section.

**Response:** The overall significance determination was first based on the magnitude, duration, and geographic extent of the potential effects characteristics (Charts 1 to 3). Magnitude levels are described as L (low), M (moderate) and H (high), while the duration is described as L (low; short-term), M (moderate; medium-term), H (high; long-term), and I (irreversible; reversibility characterization).

Moderate significance was the highest rating possible within the local or low geographic extent (orange color) (Chart 1).

		Significance			
Magnitude	H	L	M	M	M
	M	L	L	M	M
	L	N	L	L	M
		L	M	H	I
		Duration			

**Chart 1: Low Geographic Extent Significance Determination**

For effects at a moderate geographic extent (potential effects that extend beyond the project footprint but are not of regional or territorial consequence), possible ratings ranged from negligible (green colour) to high (red colour) (Chart 2).

		Significance			
Magnitude	H	M	M	H	H
	M	L	M	M	H
	L	N	L	L	M
		L	M	H	I
		Duration			

**Chart 2: Moderate Geographic Extent Significance Determination**

For effects at a high geographic extent (those potential effects that are likely to extend into the region or be of territorial consequence), possible ratings ranged from low (yellow colour) to high (red colour) (Chart 3).

		Significance			
Magnitude	H	M	M	H	H
	M	L	M	M	H
	L	L	L	M	M
		L	M	H	I
		Duration			

**Chart 3: High Geographic Extent Significance Determination**

The overall significance determination is a blend of all the Valued Components (VC's) assessed within each effects assessment table. Aggregating each of the VC's can be problematic, as potential effects may differ among species, but the DAR attempts to follow the structure outlined in the TOR. Thus, the overall significance for each species determined from using Charts 1-3 were then combined to determine the overall significance of each effects assessment to provide a general understanding of significance of each potential effect required in the TOR.

Correction: Table 8-17 (Project Effects of Dust Generation on Vegetation) page 238 of the DAR should have an overall significance as Moderate (currently stated as Low); however, the DAR indicates that the draft Contaminant Loading Management Plan for the approved mine and winter road would be extended to the proposed all season road and would be a suitable monitoring program for dust generation.

## 2.4 IR #23: Residual Effects

**Comment:** There is a lack of clarity and consistency regarding whether or not the assessment tables in Section 6 of Appendix 7 are representative of residual effects (i.e., after mitigation is applied) or unmitigated effects. For example, the preamble to Table 6-4 clearly indicates that the effects listed are predicted based on "adherence to the [proposed] mitigation" (Appendix 7 p103). In comparison, the preamble to Table 6-5 chronologically follows potential mitigation measures, but simply states that "predicted effects ...are summarized in Table 6-5". The former example, therefore, clearly points to residual effects while the latter is unclear. The assessment methodology described on p 14 of Appendix 7 says that for effects that are determined to have moderate or high overall significance, "specific management measures or plans are necessary" and "future study or monitoring is necessary to supplement the baseline data, and to be used for refining a management strategy and planning", respectively. Therefore, if the effects tables in Section 6 of Appendix 7 represent residual effects, then all of the effects that are identified as having either moderate or high levels of overall significance require additional mitigation or monitoring to reduce them to a low significance level.

**Recommendation:** Please clearly identify if the effects assessment tables in Section 6 of Appendix 7 are representative of residual or unmitigated effects. If they represent residual effects, please outline what additional mitigative actions can and will be taken in order to reduce any moderate or high significance effects down to a level of low significance.

**Response:** The effects assessment tables represent effects after mitigation is applied.

The determination of residual effects was based on the overall significance determination (outlined with Charts 1 to 3 in IR 22) plus professional judgement that considers the frequency of Project-related interactions, reversibility, and the likelihood of effects after mitigation is applied. No mitigation/monitoring is required for effects with a positive or neutral direction (e.g., Table 6-13 Project Effects on Harvesting Access).

Additional mitigation/monitoring was identified for potentially moderate or high residual effects. For example, Table 6-5 (Project Effects on the Abundance and Occurrence of Harvested Species) conservatively estimates moderate significance of effects on Boreal Caribou, but residual effects related specifically to the proposed Project and not to the existing approved winter road are difficult to determine. Since the proposed Project differs from the approved winter road on year round traffic, traffic volume monitoring (project and non-project related) and associated adaptive management triggers will be incorporated into the wildlife mitigation and monitoring plan.

Also in Table 6-6 (Project Effects on Dispersal and Local Movements of Harvested Species), Dall's Sheep effects assessment indicates a moderate geographical extent, magnitude, and duration but a low frequency of Project-related interactions due to low traffic volumes and infrequent Dall's sheep movements/dispersal (non-habituated sheep in the Nahanni Range). Thus, this was considered a low residual effect and no further mitigation recommended.

## 2.5 IR #32 and 33: Noise Assessment

**Comment: IR #32:** The DAR does not provide sufficient information for the Review Board to understand potential effects of noise from the project on the environment. The locations, timing (the start and end dates, time of day, season, etc.), duration (how long the sound is emitted) and magnitude (normal, peak, and cumulative decibel levels) of the sources of noise from the project during all its phases are not provided. For instance, information about noise from borrow sources should include their locations, time and duration they will be in operation and the cumulative noise they will generate from sources all sources such as: crushers, blasting, hauling and stockpiling material, and heavy equipment. This information is necessary to conduct an assessment of potential effects to valued components, including but not limited to caribou, bears, moose, birds, sheep and people. Please note that for this

assessment, sources of noise include, but are not limited to: borrow sources associated with construction and operation (including all equipment present, blasting, and crushing), road construction (blasting, construction of bridges and other water course crossings), operations and maintenance activities (pumping of water for dust suppression, graders, heavy equipment), and the haul fleet (including a consideration of the use of engine breaks while under load and on grades).

**Recommendation: IR #32:**

1. Please provide detailed information about sources of noise from the project including, but not limited to:
  - their locations, timing (including, but not limited to, the start and end dates, time of day, seasonality etc.); and
  - duration (how long the sound is emitted), frequency and magnitude (including, but not limited to, normal, peak, and cumulative decibel levels).
2. Provide an assessment of how far this noise can travel until it reaches background for individual sources and for any combination of noise sources, such as multiple noise sources from a borrow source.
3. Provide a consideration of how terrain, temperature, and weather may affect noise.

**Comment: IR #33:** The duration that noise is emitted can greatly influence the effect it may have. For instance, how long will the sound from an individual haul truck be audible to a person or animal and what is interval between the audible noises from haul trucks? The DAR or DAR addendum does not appear to contain this information. Without this information an assessment of the effects of noise is not complete.

**Recommendation: IR #33:** Provide a time series analysis of noise from the project. In other words, estimate how long a valued component can hear noise associated with the project. For instance, how long would a person be able to hear a haul truck and what is the interval between being able to hear the noise from one haul truck until the noise from another haul truck is audible? This must include considerations of terrain, weather, peak sound emissions (use of engine breaks for instance), and time of year.

**Response: IR #32 and 33:**

Response provided in Appendix A of this letter.

## **3.0 GOVERNMENT OF NORTHWEST TERRITORIES (GNWT) INFORMATION REQUESTS**

### **3.1 IR #6: Western Toad**

**Comment:** Table 7-2 of Appendix E lists Western Toad as a species at risk not selected for assessment. In December 2015, the NWT Conference of Management Authorities added Western Toad to the NWT List of Species at Risk as a Threatened species. CZN should be advised that Section 76 and 77 of the *Species at Risk Act* (NWT) requires the Minister of Environment and Natural Resources to make a submission to the body responsible for assessing the potential impacts of a proposed development, or for considering a land use permit or water licence application, respecting the potential impacts of the proposed development, permit or licence application on a NWT-listed or pre-listed species or its habitat. NWT-listed species are those that are on the NWT List of Species at Risk. Pre-listed species are those that have been assessed by the NWT Species at Risk Committee (SARC) but have not yet been added to the NWT List of Species at Risk.



**Recommendation:** GNWT recommends that CZN consult <http://www.nwtspeciesatrisk.ca/SpeciesAtRisk> for further information on the status assessment and reasons for listing Western Toad. GNWT requests that CZN provide an assessment of potential impacts to Western Toad from construction and operation of the access road, and identify mitigation and monitoring measures to minimize or avoid any potential impacts.

**Response:** The southernmost portions of the proposed Project, from the Liard River to the Liard Highway, occur within designated Western Toad range. The nearest known confirmed Western Toad observation is approximately 30 km south of the southernmost tip of the proposed Project, and an unconfirmed (and considered questionable due to lack of documentation and evidence) observation was reported near Nahanni Butte (date unknown; pre-1984).

Western Toads are considered in the DAR (Section 4.3.18), but an assessment of potential impacts was not completed since there are limited opportunities for Project-Western Toad interactions to occur. The proposed Project includes the construction and operation of the Liard River barge crossing, vehicle and equipment traffic along approximately 19 km of the all season access road (same alignment as the approved winter road as well as the existing Nahanni Access Road, thus no direct habitat loss) and at the transfer facility, year round operation of the Liard Transfer facility within Western Toad range. A single preferred borrow source is also proposed approximately 1-2 km north of the Liard River, and outside the designated Western Toad range.

Western Toads use a variety of aquatic and terrestrial habitat types throughout their life history stages including wetlands, shallow sandy margins of ponds, slow moving rivers and backwaters, beaver ponds, borrow pits and road ditches, and springs during breeding. Western Toads breed in the spring (within a one to two week period in mid to late-May) (Species at Risk Committee 2014)<sup>2</sup>, shortly after ice-breakup and are sensitive to disturbance at breeding ponds (particularly in the egg and tadpole stages), and during spring and fall migration. Throughout the summer, Western Toads are known to range up to approximately 1.2 km from a waterbody; however, their abundance is greatest in forests less than 100 m from water. Water drainages and upland habitats may be both used for dispersal.

It is unknown if Western Toads in the NWT are diurnal or nocturnal, and Western Toads show high fidelity to breeding, summering, and overwintering areas (Species at Risk Committee 2014). Habitat fragmentation caused by roads and trails are not considered to be a major issue as Western Toads are capable of foraging/moving in and across open areas; however, mortality from road traffic is considered a serious threat (Species at Risk Committee 2014). The Species at Risk Committee (2014) indicate that “it is the juxtaposition of roads and breeding sites, and the volume and seasonal timing of traffic that determines the level of threat, not road density itself”. Other potential threats include pollution, predation, climate change, and disease.

Proposed construction activities occur primarily in the late fall and winter when Western Toads are hibernating (torpor), with the exception, both summer and winter construction is required at the Liard River barge crossing, which is in a fast-flowing segment of the river with no shallow backwaters to support quality Western Toad breeding habitat.

Once in operation, there are two periods available for hauling mine concentrates; summer and winter. The summer haul period is after spring break-up and before fall freeze-up on the Liard River crossing (projected hauling dates June 15 to November 4). The start of the haul period is delayed by load restrictions on the Liard Highway, and outside Western Toad spring migration and spring breeding periods. The winter haul period is governed by the Liard River ice bridge (projected hauling dates January 1 to March 31). Thus the proposed Project activities may directly interact with Western Toads after spring migration and breeding season, from approximately June 15 to approximately late September (mean daily freezing temperatures that initiate winter hibernation). This period of time includes Western Toad summering, tadpole/juvenile stages in the breeding pond, as well as fall migration.

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<sup>2</sup> Species at Risk Committee. 2014. Species Status Report for Western Toad (*Anaxyrus boreas*) in the Northwest Territories. Species at Risk Committee, Yellowknife, NT.



The proposed Project may interact with Western Toads within the limited temporal period. However, since the road traverses at least 100 m from wetlands and open waterbodies (to the extent possible as the all season road directly follows the winter road) thereby reducing the risk of interaction during the summer operation period. Similarly, during the operations period, the traffic volumes are low (approximately 15 haul trucks per day).

Mitigation, including spill contingency plans, dust suppression (using water), dust suppression pumping following regulatory protocols, and designing the road with suitable culvert placement and sizes will minimize risks to potential Western Toad habitat quality. Similarly, slow traffic speeds reduce dust during operation. Thus, Western Toad interaction with the proposed Project is limited based on the limited extent of the project within Western Toad range, temporal period of construction and operations, location at least 100 m from permanent waterbodies and wetlands, and low traffic volumes. Similarly, potential indirect effects to Western Toads are significantly reduced by the existing mitigation to avoid habitat alteration (i.e., pollution, water quantity).

CZN could consider conducting a Western Toad fall migration mortality survey along the proposed all season access road east of the Liard River, in conjunction with the GNWT, once detailed Western Toad life history information is known in the NWT that could support an effective and efficient survey protocol (e.g., nocturnal or diurnal migration, timing of migration).

### 3.2 IR #8: Black Bear Mitigation

**Comment:** DAR Appendix E states that during clearing and construction, the risk of mortality to harvested wildlife is most significant at natal den sites, and specifically mentions natal dens of wolverine and marten, and beavers overwintering in their lodges. Denning black bears may also occur throughout much of the area along the access road and could be susceptible to disturbance or mortality within their dens during clearing of vegetation and road construction along the existing alignment, construction of new alignments, development of borrow sources and associated access roads. Section 7.3 (pg. 174) of Appendix E states that CZN will conduct pre-clearing denning surveys for Grizzly Bear in favourable denning habitat, but makes no mention of conducting similar denning surveys for black bear. Page 1 of Appendix C (within appendix E) states that the den reconnaissance surveys will include wolverine, grey wolf and grizzly bear, but again there is no mention of black bears. Subject to Section 52 of the *Wildlife Act* damage or destruction of a den, beaver dam or lodge, muskrat push-up or hibernaculum is prohibited unless authorized by a licence or permit to do so.

**Recommendation:** Please describe mitigation measures that will be implemented to identify and avoid damage or destruction of black bear dens during construction, operation and closure of the all-weather access road, and associated borrow pits and their access roads.

**Response:** Grizzly Bears were assessed as a surrogate for Black Bears in the DAR. Mitigation, including pre-clearing denning surveys identified for Grizzly Bears also extend to Black Bears. Environmental Monitors will survey for wildlife dens in favourable denning habitat (e.g., borrow sources) prior to clearing.

## 4.0 ENVIRONMENT AND CLIMATE CHANGE CANADA INFORMATION REQUESTS

### 4.1 IR #1: SARA Birds

**Comment:** Subsection 79(2) of the *Species at Risk Act* (SARA) states that during an assessment of the environmental effects of a project, the adverse effects of the project on the listed wildlife species and its critical habitat must be identified, that measures are taken to avoid or lessen those effects, and that the effects be monitored. This subsection applies to all species listed on Schedule 1 of SARA. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans. As a matter of best practice,

Environment and Climate Change Canada (ECCC) suggests that species under consideration for listing on SARA, including those designated as “at risk” by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), be considered during a project assessment in a manner similar to listed species. Common Nighthawks are legally listed as threatened under SARA, and Bank and Barn swallows have been identified as threatened by COSEWIC. These avian species at risk, known to commonly breed in the project area, may nest in anthropogenic habitats including borrow pits, quarries and buildings. These species may be susceptible to disturbance or nest loss by on-going activities during construction and operation phases. The Proponent has identified this as a potential impact in the DAR but did not assess the impact, identify mitigation measures or monitoring to address requirements under S.79(2) of the *Species at Risk Act* (SARA).

**Recommendation:** To help address requirements under S.79(2) of SARA, it is requested that the Canadian Zinc Corporation (the Proponent) provide an assessment of the potential impacts to avian species at risk using anthropogenic habitats during the construction and operations phase. The Proponent is also asked to provide measures that will be taken to avoid or lessen potential impacts and monitoring measures.

**Response:** Potential impacts to and mitigation/monitoring of Common Nighthawk and Barn & Bank swallows were assessed in the DAR Section 8.0 (Species at Risk and Other Wildlife and Wildlife Habitat, Vegetation).

## 5.0 PARKS CANADA AGENCY INFORMATION REQUESTS

### 5.1 IR #9: Camps

**Comment:** Appendix E of the DAR Addendum (Table 2-1: Project Development Phases at a Glance (page 3)) excludes the assessment of camps, laydown and staging areas indicating that these areas were previously assessed. Appendix E (page 18) of the DAR Addendum states “Temporary camp locations will be sited inside borrow sources and existing disturbance areas, as much as possible, and are approved under the winter road.” Parks Canada notes that winter camps which were approved in the previous EA were permitted for operation only during the winter, with all trailers removed by March 31. Section 6.5 of the DAR (pages 152-153) indicate that construction will occur in fall, winter and summer. In addition, operation of the road will occur through all seasons. Impact assessment for the all season use of both short term and long term construction camps is required.

**Recommendation:** Conduct an impact assessment for all temporary and long term construction camps associated with the project. The assessment must consider the all season use of these areas. 2. Describe any geotechnical or environmental constraints which may impact the proposed camps.

**Response:** Project-related camps (approximately 50 person maximum) are temporary facilities used only to support the construction of the road and bridges. Once the road is constructed, the staff will be housed at the mine camp and these temporary facilities will be decommissioned with the footprint being reclaimed, unless they are located in borrow pits to be used for road maintenance. Smaller maintenance camps will be retained at Cat Camp and at or nearby the Tetcela Transfer Facility location.

The total numbers and the sizes of each of the camps will be subject to the finalized construction schedule; however, Allnorth have indicated the proposed numbers and locations on road maps (DAR Appendix 1, Appendix I). Similarly, the duration that each camp will be in operation is dependent upon the construction schedule, which will primarily occur in a sequential order with road sections being started and completed in general succession. However, several camps may be in operation at the same time.

The final selection of camp locations will be dictated by the construction schedule, while considering the site characteristics favourable to support a camp. Favourable site characteristics include outside a riparian area of a waterbody, reasonably flat and dry preferably with gravel based soils to minimize site development costs and environmental impacts. All attempts will be made to utilize other disturbed areas such as borrow/gravel pits to eliminate unnecessary site disturbance. Table 2 identifies suitable locations for potentially seven camps/laydown.

**Table 2: Summary of Potential Camp/Laydown Locations**

Location	Description
KP 23 Camp	<ul style="list-style-type: none"> <li>Old winter road section. Dry gravel base.</li> </ul>
KP 40 Cat Camp	<ul style="list-style-type: none"> <li>Original camp and laydown area.</li> <li>Excellent location, lots of room, flat, dry gravel based soils.</li> </ul>
KP 65 Camp	<ul style="list-style-type: none"> <li>Close proximity to good gravel source, reasonably dry terrain with minor slopes.</li> </ul>
KP 87 Tetcela Camp	<ul style="list-style-type: none"> <li>Good location, reasonable flat with gravel based materials.</li> <li>Could be integrated with a borrow source and the proposed Tetcela Transfer Facility.</li> </ul>
KP 124 Grainger Camp	<ul style="list-style-type: none"> <li>Good location, lots of room.</li> <li>Flat, dry, gravel based location.</li> <li>Can be integrated with a borrow source.</li> </ul>
KP 159 Camp	<ul style="list-style-type: none"> <li>Could offer an alternative to KP 159 Liard Camp with a gravel based material and gentle slopes.</li> <li>Can be integrated with a borrow source.</li> </ul>
KP 159 Liard Camp	<ul style="list-style-type: none"> <li>Would offer the best strategic camp location and can combine with the Liard crossing/landing.</li> <li>May have limited space and will require significant gravelling.</li> </ul>

As mentioned in the noise assessment IR, the distance between the proposed camps ranges from 22 km to 37 km, which will minimize the risk of stationary sounds generated at any one camp being audible at another camp. Furthermore, it is anticipated that noise levels will remain the same as already permitted for use of the Prairie Creek Mine winter road, except for the extended season of use beyond winter construction and operations.

Water supply to these temporary camps will remain the same as those selected for the approved winter road, with the potential to source additional water from the larger rivers/creeks (i.e., Tetcela River, Sundog Creek). Since the camps will be active periodically based on the construction schedule, water supply requirements will be intermittent but year-round for the full construction period. A water licence would be required to authorize water use for the anticipated camps, and adherence to the DFO Water Withdrawal Protocol will be followed. Suitable water withdrawal sources (lakes and rivers) have been identified.

Similarly, all waste will be removed from the temporary camps or disposed of in a manner that is in accordance with territorial and national regulations. Solid waste will be organized and stored securely so that it is not accessible to wildlife at any time, and hauled from site regularly for proper disposal either by incineration at the mine site and/or to another approved facility. Waste that can be removed from the site progressively as the operation is under way will be, including immediately prior to any temporary closure of the camps (based on construction schedule).

Standard wastewater sanitation collection and disposal methods will be employed at the construction camps and transfer facilities. Acceptable practice for sanitary collection treatment will likely include the use of stationary/portable sewage collection systems which require pumping and waste removal with a sewage truck, or sumps. Sewage to be hauled will be on a regular basis to the mine site treatment facility. Sump use is discussed by CZN in their reply to PCA IR#28.

Operation of the Tetcela Transfer Facility (TTF) is only required for the proposed Phase 1 road (in all seasons), and would be de-activated or reduced in size once the Phase 2 portion of the road is constructed. Once Phase 2 is constructed, the TTF may continue to be used annual but irregularly for road maintenance storage. CZN currently prefers to construct the entire road at once, and if so authorized, the TTF would not be required and would not be developed at all.

Potential camp and TTF effects to wildlife are outlined in Table 3 and described below.

**Table 3: Potential Effects of the Temporary Camps and Facilities**

Effect Source	Timing (construction only)	Effects Category	Primary Species Interaction
Noise disturbances	Localized and periodic when facility active	<ul style="list-style-type: none"> <li>Abundance and occurrence</li> <li>Dispersal and local movements</li> </ul>	Individual species with small home ranges and immediately surrounding the active facility (e.g., Marten, Collared Pika, forest birds)
Visual disturbances	Localized and continuous	<ul style="list-style-type: none"> <li>Abundance and occurrence</li> <li>Dispersal and local movements</li> </ul>	
Waste management (including greywater and sewage)	Localized and continuous when facility active	<ul style="list-style-type: none"> <li>Abundance and occurrence (including attraction)</li> <li>Health and survival</li> </ul>	Individual species that may be attracted to the active facility (e.g., bears, Wolverine, Marten)
Human-wildlife conflicts	Periodic when facility active	<ul style="list-style-type: none"> <li>Abundance and occurrence</li> <li>Health and survival</li> </ul>	Individual species that may be attracted to the active facility and those tolerant to human activity (e.g., Wood Bison)
Fire risk	Continuous	<ul style="list-style-type: none"> <li>Habitat loss</li> <li>Abundance and occurrence (including attraction)</li> <li>Dispersal and local movements</li> <li>Health and survival</li> </ul>	All species
Accidental spills	Continuous	<ul style="list-style-type: none"> <li>Habitat effectiveness</li> <li>Health and survival</li> </ul>	Individual species with small home ranges and immediately surrounding the active facilities (e.g., Marten, Collared Pika, forest birds)

The noise assessment indicates that noise levels from small town residential areas is 35-40 dBA (a difference of approximately 5 dBA from background noise), and a diesel generator is 52 dBA at 120 m distance. Similar noise levels are predicted at the temporary camps and TTF when active, and noise is conservatively estimated to dissipate to normal speech within 0.5 km (predication based on Golder's (2010)<sup>3</sup> dissipation for a typical transport truck at 99 dBA). Daytime noise from general activity within the facilities will be reduced at night. Noise disturbances from the facilities have the potential to adversely affect local wildlife abundance and occurrence and local movements of individual wildlife. However, their potential effects are not expected to contribute much beyond the concurrent road construction activities. To further reduce noise levels, CZN will house the diesel generator in an enclosed shed. Noise disturbances will be localized (low geographic extent), of low magnitude, moderate duration when the facilities active, and readily reversible over a short period of time. The overall significance of noise disturbances to individual wildlife on a year-round basis is low.

<sup>3</sup> Golder (Golder Associates Ltd.). 2010. Vegetation and Wildlife Assessment Report, Prairie Creek Mine, Northwest Territories. Prepared for Canadian Zinc Corporation. 118 pp.

Visual disturbances will be localized and constant until the camps are removed after construction. If constructed for the Phase 1 road, the TTF may remain as a road maintenance yard and will be decommissioned at the end of the Project life. Activity at the TTF road maintenance yard would be infrequent year round. The camps and TTF are predicted to contribute a low visual disturbance since they are primarily located within existing disturbance areas (e.g., borrow sources, existing Cat Camp) and immediately adjacent to the active road construction/operation zone. Visual disturbances at the construction camps may be heightened at specific peak times, such as at the start and end of work shifts, but will be substantially reduced at night. Visual disturbances have the potential to adversely affect local wildlife abundance and occurrence and local movements of individual wildlife. Any visual disturbances to individual wildlife are a low magnitude, local in geographic extent, moderate frequency, and readily reversible over a short period of time. The overall significance of visual disturbances to individual wildlife in the local area is low.

The management of solid waste, sewage, and greywater have the greatest potential to attract a few wildlife species to the temporary camps and TTF while in operation. Similarly, the improper storage of the limited quantity of petroleum products at the facilities for generator maintenance has the potential to attract wildlife. Since the sewage and greywater will either be hauled away from the facilities using or treated in an on-site sump, wildlife attraction to the facilities are greatly reduced. However, bears (Grizzly and Black), Wolverines, Red Foxes, Martens, raptors and Common Ravens may still be attracted to solid waste, including food scraps and the sumps. The daily addition of bleach in the dishwater and/or grease trap and lime or crystal lye in the sumps minimizes the associated odours and wildlife attractants. Localized abundance and distribution of species attracted to the temporary camps may increase, species sensitive to noise/visual disturbance may decrease, and predator-prey relationships in the immediate vicinity of the camps may be altered. Solid waste and petroleum products generated from and used at the camps and TTF will be kept inaccessible to wildlife at all times to minimize attraction and food conditioning.

As mentioned in the DAR, CZN's waste management plan developed for the approved mine and winter road will be updated to include the temporary camps, littering and feeding wildlife is strictly prohibited, and food and food wastes (and other putrescible material) will be collected and stored in a manner inaccessible to wildlife. In addition, CZN's Environmental Monitor will periodically audit and manage, where necessary, litter and accessible attractants at the facilities. Corrective management options for waste management will be considered if problem areas arise. The potential effects from waste management at the facilities are considered adverse but readily reversible, and low in magnitude, duration, and frequency. The overall significance of waste management in the local area is low.

The potential attraction of species could also result in an increased risk of human-wildlife conflicts. Human-wildlife conflicts could periodically occur until the facilities become inactive. These conflicts could result in wildlife and or human mortality and property damage. Wildlife, such as bears, Wood Bison, and Wolverine pose the greatest risk of human-wildlife conflicts. However, the potential conflicts with bears and Wolverines can be greatly reduced with a strong and continuous commitment to waste management practices. With waste management mitigation, the risk of human-wildlife conflicts with individual animals are a low magnitude, local in geographic extent, low frequency, and readily reversible over a short period of time. The overall significance is low.

Wood Bison conflicts could potentially occur at the possible KP 159 camp location (near the Liard River). Wood Bison are known to become habituated to human activities and are known to enter Nahanni Butte. While at the temporary camp, Wood Bison can come into conflict with people, may damage property, and become a safety hazard to people. Mitigation outlined in the DAR remains appropriate for these facilities, including all employees and contractors will report human-dangerous wildlife encounters (including Wood Bison) and resulting incidents to Mine management. If an incident occurs, an ENR Officer will be informed within 24 hours. Policies and practices will be reviewed to ensure worker safety and efficient and speedy resolution of human-dangerous wildlife incidents. The risk of Wood Bison mortality is low at the temporary camp due to the low speed limits (30 km/hr in camps) and a low likelihood; however, the risk to people and property is considered a temporary but adverse risk that is local in geographical extent, moderate magnitude, low duration, moderate frequency, and readily reversible.



There is a risk of fire when the temporary facilities are active; however, the risk is substantially mitigated by siting the facilities in cleared areas with dry gravel bases (i.e., borrow sources; Table 2). Fires may be ignited from equipment operation and cigarette use/ careless disposal at the temporary camps and TTF. Fires resulting from the camps and TTF have the potential to result in regional habitat loss, wildlife mortality, and changes to wildlife abundance and occurrence and dispersal and local movements for all species. To mitigate the potential fire risk, CZN will maintain the mitigation (including fire extinguishers where appropriate around site), fire prevention training, and emergency response procedures outlined in the DAR at the temporary camps and TTF. In addition, designated smoking areas, with appropriate cigarette disposal and nearby fire extinguishers will be defined at all sites. It is anticipated that potential fire risks associated with the temporary construction camps and the TTF can generally be avoided through the application of mitigation measures related to fire prevention and emergency response mitigation as outlined in the DAR. With application of appropriate mitigation measures, the extent, magnitude, duration, and frequency of potential fire related effects are characterized as low and reversible.

There is a risk of accidental spills for the short period of time when the facilities are active, but are reversed once the facilities are decommissioned. The risk of spills or releases of large quantities are limited at the temporary camps and TTF since the storage and use of bulk supplies are low, except for fuel storage tanks. However, these tanks are double-wall enviro tanks. Section 9.0 of the DAR outlines the risks and mitigation for year round operation and accidental spill releases at the TTF. At the temporary camps, the primary sources of potential accidental spills are from truck and equipment operation and storage, and re-fueling. In the event of a large spill, there is the potential to alter the effectiveness of wildlife habitat. In addition, in the rare instance of wildlife ingesting the released spill, their health and survival may be at risk.

Wildlife species that are most at risk of accidental spills at the camps and TTF are those with small home ranges immediately surrounding the facilities (i.e., Marten, forest birds (e.g., Olive-sided Flycatcher), and Collared Pika) and those that may be attracted to the facilities (i.e., Wood Bison, Grizzly and Black bears, Wolverine, Marten, and some forest raptor species). Section 9.0 of the DAR outlines mitigation for accidental leaks and spills, spill response and preparedness for the road and TTF (year round operation), and this mitigation will be extended to the temporary camps, as appropriate, including the use of drip pans under stationary equipment and the standard spill protection and response while re-fueling. With mitigation, while individual wildlife may be adversely affected by an accidental spill (prior to its cleanup) at a local scale, the magnitude, duration, and frequency are considered low. The overall significance is considered low.

## 5.2 IR #30: Wildlife Baseline Studies

**Comment:** Page 15 of the DAR Addendum, Appendix E asserts that "Adequate baseline vegetation, wildlife and wildlife habitat information have been collected to date. Previous field studies adequately describe baseline conditions, including species at risk, and were available in developing the assessment." However, there is no standard by which this is measured. No information is provided on the number of field days for these studies, for example, the Chillborne (2007) report is based on one helicopter flight along the proposed road route, and several of the cited studies are 20, 30 or more years old. Of 21 species at risk considered in the report, there are specific project area studies on caribou only. No studies were undertaken on waterfowl or forest birds in the project area. Better information is required to properly assess potential impacts on wildlife species.

**Recommendation:** To acquire adequate baseline information for assessment, provide the following: 1. Bird surveys to determine composition of the breeding bird community, including occurrence of listed species such as Common Nighthawk & Olive-sided Flycatcher (Threatened), Rusty Blackbird and others (potential for Canada Warbler). Timing window is mid-June to early July; automated acoustic recorders can be used to help reduce field work requirements. 2. Waterfowl surveys (ducks & swans), Horned Grebe and Yellow Rail surveys in Fishtrap Creek and other suitable wetlands. Timing window is mid-June to early July for Grebes & Yellow Rails; waterfowl surveys could happen into Aug / Sep for post-breeding congregations, staging areas. 3. Collared Pika inventory in suitable habitat



(e.g. km 0-40, 125-140); preferred timing window is mid-July to end of August or early September 4. Surveys for Beaver habitat; timing window is any time in the snow-free period (active lodge surveys).

**Response:** The proposed all season road generally follows the winter road alignment, except at select locations (including borrow sources), and the total direct loss of habitat is smaller in size than what was approved for the winter road based on the same baseline studies.

The DAR assessment was prepared acknowledging that forest breeding birds, Common Nighthawk, Olive-sided Flycatcher, Rusty Blackbird, Horned Grebe, Yellow Rails, Trumpeter Swans, Collared Pika, and Beaver occur in suitable habitat in or near the project area. Accepting their occurrence, CZN's approach is to minimize potential direct and indirect effects by focusing on the Project's design (e.g., limiting the Project footprint and avoiding open water to the extent possible, scheduling clearing activities outside the migratory bird breeding period, commitment to low traffic volumes and low speed limits (60km/hr), dust suppression, responsible pumping at water sources for dust suppression following regulatory protocols, and suitable culvert placement and sizes to maintain natural drainage patterns) and committing to additional mitigation/monitoring to reduce effects at select locations. Consequently, the existing baseline information is sufficient to properly assess potential impacts on wildlife species, and mitigate them, and additional baseline information would not significantly alter this assessment or approach.

CZN committed to additional mitigation/monitoring to determine the presence of select species (at or within a specified distance to Project-related activities (i.e., blasting, clearing) that have the potential for greatest adverse effects. For example, CZN committed to surveying (and mitigating if merit determined) for the presence of Collared Pikas within the proposed Project footprint (that deviates from the approved winter road from KP 0-36) prior to Project-related clearing and construction disturbances. Similarly, commitments to avoid blasting by a minimum distance of 800 m when Trumpeter Swans are observed on territorial breeding ponds, and to monitor possible disturbances to Trumpeter Swans that are on breeding ponds within 800 m of other construction activities (including the authority for the Environmental Monitor to stop work if construction determined to be adversely affecting swans).

### 5.3 IR #31: Wildlife Assessment Scope

**Comment:** Page 16 of the DAR Addendum, Appendix E asserts that "The focus of this assessment is the biological status of species at a territorial level...". The TOR for this project assessment indicates the geographic scope for Species at Risk and Wildlife and Wildlife Habitat (including birds) (Table 2, p 11) to be "Defined... as an area large enough to assess potential impacts at a **local population** level...". Local population effects are important, and could be significant long before detection at a territorial level.

**Recommendation:** Provide assessments in sections 4.3, 4.4, 4.5 at a local population level.

**Response:** We acknowledge that the sentence "the focus of this assessment is the biological status of species at a territorial level..." is unclear. The sentence would have been better worded as "the focus of this assessment is species with special territorial conservation status". The following outlines the species considered in the DAR: those listed in the Species at Risk (NWT) Act; Schedule 1 of the Species at Risk Act public registry; and, ranked by the General Status Ranks of Wild Species in the NWT as May Be At Risk and At Risk.

The species' local population details were provided in the DAR, where information was available.

## 5.4 IR #32: Caribou

**Comment:** Within the assessment of impact of the project on Northern Mountain Caribou the report repeatedly states that the project area is "outside the defined species range", citing a website map source (ENR 2014c). This is incorrect, outdated information. 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. The report also states on page 24 that the project area is "well outside known calving and wintering areas" for caribou; however, on page 25 there is reference to multiple observations of caribou calves in the camp logs, including one calf reported as early as 01 June. The conclusion in DAR Addendum, Appendix E that potential disturbance related effects on Northern Mountain Caribou are low is inconsistent with information provided. Section 7.3 cites several references stating that caribou avoid roads, and active roads to a greater extent than inactive ones (up to 35 km avoidance for Dempster Hwy). Caribou are known to be in the project area year-round, so construction and use of an all season road is reasonably expected to have a greater impact than a winter road.

**Recommendation:** Provide an assessment of project impacts on Northern Mountain Caribou using updated accurate range and seasonal use information (significant, year round use of the project area) and reported impacts of active roads.

**Response:** Upon considering the new information provided by Parks Canada (Preliminary Data Report – Prairie Creek Caribou Research available on the registry) the Northern Mountain Caribou conclusions within the DAR remain the same. The information does not provide evidence that there is significant, year-round use near the proposed Project. On the contrary, it confirms our assessment based on previous data. The DAR assessment states that the Project is located outside the designated range, but within an area identified by ENR as having trace occurrence. The DAR acknowledges that some caribou may occasionally occur near the Project and, as a cautious approach, assesses potential Project-related affects to Northern Mountain Caribou and outlines CZN's mitigation and monitoring plans (see draft Wildlife Mitigation and Monitoring Plan for the Prairie Creek Mine and winter road, which will be updated for the proposed Project).

The DAR was based on existing information at the time, including but not limited to, range maps from ENR, traditional knowledge reported in the Deh Cho Land Use Planning Committee maps, and satellite collar data (Weaver 2008). This information is consistent with CZN's anecdotal reports that the main caribou congregation areas are well to the north of the project (e.g. Caribou Flats), and few caribou are seen near the road (e.g. September 2014, 2 week road survey programs, one sighting of a group of 3 caribou just south of Sundog Creek) (D. Harpley, pers. comm.).

The new information provided by Parks Canada is preliminary, and supports the opinion that a few caribou do occur near the Project, year round, consistent with CZN's observations. This preliminary data provides the following evidence:

- Of the six female caribou collared in February 2015 (approximately 1 year of data; February 2015 – January 2016), three were captured approximately 13 km north of the proposed Project, and three were captured approximately 70 - 80 km north of the proposed Project (Figure 1 of the Preliminary Data Report).
  - Of the three captured approximately 13 km from the proposed Project, two spent some portion of their year within approximately 5 km (nearest distance) of the proposed Project; however actual distances are difficult to determine based on the map scale provided (Figure 3 of the Preliminary Data Report). One of these caribou moved within a home range approximately 5 – 30 km from the proposed Project during the year, and the second of these caribou moved within a home range approximately 5 – 80 km from the proposed Project. The third caribou may have come as close as approximately 15 km from the proposed Project, but spent the majority of its time at least 40 km from the proposed Project.

- Of the other three that were captured 70 - 80 km north of the proposed Project, near the North Nahanni River drainage (Figure 1 of the Preliminary Data Report), two females migrated to presumed calving areas near the NWT-Yukon border (calving areas known to be used by the Redstone herd, which are believed to have a stable population) and occupied an expansive annual range (Figure 5 of the Preliminary Data Report). Data may not have been provided for the other collared caribou (the third caribou captured furthest from the Project). The annual range of these two migrating females reached as close as approximately 40 km west of the proposed Project (nearest point). Furthermore, the capture locations on February 2015 represent the most easterly extent of their recorded annual range. Interestingly, the Preliminary Data Report also indicates that a significant number of caribou have once been reported moving through the upper Prairie Creek watershed at certain times in the fall. Depending on the observation location, the upper Prairie Creek watershed could be as far as 60 km north of the proposed Project, and could potentially represent seasonal migration of the Redstone herd, which are known to primarily overwinter in the boreal forest of the Sahtu region, but some overwintering further south into the Deh Cho region is known.
- Of the 12 female caribou collared in December 2015 (approximately 2 months of data; December 2015 - January 2016), all were captured within approximately 5 – 22 km from the proposed Project (Figure 2).
  - Of these 12 collared caribou, location information was provided for eight (Figure 4 of the Preliminary Data Report). Location information represents approximately 2 months of data during the winter.
  - During this 2 month period, the eight caribou with data available remained in a relatively small area, near their capture locations.
  - One caribou crossed the existing road near KP 7, during this 2 month period, but spent the majority of its time at least 4 km south of the proposed Project. The other seven caribou came as close as 3 - 14 km to the proposed Project.
- Approximately 100 – 200 caribou were observed on December 16, 2015 during the collaring operations. This observation was approximately 8 km north of the proposed Project, in the headwaters of Fast Creek (known locally as Caribou Flats). This observation suggests periodic winter use and aggregation, possibly at a known mineral lick nearby (mineral lick approximately 11 km from the proposed Project, nearest to KP 10). Northern Mountain Caribou may infrequently use mineral licks throughout the year, and COSEWIC (2014)<sup>4</sup> reports that mineral licks are known to be used in the spring before calving. Based on Parks Canada's preliminary collaring data, two caribou were collared near this location, and the movement location data indicates that one caribou spent a small portion of two months in this local area. The Northern Land Use Guidelines for seismic operations (AANDC 2011)<sup>5</sup> and the British Columbia Ministry of Forestry, Lands and Natural Resource Operations (2014)<sup>6</sup> recommends a 250 m minimum setback from mineral licks occupied by caribou, particularly from April to October. In addition, mountains visually screen the proposed Project from the headwaters of Fast Creek (and this known mineral lick). 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. This mitigation is applicable only if blasting is required at any time throughout the year. Blasting is prohibited if caribou are observed within 1 km of the blast site until the animal moves out of the area. Additional existing mitigation, specific to Northern Mountain Caribou, includes:

<sup>4</sup> COSEWIC. 2014. COSEWIC assessment and status report on the Caribou *Rangifer tarandus*, Northern Mountain population, Central Mountain population, and Southern Mountain population in Canada.

<sup>5</sup> Aboriginal Affairs and Northern Development Canada (AANDC). 2011. Northern Land Use Guidelines – Volume 9a Seismic Operations. Web access: [http://publications.gc.ca/collections/collection\\_2012/aadncaandc/R2-226-9-1-2011-eng.pdf](http://publications.gc.ca/collections/collection_2012/aadncaandc/R2-226-9-1-2011-eng.pdf)

<sup>6</sup> BC Ministry of Forests, Lands and Natural Resource Operations, North Area. 2014. A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia, Interim Guidance. 212 pp.

- If caribou are reported on the road or within 500 m of the Project footprint (this 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), 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 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;
- If caribou are reported beyond 500 m of the Project footprint, traffic speeds are to be reduced to half the posted speed limit, 30 km/hr, within 1 km of the sighting or as soon as the animal is sighted; and
- All other wildlife-related mitigation outlined in the DAR.

No further assessment of Northern Mountain Caribou is considered necessary.

## 5.5 IR #33: Beaver

**Comment:** In the assessment of impacts, DAR Addendum, Appendix E acknowledges possible interaction with dispersing beavers, but only at Tetcela & Fishtrap areas. Although these are likely interaction areas, dispersing beavers could occur in the vicinity of almost any creek crossing. An all season road will have significantly more impact than a winter road, especially in wetland areas. The magnitude and frequency of project effects (Table 6-6) should likely be ranked higher. Also, potential changes to drainage patterns resulting from construction activities could impact beaver habitat, and behaviour. There is potential to attract them to areas of concentrated water flows (culverts), and thereby impact movements, impair habitat effectiveness, and raise potential for road mortality.

**Recommendation:** Provide an assessment of project impacts on beaver in the context of the proposed project.

**Response:** The all season road avoids wetlands and open water to the extent possible due to engineering constraints. Therefore, the road also inherently avoids possible Beaver habitat within the NNPR. Dispersing beavers could occur in the vicinity of any creek crossing in the forested zone. Table 6-6 in the DAR describes effects to Beaver dispersal and movement, and the magnitude and frequency levels remains appropriate. The magnitude, or severity of residual effects to Beaver dispersal and movement, remains low as Beavers are highly capable dispersers and can cross large areas of unsuitable habitat, and are not particularly sensitive to human activities. The frequency of residual effects to Beaver dispersal and movement also remains low because Beaver dispersal is infrequent and local movements remain primarily within 100 m of the waters' edge, which minimizes the number of Project-Beaver interaction, as well as the low traffic volumes.

Potential changes to the drainage patterns resulting from road construction, is considered a low residual effect to Beaver habitat, behaviour, and mortality. Besides the inherent Project design for careful placement and sizing of culverts (even where no obvious stream channel exists), the DAR commits CZN to maintain natural drainage patterns for the Project. This strong commitment to maintaining natural drainage patterns includes regular inspections of drainage measures to identify areas that are or might unexpectedly pond water, and take corrective actions. Not only could ponding water adversely affect Beavers, but ponding water can become a serious geotechnical and permafrost issue, which needs to be quickly addressed for operation of the road.

Further assessment of Project-related effects to Beaver habitat effectiveness and mortality are discussed in Section 6.7.2 (Risk to Harvested Wildlife from Non-Harvest Mortality) and Section 6.5 (Effects on Abundance and Occurrence of Harvested Species). A suitable assessment of project impacts on beaver in the context of the proposed project has been completed.

## 5.6 IR #34: Species at Risk

**Comment:** DAR Addendum, Appendix E, Table 7-2 outlines the rationale for the Species at Risk not selected for assessment. A number of incorrect assumptions are stated in this table as well as in the associated sections of the report. For example, Parks Canada has the following information on Harlequin Ducks and Yellow Rail that is not reflected in the report: 1. Harlequin Duck; there are observations from Prairie Creek tributaries, and in Sundog Creek. 2. Yellow Rail; there are records from both within Nahanni National Park Reserve, and elsewhere in the Dehcho Region.

**Recommendation:** Correct the inaccurate statements regarding Harlequin Ducks and Yellow Rail and reconsider if these species are suitable for inclusion in the assessment. If these species are not included in the assessment, provide a rationale for exclusion.

**Response:** New sightings of Harlequin Ducks and Yellow Rails in the Nahanni National Park have been made public since writing the DAR.

### Yellow Rails

The main threat to Yellow Rail populations is habitat loss (Environment Canada 2013)<sup>7</sup>. The proposed all season access road currently deviates beyond the general approved winter road alignment a total of 17 km within the boreal forest zone, purposely to avoid wet habitats that the winter road selects. Of this 17 km, the proposed all season road traverses upland habitat, to the extent possible, thereby avoiding potential Yellow Rail direct habitat loss.

Similarly, CZN commits to maintaining natural drainage patterns throughout the boreal forest zone, by careful placement and sizing of culverts, and regularly inspecting drainage measures to identify areas that are or might unexpectedly pond water, and take corrective actions. CZN strongly commits to maintaining natural drainage patterns since ponding water can become a serious geotechnical and permafrost issue and has the potential to affect the operation of the road itself if not corrected. This strong commitment to maintaining natural drainage patterns also minimizes potential alteration of Yellow Rail habitat effectiveness.

Yellow Rails may be conservatively estimated to occur in the area from early May to early October. Yellow Rails have been documented at Yohin Lake (inside Nahanni National Park Reserve) in 2005 and 2015. Yellow Rails may return to the same breeding site for several years; however, natural fluctuating water levels are thought to significantly influence abundance at any given site from year to year (Environment Canada 2013). Thus, Yellow Rails may only irregularly occur within suitable habitat, which further reduces potential Project-Yellow Rail interaction.

Similarly, summer construction and operation activities of the proposed Project primarily occur in the day, including haul truck traffic during road operations. Although Yellow Rails feed in the daytime, they are sensitive to disturbance at night when calling. Environment Canada (2009)<sup>8</sup> suggests the following beneficial management practices for Yellow Rails:

- Avoid activities in areas while birds are present;
- Prevent loss and alteration of wetlands;
- Maintain year-round 100 m no-activity buffer from potential habitat;
- Avoid nighttime activities (including light and noise) near breeding wetlands; and
- No mowing of potential habitats when dry.

<sup>7</sup> Environment Canada. 2013. Management Plan for the Yellow Rail (*Coturnicops noveboracensis*) in Canada. Species at Risk Act Management Plan Series. Environment Canada, Ottawa. iii + 24 pp.

<sup>8</sup> Environment Canada. 2009. Draft Petroleum Industry Activity Guidelines for Wildlife Species at Risk in the Prairie and Northern Region. Canadian Wildlife Service, Environment Canada, Prairie and Northern Region, Edmonton, Alberta. 64 pp.



By design, the proposed all season road follows these suggested management practices, and thus adverse effects to Yellow Rails that may irregularly occur near the proposed road are considered low.

### **Harlequin Ducks**

Harlequin Ducks occupy swift-flowing streams, particularly streams with braided channels. Harlequin Ducks nest on or near the ground generally within 5 m of the stream; preferring stream channel islands or stream banks with suitable protective cover (e.g., shrubs, fallen logs). Nest site fidelity is expected. They may also occupy lakes downstream from the nest site, and molt in large groups away from the nesting site. At the time of writing the Harlequin Duck section in the DAR, the nearest publically documented Harlequin Duck was at Rabbitkettle Lake, approximately 135 km from the Mine. However, a report of a female Harlequin Duck, observed on Sundog Creek on August 1, 2013, adjacent to the proposed all season road has more recently become public.

The fast-flowing Prairie, Fast, Funeral, and Sundog creeks along the proposed Phase 1 all season access road may provide suitable Harlequin Duck habitat. Sundog Creek is often dry in the summer and fall, apart from a few ribbons and deep pools.

During operation, traffic along the proposed all season road may interact with Harlequin Ducks beginning in mid-June (when the road may be open) and continue until mid-September when Harlequin Ducks migrate south for winter. The existing road near potential Harlequin Duck habitat is near all season quality; however, additional construction is proposed in the late fall, at a time when the floodplain is dry except for isolated deep pools and Harlequin Ducks are not expected to be present. The proposed all season road follows the southern edge of the Sundog Creek floodplain, which encroaches into the main channel of Sundog Creek in places. Construction includes re-aligning 1.4 km of Sundog Creek and armouring portions of Sundog Creek shoreline. Construction in Sundog Creek will also include a clear-span bridge (bank to bank using 100 year flood analysis) over the main stem at KP 23, as well as two spans over tributaries and culvert crossings in two other tributaries. Re-alignment includes the addition of one berm across the primary channel of this braided creek segment, and dredging the historical channel to divert the water away from the proposed road. The construction designs mimic the dimensions of the existing channel to allow for natural flow velocities to be maintained, as well as maintaining flow through existing old or secondary channels.

### **Effects of Habitat Loss and Fragmentation**

A re-alignment of approximately 1.4 km of Sundog Creek will alter potential Harlequin Duck habitat and approximately 4 km of the proposed all-season road will be re-aligned from the general winter road alignment. Construction is primarily proposed during the late fall; however, summer construction at the clear-span bridges is proposed. Given the low proportion of habitat loss relative to available habitat within the region and the mitigation of project related effects by maintaining flow and flow velocities and constructing during no-flow conditions, the extent, duration and frequency of potential project related effects are considered low and the magnitude is moderate. The overall significance of effects with respect to habitat loss and fragmentation is considered low.

### **Effects on Habitat Effectiveness**

Without mitigation, the proposed Project may indirectly change the neighbouring habitat's ability or quality to support a few Harlequin Ducks. Dust accumulation is the primary source of Project-related effects, as well as possible erosion/siltation and accidental spills. Potential effects to habitat effectiveness may occur during construction, operation, and closure of the access road. Dust sources include vehicle traffic on the access road during construction, operation, and reclamation. As mentioned in the DAR, the majority of the large dust particles dispersed from the construction, operation, and closure phases of the proposed Project are anticipated to settle out about 10 m from source, but may extend up to 100 m, particularly in areas within Harlequin Duck habitat. The DAR outlines dust suppression mitigation that remains appropriate to minimize potential effects to Harlequin Duck habitat.



In addition, the risk of erosion and siltation is greatest during construction, particularly at the bridge crossings, new Sundog Creek re-alignment, Sundog Creek armouring, and throughout operation in areas with greatest slopes and in the event of high rainfall periods and or damaged erosion control structures. Without mitigation, erosion and siltation may significantly affect nearby and downstream Harlequin Duck habitat. Harlequin Ducks and their habitat may be sensitive to dust, erosion, and siltation-related changes to water pH and invertebrate abundance and diversity. Increased siltation of rivers that adversely changes the invertebrate populations may result in territory abandonment (COSEWIC 2013)<sup>9</sup>.

Sources of potential spills include non-winter road operation and maintenance and vehicle traffic. If a spill occurs, local habitats may be temporarily lost or converted to unusable areas until the spilled material is recovered. Section 9.0 of the DAR outlines the potential risks from accidents and malfunctions and spill mitigation and response plans. Section 9.0 of the DAR also indicates that due to the proposed road's proximity to Prairie, Fast, Funeral, and Sundog Creeks there is a risk from spills. However, because of the road alignment design, relatively flat to gentle grades, and potential spill containment, the spill risk is primarily low throughout potential Harlequin Duck habitat. With exceptions, a total of 5 km along the Funeral and Sundog Creeks have a moderate spill risk, and approximately 5 km along Sundog Creek has a high spill risk due to the steeper grade. Since the risk of accidental rollover, and therefore spills, is greater during winter driving conditions, species overwintering in the immediate area of the access road are of most concern. Harlequin Ducks do not overwinter, and are therefore at less risk of encountering spills. Nonetheless, a spill within Harlequin Duck habitat could potentially lead to territory abandonment and mortality of a few individuals.

Effective mitigation to avoid and minimize the risk of dust, erosion/siltation, and accidental spill effects are industry standard best practices and established within several GNWT and federal regulatory documents. Once followed, these standard practices minimize any potential Project-related changes to the habitat's effectiveness to support Harlequin Duck. Mitigations to minimize dust, erosion/siltation, and accidental spills and emergency preparedness for spill responses outlined in the DAR remain appropriate to mitigate potential changes to Harlequin Duck habitat effectiveness, as well as a commitment to conduct Sundog Creek channel re-alignment and armouring in the late fall when there is no stream flow.

In addition, CZN will conduct any in-stream bridge construction work and the Sundog Creek re-alignment/armouring outside Harlequin Duck occurrence period (late April to mid-September) and or when no flow (thus likely not occupied by Harlequin Ducks). Should in-stream work be required during this period of time, the Environmental Monitor will first survey for the presence of Harlequin Ducks within 500 m of the activity (both upstream and downstream) and in-stream work will cease work if a Harlequin Duck is present.

With mitigation, the proposed all season access road is considered to have an adverse effect on Harlequin Duck, but of moderate magnitude and duration, and low extent and frequency, and reversible. Overall significance to potential changes to habitat effectiveness is considered low.

### **Effects to Abundance and Occurrence**

In the context of potential road-related effects, changes in abundance and occurrence is a measure of Harlequin Duck's: 1) sensitivity to disturbance (i.e., avoidance behaviour); 2) vulnerability to road mortality; and, 3) available habitat and habitat quality. Construction is primarily occurring in the late fall when Harlequin Ducks are not present; however, road operations will occur throughout the year. COSEWIC (2013) indicates that Harlequin Ducks are relatively tolerant of moderate levels of human disturbances; however, Harlequin Ducks may be adversely affected by intense and chronic disturbances. Considerable disturbances at the nest site may lead to site abandonment.

<sup>9</sup> COSEWIC. 2013. COSEWIC assessment and status report on the Harlequin Duck *Histrionicus* Eastern population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 38 pp.

Mitigation to minimize traffic-related disturbances (i.e., low traffic volumes, low traffic speeds) identified in the DAR, remain appropriate, as well as avoiding construction work when Harlequin Ducks are present. Potential Project-related effects to Harlequin Duck abundance and occurrence are considered adverse but low in magnitude and extent, and moderate in duration and frequency, and readily reversible. Overall significance to abundance and occurrence effects are considered low.

### **Effects on Dispersal and Local Movement**

Local movements are defined as daily movements to access available resources within breeding territory. Dispersal is the movement away from the nesting territory. Harlequin Ducks may change their local movement patterns and behaviour by intense and chronic disturbances. In addition, low bridges may force Harlequin Ducks to fly over the bridge rather than underneath, thus increasing their risk of traffic-related mortality (see discussion below). Any changes to their movements are directly related to their sensitivity to disturbance levels and the intensity of Project-activities. Although traffic along the all season access road will parallel possible Harlequin Duck habitat, it will not substantially alter Harlequin Duck dispersal. Potential effects to Harlequin Duck local movements resulting from the proposed all season road are considered adverse but low in magnitude and extent, moderate in duration and frequency, and readily reversible. Overall significance of effects are considered low.

### **Risk of Project-Related Mortality**

The risk of Project-related mortality is dependent upon on the inherent behaviour of Harlequin Ducks, their abundance along the access road, and seasonal use of the surrounding area, as well as traffic volumes, traffic speeds, bridge construction, and risk of accidental spills and emergency preparedness.

Construction primarily occurs in the late fall when Harlequin Ducks are not present; however, site specific bridge construction is required to occur in the summer. Summer traffic and equipment operations during construction and operation poses the greatest risk to Harlequin Ducks. Mortality due to vehicle/equipment collisions is possible, but unlikely to occur since Harlequin Ducks primarily remain near the waters' edge and thus few individuals are exposed to the road due to road mitigation (i.e., low traffic volume, low traffic speed). In addition, low bridges and culverts may force Harlequin Ducks to fly over rather than underneath/through, thus increasing their risk of traffic-related mortality. Clear-span bridges are designed for 1:100 flow, and the number of bridge crossings are minimized, to the extent possible. Sundog Creek and tributaries are considered to have ephemeral flow, and known to regularly dry up in the summer and fall thus providing poor Harlequin Duck habitat during this time, and reducing Project-Harlequin Duck interaction risk.

Additional ways the all season access road and associated infrastructure and activities may affect wildlife are through increased predation risk. Predators may be attracted to the approved winter road/proposed Project corridor to hunt, any litter along the road, or by deliberate feeding by employees. Once in the area, these predators will prey upon resident species. This attraction of predators may lead to the indirect death of Harlequin Ducks. As a ground-nesting species, Harlequin Duck nests are particularly susceptible to nest predation.

Mitigation already outlined in the DAR regarding traffic speeds and project-related mortality reporting (i.e., all Project-related mortality reported to CZN's Environmental Monitor, all big game and species at risk accidentally killed or seriously injured as a result of a vehicle collision reported to Parks Canada or an ENR Officer within 24 hours (Wildlife Act Regulations)) remain appropriate for Harlequin Ducks. Potential Project-related effects to Harlequin Duck mortality are considered adverse but moderate in magnitude, duration and frequency, local in extent, and readily reversible upon cessation of traffic. Overall significance is considered low.

### **Effects to Population Cycles**

Harlequin Ducks are not known to undergo population cycles.

### Effects on Predatory-Prey Relationships

Ground-nesting species, such as Harlequin Ducks are particularly sensitive to nest predation from a number of predators, including Red Fox, Common Raven, gulls, and mustelids. Project-related activities that may attract nest predators (e.g., poor waste management and handling) have the potential to increase encounter and predation rates. Mitigation already outlined in the DAR regarding adherence to a waste management plan and no littering and no feeding wildlife policies remain appropriate for Harlequin Duck. Potential effects to predator-prey relationships are adverse but low in magnitude, geographical extent, and frequency, moderate in duration, and reversible at Project closure.

### Effects from Invasive Wildlife Species

Potential effects from invasive or nonindigenous wildlife species as a result of the all season access road and its associated infrastructure and activities will remain similar to baseline conditions since a winter road route will be cleared prior to construction of the all season road. In addition, Harlequin Ducks and their nests are not considered particularly sensitive to invasive wildlife species. Mitigation measures are not considered necessary, beyond the general mitigation and best management practices. The predicted effects from invasive wildlife are considered low in magnitude, moderate in geographical extent, moderate in duration, and low in frequency. The overall significance of effects is low.

### Effects on the Ability to Recover

Project-related effects on the ability of Harlequin Duck populations to recover are negligible since: 1) the proposed Project does not significantly contribute to local and regional habitat loss and fragmentation, 2) high quantities of quality habitat remain throughout the local and regional areas, and 3) with mitigation, the proposed Project does not result in residual effects on movements and mortality risk. Thus, the proposed Project is not expected to affect Harlequin Duck populations' ability of recover. The predicted effects are considered neutral in direction, low in magnitude and geographical extent, and moderate in duration and frequency. The overall significance of effects is low.

## 5.7 IR #35: Forest Birds

**Comment:** The DAR Addendum, Appendix E Table 7.2 (p 161) refers to the Common Nighthawk species as 'Representative of Forest Birds monitored by Parks Canada'; presumably this statement implies that its status is adequately represented by PCA bird monitoring? The PCA monitoring protocol assesses diurnal, passerine, forest-nesting species, whereas this bird is a nocturnal, non-passerine, open-nesting species.

**Recommendation:** Correct the inaccurate statement regarding Common Nighthawk and reconsider if it is suitable for inclusion in the assessment. If common nighthawk is not included in the assessment, provide a rationale for exclusion.

**Response:** Common Nighthawks are assessed in Section 8 of the DAR Addendum (Species at Risk and Other Wildlife and Wildlife Habitat, Vegetation)

## 5.8 IR #36: Wildlife Species Assessment

**Comment:** The DAR Addendum, Appendix E Table 7.2 (p 161) includes notes that no NWT population information is available (for example for Common Nighthawk, and others) to develop the assessment. However, population information is not used in any apparent meaningful manner in other species assessments, so the relevance of this comment is unclear.

**Recommendation:** Clarify how population information for the NWT is used in developing the assessment of impacts on species.

**Response:** The statement regarding no NWT population information should have been removed from Table 7.2. Other rationale provided remains valid. Common Nighthawks were assessed in Section 8.

## 5.9 IR #40-42: Wildlife Significance of Effects

**Comment: IR #40:** A number of the summary tables in DAR Addendum, Appendix E, Section 6.0 show multiple (majority) criteria ranked as Moderate and/or High, yet the overall significance is considered Low, e.g. Tables 6-3, 6-4, 6-5, 6-6, 6-7, 6-11, 6-15.

**Recommendation: IR #40:** Re-evaluate the significance in the section 6.0 summary tables (6-3, 6-4, 6-5, 6-6, 6-7, 6-11, and 6-15) as there should likely be several higher overall rankings (i.e. Moderate or High). Provided the methodology/criteria used in determining the overall ranking.

**Comment: IR #41:** A number of the summary tables in DAR Addendum, Appendix E, Section 7.0 show multiple (majority) criteria ranked as Moderate and/or High, yet the overall significance is considered Low, e.g. Tables 7-6, 7-7, 7-8, 7-10, 7-12.

**Recommendation: IR #41:** Re-evaluate the significance in the section 7.0 summary tables (7-6, 7-7, 7-8, 7-10, and 7-12) as there should likely be several higher overall rankings (i.e. Moderate or High). Provided the methodology/criteria used in determining the overall ranking.

**Comment: IR #42:** A number of the summary tables in DAR Addendum, Appendix E, Section 8.0 show multiple (majority) criteria ranked as Moderate and/or High, yet the overall significance is considered Low.

**Recommendation: IR #42:** Re-evaluate the significance in the section 8.0 summary tables (8-5, 8-6, and 8-7) as there should likely be several higher overall rankings (i.e. Moderate or High). Provided the methodology/criteria used in determining the overall ranking.

**Response: IR #40, 41, and 42:**

See MVRB IR #22 response.

## 5.10 IR #43: Wildlife Significance

**Comment:** The DAR Addendum, Appendix E Section 8.2 and 8.3 claim that both Common Nighthawk and Olive-sided Flycatcher will be positively affected by clearing; this is based on papers reporting species' responses to selective logging or slash-burning. Construction and use of a haul road is not the same as selective logging, and may not have the same impacts.

**Recommendation:** Clarify if there are literature reports of road construction having positive impacts on populations of Common Nighthawk and/or Olive-sided Flycatcher. If not, revise effects assessment accordingly.

## Response:

### Common Nighthawk

Sections 8.2 and 8.3 assess the effects of habitat loss and fragmentation and effects on habitat effectiveness, respectively. COSEWIC (2007)<sup>10</sup> reports breeding habitat includes “open habitats, such as sand dunes, beaches, recently logged areas, recently burned-over areas, forest clearings, short-grass prairies, pastures, open forests, peatbogs, marshes, lakeshores, gravel roads, river banks, rocky outcrops, rock barrens, railways, mine tailings, quarries, urban parks, military bases, airports, mines and commercial blueberry fields”. The proposed Project minimizes clearing of the existing forest by generally following the approved winter road, particularly within the expansive post-fire polje area (represented as Exposed Land in the land cover classification, and possibly suitable breeding habitat), and the proposed borrow sources create potential breeding habitat. Ninety percent of the borrow sources are temporary and will be utilized during the construction period. Temporary borrow sources will be de-activated and reclaimed to allow natural regeneration of vegetation once they are no longer required or depleted. The remaining borrow sources will stay active through road operations for maintenance works.

COSEWIC also indicates that Common Nighthawk habitat loss (quantity and quality; i.e., Sections 8.2 and 8.3) occurs as a result of vegetation re-growth (i.e., succession and reforestation), forest fire suppression, and other vegetation conservation practices currently used in the forestry industry. COSEWIC also suggests that habitat does not appear to be declining in some areas because development continues to open areas due to gravel quarries, logging, and coal mines, as well as other anthropogenic activities that open forests and provide nesting substrates. Therefore, the overall effects assessment for Common Nighthawk remains appropriate.

Section 8.3 (effects on habitat effectiveness) should be reclassified from Positive to Neutral for the Common Nighthawk. With adherence to mitigation outlined in the DAR, the risk of altering the habitat quality from erosion, dust accumulation, accidental spills and contamination is neutral. Without mitigation, and in the unlikely event of extensive erosion or an accidental spill which would be followed by clean-up, potential Common Nighthawk breeding habitat may be created temporarily until the area is revegetated.

### Olive-sided flycatcher

There are no known studies that directly connect Olive-sided Flycatcher breeding habitat and road clearing. However, the DAR assessment was based on the understanding that Olive-sided Flycatchers are associated with habitat edges and open habitats. COSEWIC (2007) indicate Olive-sided Flycatchers are most associated with natural forest openings, forest edges near natural openings (e.g., wetlands), or open to semi-open forest stands and are known to use anthropogenic openings (clearcuts are provided as an example). For foraging, open areas with tall trees or snags are required (COSEWIC 2007). In addition, Olive-sided Flycatchers are found to be more abundant in a highly fragmented landscape consisting of late-seral forests with “high-contrast edges” than compared to less fragmented landscapes (COSEWIC 2007). Kotliar (2007)<sup>11</sup> also reported that Olive-sided Flycatchers are associated with forest openings and edges within mature forests that are a result of natural and anthropogenic disturbances (tree fall gaps, fire, and logging are provided as examples).

The DAR assesses multiple potential Project-related effects to Olive-sided Flycatchers based on the Terms of Reference. The DAR does not indicate that road construction has an overall positive impact on Olive-sided Flycatcher populations (as suggested in the IR), but rather assesses that there could be a low positive effect to Olive-sided Flycatcher habitat by way of creating habitat edges (beyond the approved winter road). Notably, the

<sup>10</sup> COSEWIC. 2007. COSEWIC assessment and status report on the Common Nighthawk *Chordeiles minor* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 25 pp.

<sup>11</sup> Kotliar, N.B., 2007. Olive-sided Flycatcher (*Contopus cooperi*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. [http://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5182039.pdf](http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5182039.pdf)

DAR further describes potential adverse effects from direct project-related mortality and predation to individual Olive-sided Flycatchers (Section 8.6). Therefore, all potential project-related effects, recommended as part of the Terms of Reference (i.e., habitat loss, mortality), need to be considered to understand the potential impacts to the overall local population.

The DAR effects assessment is supported by results by Haché et al. (2014)<sup>12</sup> that found a negative effect on Olive-sided Flycatcher densities near linear features (which the DAR attributes to potential individual mortality and predation effects), even though they found this species to be strongly associated with fragmented landscapes and they reported a positive roadside bias (which the DAR attributes to potential positive habitat effects).

## 5.11 IR #44: Effects Assessment

**Comment:** The DAR Addendum, Appendix E Section 8.1 refers to the exclusion of three species in table 8.2 (p 202); there are in fact eight species listed in the table. Criteria used to exclude these species are insufficient, considering these are all SARA- or COSEWIC-listed species potentially occurring in the project area. For example: 1. Bats are known to occur near the proposed road; although the project may not impact hibernacula, impacts to roosting or feeding habitat, and prey sources, should be considered. 2. Grebes, rails and blackbirds are indeed wetland species, and although the road routing intends to avoid open water ponds by 100 m where possible, an all season road could fragment habitats and drainage changes could impact habitat effectiveness. 3. Peregrine Falcon has been recorded numerous times in NNPR, including near the southwest edge of the Ram Plateau, not far from the proposed road. Sections of the proposed road along Funeral and Sundog Creeks, and Grainger Gap to Nahanni Butte, do pass in close proximity to cliff habitats. 4. Low traffic speed is cited as a mitigation for impacts on Western Toads; this is likely not an effective measure for such a small, slow-moving species. Low traffic volumes could help, but impacts are still possible, especially during dispersal seasons in the southern end of the proposed road where it is most likely to overlap with toad range.

**Recommendation:** Include the eight listed species in Table 8-2 in the effects assessment.

### Response:

#### Bats

The Proposed Recovery Strategy<sup>13</sup> (became publically available on December 30, 2015, after the submission of the Vegetation and Wildlife and Wildlife Habitat assessment) lists hibernacula as critical habitat. The DAR considered bat hibernacula based on COSEWIC's (2013) recommendation that winter hibernacula are critical habitat. Based on this assessment of bat hibernacula, no effects assessment was completed because no adverse Project-bat interactions were established. The Proposed Recovery Strategy also indicates that industrial disturbances to individual bats are a low level concern and low severity. Similarly, the loss or degradation of foraging and roosting habitats are a medium to medium-low concern and moderate severity; however, the proposed Project minimizes direct habitat loss beyond the approved winter road. Roosting and feeding habitat is not considered limiting within the project area, especially since foraging Little Brown Myotis and Northern Myotis are associated with open and edge habitats provided by road corridors.

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<sup>12</sup> Hache, S., P. Solymos, T. Fontaine, E. Bayne, S. Cumming, F. Schmiegelow, and D. Stralberg. 2014. Analysis to support critical habitat identification for Canada Warbler, Olive-sided Flycatcher, and Common Nighthawk. Boreal Avian Modelling Project. [http://www.borealbirds.ca/files/Technical\\_Reports/Hacheetal2014.pdf](http://www.borealbirds.ca/files/Technical_Reports/Hacheetal2014.pdf)

<sup>13</sup> Environment Canada. 2015. Recovery Strategy for Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), and Tri-colored Bat (*Perimyotis subflavus*) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. ix + 110 pp



The karst formations immediately near the proposed route are not considered appropriate for possible bat hibernacula. Many appear simply as water-filled ponds with no cliff walls. Refer to the photographs of the nearest karst features from km 56 and 59 in the Permafrost-Karst Characterization letter (Tetra Tech EBA January 2016). In addition, although karst formations provide the most potential as hibernacula in the area, actual overwintering occupation is determined by very site specific conditions (e.g., temperature and temperature stability, humidity), as mentioned in the DAR. Also mentioned in the DAR, mist-net and ultrasound detector surveys in the karst terrain near the proposed all season road had fewer bat detections than lower elevations in Nahanni National Park Reserve (Lausen 2006)<sup>14</sup>, and Lausen (2006) indicated that the karst terrain near the access road did not appear to provide highly favourable summer roosting habitat (at least for females), likely due to its high elevation and relatively cool night temperatures.

In addition, COSEWIC (2013)<sup>15</sup> indicates that bats are not sensitive to disturbances while overwintering, unless the activity is occurring directly at or within the hibernacula. The approved winter road annual construction and operation occur within the bats' overwintering period, as bats in the study area are believed to begin their hibernation (or torpor) in late September and arouse in early June.

Operation of the proposed all season road is not likely to change winter bat-Project interactions from the approved winter road construction and operation. During summer operations of the proposed all season road, low traffic speed limits (maximum 60 km/hr) will minimize mortality of these agile fliers. Overall, traffic rates (i.e., 15 haul trucks per day) will limit potential direct (e.g., mortality) and indirect (e.g., noise-disturbance of roosting bats) effects.

The Proposed Recovery Strategy identifies that destructive activities to hibernacula include those that introduce White Nose Syndrome into the hibernacula, and or those that result in collapsed walls/ceilings, or activities that result in the hibernacula being inaccessible or unavailable to bats, or alters the hibernacula's temperature, humidity, airflow, or other microclimatic characteristics outside acceptable ranges. Construction and operation of the proposed all season access road are not considered destructive bat hibernacula activities.

### **Western Toad**

See the GNWT IR #3 reply (section 3.1 of this response letter).

### **Yellow Rail, Rusty Blackbird, and Horned Grebe**

Habitat fragmentation of potential Yellow Rail, Rusty Blackbird, and Horned Grebe habitat will result from the approved winter road, which by design, prefers low lying wetland habitats. In comparison, over 50% of the all season road re-alignments (5 km) off the approved winter road corridor are proposed specifically to avoid wet areas.

Similarly, CZN commits to maintaining natural drainage patterns, by careful placement and sizing of culverts, and regularly inspecting drainage measures to identify areas that are or might unexpectedly pond water, and take corrective actions. CZN strongly commits to maintaining natural drainage patterns since ponding water can become a serious geotechnical and permafrost issue and has the potential to affect the operation of the road itself if not corrected.

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<sup>14</sup> Lausen, C. 2006. Bat Survey of Nahanni National Park Reserve and Surrounding Areas, Northwest Territories, July – August 2006. Prepared for Parks Canada and Canadian Parks and Wilderness Society. Kaslo, British Columbia. 45 pp.

<sup>15</sup> Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2013. COSEWIC assessment and status report on the Little Brown *Myotis lucifugus*, Northern *Myotis septentrionalis* and Tri-colored Bat *Perimyotis subflavus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ontario.

Construction and operation of the proposed all season access road are not expected to fragment Yellow Rail, Rusty Blackbird, and Horned Grebe habitat and result in indirect habitat loss due to changing drainage patterns.

### Peregrine Falcon

The DAR acknowledges that Peregrine Falcons may occur throughout the proposed all season access road route, within the NNPR, from mid-May to late August. However, potential nest sites within 1.5 km of the proposed road (AANDC 2011<sup>16</sup>) are limited to specific areas (e.g., upper Sundog Creek area). The Peregrine Falcon sighting on the southwest edge of the Ram Plateau is approximately 5 km from the nearest point on the proposed all season road.

Peregrine Falcons nest on ledges of cliffs, preferably 50 to 200 m in height, commonly near water, and on southerly and westerly aspects. Not only is a nest site reused by a territorial pair in successive years, but the same nest site may be reused through successive generations. Aerial and ground-based surveys in 1980, 1981, 1994, 2006, 2007, and 2009 did not result in any observations of Peregrine Falcons (CZN 2010). Parks Canada (1984)<sup>17</sup> reported Peregrine Falcons were rare breeders in the NNPR, and a single nest site is known along the South Nahanni River (ENR 2014a)<sup>18</sup>. Peregrine Falcons are highly territorial and local nest density may be limited by the species' territorial behaviour (EC 2015)<sup>19</sup>, thereby limiting the number of active Peregrine Falcon nests occurring near the proposed Project.

The proposed access road is located mainly in valley bottoms and at lower elevations, below potential Peregrine Falcon nest sites. The DAR indicates that mitigation considered to minimize noise and visual disturbances would also minimize potential Peregrine Falcon effects at nest sites. This includes prohibiting clearing and construction of the proposed Project within 1.5 km of known active raptor nests. Clearing and the majority of the construction activities are scheduled to occur in the winter, when Peregrine Falcons are not present. Road operations will occur from approximately June 15 to November 4, when Peregrine Falcons will be at or near the nest site and parents are incubating the eggs (eggs are laid between May and early June). However, mitigation already outlined in the DAR to minimize traffic-related noise (e.g., deterring use of engine retarder breaks, low traffic speeds, and low traffic volumes) also mitigate disturbances to Peregrine Falcons at the nest site.

## 5.12 IR #45: Vegetation Baseline Studies

**Comment:** Vegetation work from the early 1980s (Beak 1981) is relied upon extensively in the DAR's description of current vegetation assemblages; these surveys were limited and are now out of date. Vegetation mapping concluded that 12 vegetation communities are encountered along the access road, yet this was based on a total of 14 transects. This is nearly 1 transect per community which is clearly insufficient; more sampling would have likely yielded more and better defined vegetation assemblages, and would have offered some description of rare plant species and assemblages. Additionally, since the original surveys in 1981, natural and climate-change related processes (e.g. fires, shrub encroachment) may have significantly altered the composition and distribution of

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<sup>16</sup> Aboriginal Affairs and Northern Development Canada (AANDC). 2011. Northern Land Use Guidelines – Volume 9a Seismic Operations. Web access: [http://publications.gc.ca/collections/collection\\_2012/aadncaandc/R2-226-9-1-2011-eng.pdf](http://publications.gc.ca/collections/collection_2012/aadncaandc/R2-226-9-1-2011-eng.pdf)

<sup>17</sup> Parks Canada. 1984. Nahanni National Park Reserve Resource Description and Analysis. Natural Resource Conservation Section, Parks Canada, Prairie Region, Winnipeg, Manitoba.

<sup>18</sup> Environment and Natural Resources (ENR). 2014a. NWT Wildlife Management Information System. Government of the NWT, Yellowknife, NT. Projects: 134 NWT Wildlife Sightings, 140 NWT Amphibian and Reptile Observations 1849 to present, 145 Deh Cho Historical Dall's Sheep Surveys 1981-87, Deh Cho Bat Survey of Nahanni National Park Reserve and area 2006, Deh Cho Nahanni Wood Bison Classification Surveys 1999-present, and NWT/NU Raptor Nest 1928-present.

<sup>19</sup> Environment Canada. 2015. Management Plan for the Peregrine Falcon *anatum/tundrius* (*Falco peregrinus anatum/tundrius*) in Canada [Proposed]. Species at Risk Act Management Plan Series. Environment Canada, Ottawa. iv + 27 p.

vegetation communities. Cameron et al (2015) identified changes in plant communities and hydrology along the winter road. In addition to evidence that vegetation communities have been altered and despite statements that the 1981 classification is still valid, no assessment of this has been made in the DAR. The use of remotely sensed EOSD map units to describe vegetation on sections of the all season road that were not mapped by Beak (1981) is also an inadequate substitute for comprehensive field surveys. Currently, vegetation surveys have not been done for undisturbed areas within the right of way as well as areas to be cleared for road facilities (camps, borrow pits etc.). No information on rare, valued, protected or designated plant assemblages has been provided in the DAR (TOR section 5.1.7 item 3), except for the Polje bypass re-alignment, which was surveyed and classified as burned and having no rare plant assemblages (EBA 2010). No assessment of plant community and rare plant potential was used to target areas of higher potential, or stratify surveys to obtain coverage of various community types across the study area. Surveys were of limited duration and were not repeated within or between growing seasons to achieve optimal levels of detection, using best practices for vegetation and rare plant surveys (ex. Alberta Native Plant Council. 2012. Guidelines for Rare Vascular Plant Surveys in Alberta, available on-line at <http://www.anpc.ab.ca/content/resources.php>). No quantitative vegetation surveys have been conducted, thus no assessment of the abundance of rare plants as required in the TOR (section 5.1.7 item 4) has been conducted.

**Recommendation:** Conduct detailed field vegetation surveys to update and refine the vegetation classification (Beak 1981), with appropriate replication of samples in all vegetation assemblages and distribution throughout the study area. 2. Conduct additional rare plant surveys using best practices to optimize detection of rare species (i.e. search pattern, survey timing and repetition, etc.), and ensures coverage of all vegetation assemblages, with survey locations distributed across the study area, or justification for the concentration of survey effort in areas of high rare plant potential. 3. Provide an assessment of project impacts on vegetation, broken down by habitat type, taking into account the best available information of ecological trajectories of terrain types. Cameron (2015) and up to date baseline information.

**Response:** The proposed all-season road generally follows the alignment of the winter road, except at select locations (including borrow sources); the total direct loss of habitat is smaller in size than what was approved for the winter road based on the same baseline studies.

In addition, the proposed re-alignment is designed to avoid sensitive habitat features such as wetlands and karst formations where rare plants have a higher potential for occurrence. Rare plant surveys related to the Prairie Creek Mine Project and associated winter access road were conducted by EBA on behalf of CZN in July 2009 (three field survey days) and further surveys were completed in August 2010 (5 field survey days). Rare plant surveys were conducted along the Prairie Creek Mine winter road, the proposed Polje By-Pass re-alignment (which has not been disturbed previously), the proposed waste rock storage facility, and the area around camp and the beaver pond to the south. No plant species listed within the federal SARA were observed in the surveyed areas. However, one plant species, few flower meadow rue (*Thalictrum sparsiflorum*), listed as 'May Be At Risk' (ENR 2014b), was documented along the Prairie Creek winter road and an adjacent wetland. As the species appears locally abundant within the study area, conversion of the winter road to all season access is unlikely to threaten the viability of this species locally, considering confirmed observations were identified outside of the proposed development footprint. No rare vegetation communities were noted. Due to the passive mobility nature of plants and the lack of disturbance within the Project Area since these rare plant surveys were conducted, the rare plant communities are not expected to have changed substantially. They do, however, provide a baseline gauge of rare plant abundance in the area.

Vegetation cover units are unlikely to have changed significantly in the past 30 years; EOSD mapping was used as a suitable substitute and to conservatively confirm the original classification. Tetra Tech EBA used the most currently available EOSD vegetation classification descriptions and data and correlated these descriptions to the extent feasible with the information reported in Golder (2010), which was based on Robertson Environmental Service's (RES) (1994) summary of the earliest studies conducted by Beak (1981, 1982). Some shift in vegetation cover units along the winter road has occurred over time; this is noted in "Table 4-27: Concordance with Beak 1981 Community Mapping and EOSD Map Units" in the DAR.

### 5.13 IR #47: Vegetation Invasive Species

**Comment:** The effects assessment in section 10.6 of the DAR states that there is a risk of introduction of invasive species during summer construction during phase 2 but does not address any risks associated with operational traffic. The assessment concludes that the significance of effects will be low if appropriate mitigation strategies (ex. wheel washing) are used.

**Recommendation:** Re-evaluate the effects assessment for invasive plants considering additional information such as species which are likely to be introduced into the study area through operational traffic. Describe risks associated with their establishment, and the effectiveness of proposed measures (ex. wheel washing) that will be taken to prevent their introduction and control.

**Response:** Response provided in Appendix B of this letter.

## 6.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Canadian Zinc Corporation and their agents. Tetra Tech EBA Inc. (Tetra Tech EBA) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Canadian Zinc Corporation or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech EBA's Services Agreement. Tetra Tech EBA's General Conditions are provided in Appendix C of this report.

## 7.0 CLOSURE

We trust this letter report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,  
Tetra Tech EBA Inc.



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# APPENDIX A

## MVRB IR #32 AND 33: NOISE ASSESSMENT

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April 27, 2016

Canadian Zinc Corporation  
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ISSUED FOR USE  
FILE: Y14103320-01.007  
Via Email: david@canadianzinc.com

**Attention:** Mr. David Harpley  
Vice President, Environment and Permitting Affairs

**Subject:** Response to MVRB Information Requests 32 and 33 - Noise Assessment

This Letter Report serves to address Mackenzie Valley Review Board (MVRB) Information Requests 32 and 33.

### **MVRB Information Request 32**

1. *Provide detailed information about sources of noise from the project including, but not limited to:*
  - a. *their locations, timing (including, but not limited to, the start and end dates, time of day, seasonality etc.); and*
  - b. *duration (how long the sound is emitted), frequency and magnitude (including, but not limited to, normal, peak, and cumulative decibel levels).*
2. *Provide an assessment of how far this noise can travel until it reaches background for individual sources and for any combination of noise sources, such as multiple noise sources from a borrow source.*
3. *Provide a consideration of how terrain, temperature, and weather may affect noise.*

### **MVRB Information Request 33**

*Provide a time series analysis of noise from the project. In other words, estimate how long a valued component can hear noise associated with the project. For instance, how long would a person be able to hear a haul truck and what is the interval between being able to hear the noise from one haul truck until the noise from another haul truck is audible? This must include considerations of terrain, weather, peak sound emissions (use of engine breaks for instance), and time of year.*

Response to MVRB Information Requests 32 and 33

## **1.0 SOURCES OF NOISE**

Sources of noise and other types of project interactions with the receiving environment were previously described in the Vegetation and Wildlife and Wildlife Habitat Assessment Report (Report) for a proposed all-season road from Northwest Territories Highway 7 (near Nahanni Butte) to the Prairie Creek Mine (Tetra Tech EBA September, 2015). This Report was submitted as Appendix E to the Developer's Assessment Report Addendum (DAR Addendum) to support Canadian Zinc Corporation (CZN) in securing approval from the Mackenzie Valley Review Board (MVRB).

The following description of the types of infrastructure and activities that would generate noise is drawn from Section 5.0 of the Tetra Tech EBA Report, entitled "Project Interactions and Effects Categories".

## 1.1 Camps

For the construction of the Prairie Creek Access Road, there will be need and the requirement for the establishment of camps and staging areas along the road corridor.

The camps will be temporary facilities to support the construction of the road and bridges. At the completion of the road these temporary facilities will be decommissioned with the footprint being reclaimed to the applicable standard. The total numbers and the sizes of the camps will be subject to the finalized construction schedule.

The selection of camp locations will be dictated by the construction schedule while considering the site characteristics favourable to support a camp. Favourable site characteristics include outside a riparian area of a waterbody, reasonably flat and dry preferably with gravel based soils to minimize site development costs and environmental impacts. All attempts will be made to utilize other disturbed areas such as borrow/gravel pits to eliminate unnecessary site disturbance. Table 1 identifies a number of suitable camp/laydown locations.

As can be noted, the distance between the proposed camps ranges from 22 km to 37 km, which will ensure that the range of stationary sounds generated at any one camp will not be audible at another camp. Furthermore, it is anticipated that noise levels will remain the same as already permitted for use of the Prairie Creek Mine winter road, except for the extended season of use beyond winter construction and operations (e.g., transfer facility electrical power generator, traffic).

**Table 1: Summary of Potential Camp/Laydown Locations**

Location	Description
KP 23 Camp	<ul style="list-style-type: none"> <li>Old winter road section. Dry gravel base.</li> </ul>
KP 40 Cat Camp	<ul style="list-style-type: none"> <li>Original camp and laydown area.</li> <li>Excellent location, lots of room, flat, dry gravel based soils.</li> </ul>
KP 65 Camp	<ul style="list-style-type: none"> <li>Close proximity to good gravel source, reasonably dry terrain with minor slopes.</li> </ul>
KP 87 Tetcela Camp	<ul style="list-style-type: none"> <li>Good location, reasonable flat with gravel based materials.</li> <li>Could be integrated with the BP 87 and the proposed Tetcela Transfer Facility.</li> </ul>
KP 124 Grainger Camp	<ul style="list-style-type: none"> <li>Good location, lots of room.</li> <li>Flat, dry, gravel based location.</li> <li>Can be integrated with BP 123A.</li> </ul>
KP 159 Camp	<ul style="list-style-type: none"> <li>Could offer an alternative to KP 159 Liard Camp with a gravel based material and gentle slopes.</li> <li>Integrate with BP 151.</li> </ul>
KP 159 Liard Camp	<ul style="list-style-type: none"> <li>Would offer the best strategic camp location and can combine with the Liard crossing/landing.</li> <li>May have limited space and will require significant gravelling.</li> </ul>

## 1.2 Borrow Sources and Blasting

There are a total of approximately 11 preferred borrow sources, located near KP 47, between KP 55-67, 103-116, KP 123, and KP 158 that may require blasting and/or crushing activities. These sources are located approximately 6 km west of the Polje area, near Silent Hills (between 3 – 5 km west of the Nahanni Range and 500 – 900 m from wetland/pond complexes), at the Grainger Gap, and near the Liard River. In addition, limited blasting will be required at KP 23.4 and 27.3 for bridge approaches, at KP 28-29 for a further road re-alignment, and at KP 37 for the road-bed off the floodplain.

In all cases where blasting is required, blasts would be infrequent on an annual basis and of short-duration (seconds), extending over a period of two to four weeks at each borrow site, and a shorter period at the other sites. Crushing operations would be continuous but of short-duration, extending to approximately one month at each borrow site. Blasting and crushing operations will occur at one borrow source before activities commence at another; occurring in a phased approach over a two year construction period.

For human safety, blasting activities will occur during daylight hours. In addition, blasting and crushing activities may occur throughout the year.

### 1.3 Haul Trucks and Other Equipment

Typical road construction and operation activities, such as site preparation, clearing, earthworks and maintenance may include bulldozers, graders, haul trucks and other large equipment. Road clearing and construction equipment will primarily operate from late fall and into the winter over a two year period, with a minimal amount of summer construction occurring at the barge crossing and the Tetcela Transfer Area. Operation of haul trucks and other equipment, during road operation and maintenance, will be year round.

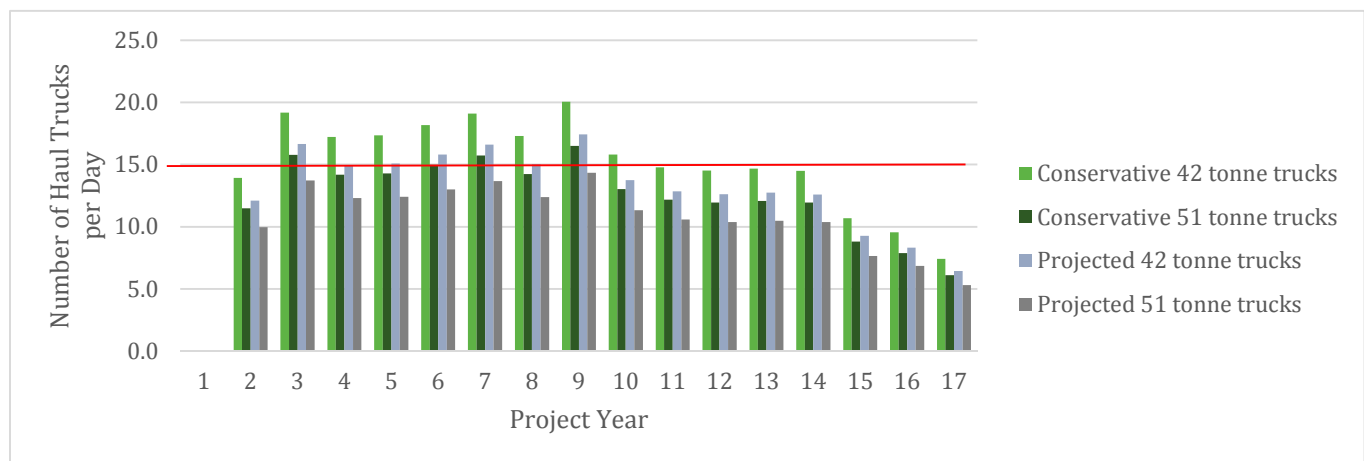
With the operation of the proposed all-season road, there will be a reduction in daily traffic volumes from currently approved winter road operations and general site activity. The projected Prairie Creek winter road daily traffic volume (from late November to early April, subject to weather) is approximately 37 vehicles, round trip, per day (equivalent to approximately three concentrate trucks an hour per day), for approximately 140 calendar days a year, although the actual winter window will likely be less, potentially as short as 75 days).

In comparison with winter operations, the proposed all-season access road Phase 1 development will involve approximately five trucks making two round trips per day (total ten vehicles, round trip, per day or roughly equivalent to one concentrate truck an hour per day). Thus, the Phase 1 all-season road development will significantly reduce the number of potential daily vehicle-wildlife interactions over the winter as a direct result of minimizing the number of trips. This is particularly important considering the winter period is a time when many wildlife species are particularly sensitive to disturbance.

With the development of Phase 2, approximately 15 trucks will make a single return trip daily (total of 15 vehicles, round trip, per day, or approximately one concentrate truck every 0.75 hours), for approximately 210 calendar days a year. This traffic volume is still considerably less than the anticipated, currently approved Prairie Creek Mine daily winter road volumes; however, traffic volumes proposed for the all-season road will be extended throughout the year.

Recently Tetra Tech EBA received more details from CZN on the haul truck traffic volumes based on completion of an updated preliminary feasibility study. CZN provided greater detail to explain their statement that 'approximately' 15 trucks/day would be involved. CZN provided a range of truck numbers, up to 20 per day at a maximum, and Tetra Tech EBA was asked to consider if the details had any effect on the vegetation and wildlife and wildlife habitat impact assessment in the Report.

Tetra Tech EBA understands that haul truck traffic volumes are dependent upon the truck size (42.5 tonne or 50.3 tonne payloads), production year, and the length of the hauling period. As a result, the overall concentrate truck volumes will differ each year, with the annual traffic ranging from as low as 5.3 trucks/day to 20.0 trucks/day depending on conservative (192 hauling days) and projected (221 hauling days) estimates (Figure 1). Therefore, throughout the length of the project period, haul truck traffic volumes average between 10.9 to 15.3 trucks/day.



**Figure 1: Conservative and Projected daily haul truck traffic volumes**

The environmental assessment was completed based on approximately 15 haul trucks/day throughout the entire project life (Graph 1, red line). Tetra Tech EBA regards the haul truck traffic volume modifications to be of a very minor nature and do not alter the predictions presented in the environmental assessment report.

## 2.0 NOISE ASSESSMENT

Typical sound levels associated with natural background conditions and other common sources of noise that are familiar to the residents of communities in the vicinity of the proposed all-season road are presented in Table 2 from Harris (1991).

**Table 2: Typical Sound Levels of Common Noises**

Description	Type of Noise	Sound Level (dBA)
Rural area – background noise	Continuous	30 - 35
Small town residential – background noise	Continuous	35 - 40
Snowmobile at 15 m	Intermittent	75 (peak)
Snowmobile at 1 km	Intermittent	50 (peak)
Haul Truck at 15 m	Intermittent	85 (peak)
Haul Truck at 1 km	Intermittent	65 (peak)

Activities associated with the operation of the construction camps will produce various kinds of intermittent and/or continuous sounds during the time(s) that they are operating. The main source of steady, continuous noise during these times will be produced by the electrical power generator at each camp.

Short-term, intermittent noise will be generated by the mobile equipment required to construct and/or operate the camps, borrow sites and by trucks and other vehicles using the all-season road. This would include the earth-moving equipment, bulldozers, loaders, dump trucks, construction cranes(s), haul trucks, pickups/SUVs, and other miscellaneous equipment. Typical sound levels produced by these types of equipment are summarized at various distances in Table 3.

**Table 3: Typical Maximum Construction and Transportation-Related Sound Levels**

Noise Source	Sound Level (dBA) at Various Distances			
	15 m	30 m	60 m	120 m
Bulldozer	85	79	73	67
Loader	85	79	73	67
Crane	83	77	71	65
Moving dump truck or haul truck	88	82	76	70
Idling dump truck or haul truck	65	59	53	47
Diesel generator	70	64	58	52

**Notes:**

Reference sound level obtained from OMOE Publication NPC-115, contained in the OMOE *Model Municipal Noise Control By-Law 1977*

Reference sound levels obtained from US Department of Transportation. *Transit Noise and Vibration Impacts Assessment*, Chapter 12: Noise and Vibration, 1977.

Reference sound level obtained from *British Standards No. 5228, Second Edition, May 1997*.

When comparing sound level values, the following general rules, initially reported in the De Beers Snap Lake Diamond Project Environmental Assessment Report (2002), are of interest and applicable to the current discussion:

- a difference in sound level of less than 3 dBA is barely perceptible to the human ear;
- a difference of 5 dBA is noticeable;
- a difference of 10 dBA corresponds to a halving or doubling in perceived loudness; and
- a 20 dBA difference corresponds to a four-fold difference in perceived loudness.

It is also important to note that sound propagation between a noise source and receptor (e.g. person or animal listening) is affected by several sound attenuation (reducing) mechanisms. These include the following:

- Distance dissipation – sound naturally decreases with increasing distance from the source;
- Ground attenuation – sound is absorbed by the ground that it passes over;
- Atmospheric absorption – sound is absorbed by the atmosphere it passes through; and
- Barrier attenuation – sound can be blocked by physical barriers (e.g. forest, hills, topography).

Barrier attenuation is particularly relevant for the Prairie Creek all-season road and associated infrastructure because forests dominate the landscape traversed by the road.

Sound is also affected by wind and temperature conditions. For example, a distant noise source will be louder under downwind conditions than it will be under calm conditions. Conversely, a distant source will be quieter under upwind conditions than it will be under calm conditions. Sound is affected by temperature conditions in the atmosphere (i.e. a distant noise source will be louder under atmospheric inversion conditions than it will be under neutral atmospheric conditions).

Sound level attenuation predictions and modelling of construction and operations-related activities, as reported in the environmental assessment conducted for the Snap Lake Project (De Beers 2002) were considered to be relevant and directly applicable to evaluating anticipated noise levels associated with the Prairie Creek all-season road project components.

De Beers (2002) determined that "worst case" site construction noise would be at a level of less than 40 dBA at a distance of 1.5 km from the site. As a result of the natural attenuation of outdoor sound with distance, continuous construction-related noise from the site would be close to, or less than ambient sound levels at distances of about 6 km from the site.

For the operations phase of the Snap Lake Project, average values for continuous noise emanating from the site were also predicted to be less than 40 dBA at a distance of 1.5 km from the site. It was noted that this sound level was similar to the typical level of continuous background noise that would occur in a small town residential area and approaching natural background noise values of 30-35 dBA.

De Beers (2002) also noted that although the continuous noise produced by the site at this distance was identified to be greater than pre-existing ambient sound levels during calm conditions, the predicted sound level met the guideline criteria of the Alberta EUB Noise Control Directive (EUB 1999) for industrial facilities in remote locations.

The construction and operations phase of the Prairie Creek all-season road project components and associated activities, including the very low level of anticipated haul truck traffic, are expected to generate similar noise levels to those discussed by De Beers (2002) for the Snap Lake Project, but for shorter periods and at a much lower intensity.

Based on the available information, noise levels emanating from the Prairie Creek all-season road project components during all phases of the Project are predicted to be typically less than 40 dBA at a distance of 1.5 km from the anticipated noise sources, with the exception of the intermittent blasting.

More specifically, for highway transport trucks driving along the all-season road, Golder (2010) predicted that the source noise generated by a typical truck (99 dBA) is expected to be reduced to 35 dBA (the level between normal speech and a whisper) at a distance of about 0.5 km from the road.

Noise generated from blasting is dependent upon the explosive type, explosive load, spacing and depth of blasting holes and other factors (AMEC 2015). Ambient conditions such as cloud cover, high winds, or atmospheric temperature inversions affect the propagation of blasting noise. The noise from a blast can be loud if the listener is within a few hundred metres of the blast. Airborne pressure waves can cause annoyance due to hearing and feeling (particularly the low frequency component) the noise levels above peak linear values of around 115 dBA.

However, at a distance it is usually heard as a low rumble or "popping" sound that lasts one or two seconds. If the wind is blowing away from the listener, there may be no audible sound. Some atmospheric conditions, such as low cloud cover, cause sound waves to propagate over a greater distance, resulting in a more noticeable "bang", referred to as an air blast (AMEC 2015).

Specific mitigation measures to be implemented to minimize potential environmental effects associated with intermittent blasting noise generated during the construction phase, as previously described in Tetra Tech EBA (2015), are provided in the following section of this letter response.

Following cessation of Project-related activities, noise levels will immediately return to existing ambient conditions.



### 3.0 MITIGATION MEASURES AND EFFECTS ON WILDLIFE

Proposed mitigation measures to be implemented to further minimize potential environmental effects associated with noise generated from the construction and operation of the proposed all-season road were previously described in Tetra Tech EBA (2015) and are summarized as follows:

- The proposed road and borrow source developments will conform to Aboriginal Affairs and Northern Development Canada's (AANDC's) Northern Land Use Guidelines for Pits and Quarries (2010).
- CZN Environmental Monitor to complete a Wolverine, Grey Wolf, and Grizzly Bear den reconnaissance survey in habitat favourable for natal denning, on and near the proposed Project footprint, prior to clearing activities. If a den is found, mitigation will be considered depending on the circumstances and location, including restrictive timing windows appropriate for species denning use.
- Speed limits will be implemented and enforced – maximum vehicle traffic speed limit of 60 km/hr along the all-season road and 30 km/hr at the airstrip, borrow sources, and transfer facilities.
- Wildlife reconnaissance surveys will be completed (by the CZN Environmental Monitor) by scanning adjacent slopes, ponds, and surrounding areas with binoculars prior to blasting. Blasting is prohibited if caribou, Dall's Sheep, Wolverine, and/or Mountain Goat are observed within 1 km of the blast site until the animal moves out of the area.
- Blasting within Boreal Caribou range will be prohibited from May 1 to July 15 to avoid disturbance to potential Boreal Caribou calving and post-calving.
- Prohibit blasting when Dall's Sheep lambs within 2 km of the proposed Project from May 1 to June 15.
- Blasting in Boreal Caribou range should be minimized from December to April, should it be deemed necessary for construction.
- Avoid blasting by a minimum distance of 800 m when Trumpeter Swans are observed on breeding ponds from April 1 to September 30 (AANDC 2011). Other construction activities (if critical for development) may occur within 800 m of observed Trumpeter Swans (from April 1 to September 30) with the assistance of a CZN Environmental Monitor. The CZN Environmental Monitor has the authority to stop work if construction determined to be adversely affecting swans.

Some wildlife may show minor displacement behaviour and avoid the immediate areas of the road camps, road construction and borrow site activities during periods of particularly loud and irregular noises. The duration of such exposures are expected to be brief, perhaps lasting a few minutes to a few hours, and are reversible upon cessation of the activity or by moving away from the activity. The number and frequency of such exposures to noise disturbance by wildlife would be expected to be limited and sporadic.

The overall environmental consequences of noises generated by the Prairie Creek all-season road project components and associated activities are expected to be low and the residual impact on the existing noise environment of the region is expected to be negligible.

## 4.0 CLOSURE

We trust this Letter Report serves to address MVRB Information Requests 32 and 33. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,  
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# APPENDIX B

## PARKS CANADA IR #47: VEGETATION INVASIVE SPECIES

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April 27, 2016

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ISSUED FOR USE

FILE: Y14103320-01.007

Via Email: david@canadianzinc.com

**Attention:** David Harpley  
VP Environmental & Permitting Affairs

**Subject:** Invasive Species Management Framework  
Proposed All-Season Road Access to Prairie Creek Mine, NT

## 1.0 INTRODUCTION

Tetra Tech EBA Inc. (Tetra Tech EBA) prepared a Vegetation and Wildlife and Wildlife Habitat Assessment Report for a proposed all-season road from Northwest Territories Highway 7 (near Nahanni Butte) to the Prairie Creek Mine (the Project). This assessment report has been submitted as an appendix to the Developer's Assessment Report (DAR), and a revised version as an appendix to the DAR Addendum, to support Canadian Zinc Corporation (CZN) in securing approval from the Mackenzie Valley Review Board (MVRB). In response to this assessment, Parks Canada Agency made the following request (IR47) regarding invasive species:

*Re-evaluate the effects assessment for invasive plants considering additional information such as species which are likely to be introduced into the study area through operational traffic. Describe risks associated with their establishment, and the effectiveness of proposed measures (ex. wheel washing) that will be taken to prevent their introduction and control.*

This document replies to IR47 and provides an invasive species management framework (Framework) to prevent and control the spread of invasive species during construction and operation of the all-season road.

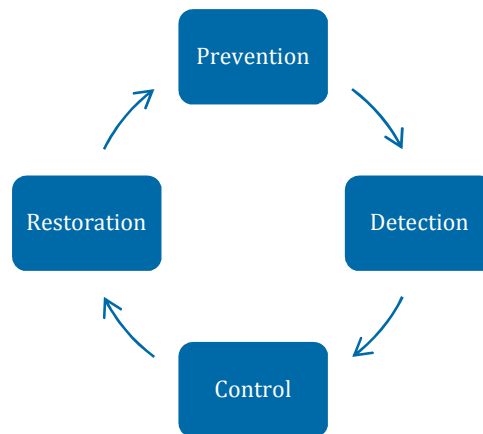
## 2.0 FRAMEWORK RATIONALE

Invasive plants have the ability to aggressively establish and quickly spread in new environments, altering natural habitats, displacing native species reducing habitat effectiveness for wildlife. Once native species are displaced, conditions become favorable for the establishment of other invasive species, further compounding the issue. Once well established, control of invasive species can be difficult, therefore prevention and early detection is an important component within the Framework.

Generally, the Northwest Territories (NT) has fewer documented occurrences of invasive species despite its size compared to the rest of Canada, nor does it have legislation pertaining to weed control. Invasive alien plant species are those that have been introduced into areas beyond their natural range by humans and are capable of causing significant harm to the environment, economy, or society (GNWT and NWT Biodiversity Team 2010). Increasing development, disturbance, and climate change may promote conditions favorable for the establishment of invasive species; an Invasive Species Management Plan is useful to reduce encroachment of invasive species in native habitat.

As an example, this Framework will focus on field sow thistle (*Sonchus arvensis*), one of the most common invasive species found along roadsides in the NT (Oldham 2007) since to date, no invasive species have been documented along the existing winter road. This Project is unique in that most invasive species management plans operate under the assumption that invasive species are prevalent on site, so the goals of the program focus on priority areas and reduction zones.

This Framework is meant to be adaptive and evolve as the Project evolves and invasive species are, or are not, detected. The four key principals (prevention, detection, control, and restoration) can be applied to any species detected throughout the lifetime of the Project to provide the most applicable mitigation for control.



## 3.0 INVASIVE SPECIES MANAGEMENT

The Prairie Creek Mine site and existing winter access road have been in place since 1982, and Mine-related heavy equipment is already on site. In the future, any new equipment would be brought in along the access road on trucks or tractor trailer units. Similarly, mine supplies and fuel will be brought in along the access road. Invasive plants are usually brought into a site (or along an access road) through dirty vehicles or heavy equipment operating during the non-winter period, when seeds of invasive plants can more readily be mixed with mud or dirt on vehicles or equipment, and then fall off along the road way.

Invasive species have the greatest risk of being introduced on transport trucks during the summer months of road operation. Trailers will be hauled from the Mine site to Fort Nelson, British Columbia in “summer” between approximately July 1 and November 1; no hauling will take place during spring break-up and the post-spring period of weight restrictions on the Liard Highway (March 31 to June 30). One type of truck will operate on the access road, and another on the highway. Trailers will be switched out at the Liard Transfer Facility (LTF), about 1 km from the junction of the Liard Highway. Only the trailers complete the whole journey from the Mine to Fort Nelson and back.

### 3.1 Prevention

The most effective management strategy for addressing the introduction of invasive plants is preventing their establishment into an area (Carlson and Shephard 2007; Schrader and Hennon 2005; USDA 2006; Polster 2005; Clark 2003). Removal once established is more costly and can be particularly challenging logistically in more remote northern areas. Adaptive management options to prevent the introduction and spread of invasive species were introduced in the DAR and include:

- Utilization of a wheel-wash station in summer- the station will be located at the LTF. Trucks headed for the Mine will pass through the wheel-wash and be cleaned of any debris before departure;
- Road use monitoring – to restrict access and use of the road by unauthorized persons. Off-road vehicles have a high potential of introducing invasive species; road use monitoring is proposed at about km 140 on the all season access road; and



- The use of natural encroachment as a re-vegetation strategy in disturbed areas; this avoids the introduction of invasive species sometimes found in seed mixes.

### 3.2 Detection

Prevention measures should be monitored for effectiveness; this is accomplished through training and regular monitoring as follows:

- Training - train CZN Environmental Monitor to identify, monitor, and control invasive species using appropriate mechanical treatments specific to the plant species (e.g., covering/smothering, cutting, digging);
- Monitor – monitoring should be conducted regularly throughout the growing season (June to August); and
- If an infestation is detected, size, density and location should be recorded and tracked. Other factors to consider include:
  - Potential impacts of the species (e.g., How does it alter ecosystem processes? How competitive is it with native species?);
  - By what means does the species spread;
  - How valuable and/or rare is the habitat with the infestation; and
  - How difficult is control of the infestation and the re-establishment of native species.

### 3.3 Control

If prevention measures fail and an infestation of an invasive species is detected, mitigation measures may be required. Mitigation options introduced in the DAR are based on the knowledge and principles of industry standards, and are described in the *Nature Conservancy Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas* (2001). Measures will be specific to the species and its lifecycle, and may include the following:

- Consider maintaining roadsides using mechanical control to keep healthy plant communities that are resistant to invasive plant establishment;
- Consider mowing - can reduce seed production and restrict growth, especially in annuals cut before they flower and set seed (Hanson 1996). Some species however, re-sprout vigorously when cut so this option must be evaluated for each invasive species detected;
- Promote competition from native plants;
- Hand pulling – useful for annuals and tap-rooted plants where the infestation is small. Weeds should be bagged, removed from site, and disposed of (burning) in a manner that will not result in an infestation in the disposal area; and
- Consider mulching – mulch from grass clippings can suppress or stunt growth of invasive species.

The invasive species management plan will be developed in consultation with applicable stakeholders to ensure proposed mitigation efforts comply with existing regulations which may potentially limit the application of specific invasive species control measures (e.g. use of herbicides in National Parks or prescribed burns).

### 3.4 Restoration

Once control measures have been implemented, regular monitoring will occur to ensure the site is naturally restored to pre-infestation conditions. If control measures are effective, the site enters back into regular monitoring with the rest of the all-season access road. The ultimate focus is to maintain native vegetation communities. Areas most vulnerable to invasive species are areas disturbed by construction. In these areas, if invasive species are detected, additional techniques may warrant consideration to encourage native plant encroachment and limit pathways for the establishment of invasive species.

## 4.0 SPECIES SPECIFIC IDENTIFICATION AND CONTROL PLANS

A weed control plan should be developed for each species detected and should include the following:

- Species name – scientific name and associated common names;
- Key photos that show unique features;
- Life cycle (e.g. perennial, creeping);
- Physical description including roots, stem, leaf arrangement, flowers, seeds/fruits;
- Key identification features (i.e., most unique and identifiable features);
- Avenues of disbursement (e.g. seed, roots);
- Favorable habitats that support the species; and
- Applicable control measures.

### Example: Perennial Sow-Thistle (*Sonchus Arvensis*)



#### Synonyms

Field sow thistle, creeping sow thistle, field milk thistle.

#### Life cycle

Creeping perennial.

#### Roots

Extensive, deep, creeping rhizomatous roots.

#### Leaves

Alternate, **prickly on the edges**, similar in shape to a dandelion. Juvenile plants are in rosette form.

#### Stems

Erect and hollow, often containing a milky sap. Branched towards the top where flower clusters are born.

#### Flowers

Bright yellow. **Involucral bracts are covered with dense hair**. This species is often confused with annual sow-thistle (*Sonchus uliginosus*) which lacks hair.

#### Seeds:

Small, winged brown seeds with a wrinkled appearance.

#### Disbursement Mechanisms

A piece of broken root containing a bud can start a new plant. Seed dispersal.

#### Favorable Habitat

Roadsides and waste areas.

#### Control Measures

Hand pull and chemical.

## 5.0 INVASIVE SPECIES FOUND WITHIN THE NT

The General Status Ranks of Wild Species in the Northwest Territories lists 118 plants as being exotic/alien (Table 1; Working Group on General Status of NWT Species 2011). Not all of these plants will require control as they are not aggressively invasive.

**Table 1: Invasive Species Documented in the NT**

ENGLISH NAME	SCIENTIFIC NAME
Manitoba Maple	<i>Acer negundo</i>
Pearl Yarrow	<i>Achillea ptarmica</i>
Crested Wheat Grass	<i>Agropyron cristatum</i> spp <i>pectinatum</i> ( <i>Agropyron pectiniforme</i> )
Siberian Wheat Grass	<i>Agropyron fragile</i> ( <i>Agropyron sibiricum</i> )
Black Bentgrass	<i>Agrostis gigantea</i>
Spreading Bentgrass	<i>Agrostis stolonifera</i>
Welsh Onion	<i>Allium fistulosum</i>
Creeping Meadow-foxtail	<i>Alopecurus arundinaceus</i>
Field Meadow-foxtail	<i>Alopecurus pratensis</i>
Green Amaranth	<i>Amaranthus retroflexus</i>
Annual ragweed	<i>Ambrosia artemisiifolia</i>
Biennial Sagebrush	<i>Artemisia biennis</i>
Garden Orache	<i>Atriplex hortensis</i>
Spreading Orache	<i>Atriplex patula</i>
Wild Oats	<i>Avena fatua</i>
Cultivated Oats	<i>Avena sativa</i>
Russian Pigweed	<i>Axyris amaranthoides</i>
English Daisy	<i>Bellis perennis</i>
Hoary False-alyssum	<i>Berteroa incana</i>
Chinese Mustard	<i>Brassica juncea</i>
Turnip	<i>Brassica napus</i>
Bird Rape	<i>Brassica rapa</i> var. <i>rapa</i> ( <i>Brassica campestris</i> )
Meadow Brome	<i>Bromus commutatus</i>
Soft Brome	<i>Bromus hordeaceus</i> ( <i>Bromus mollis</i> )
Awnless Brome	<i>Bromus inermis</i>
Corn Brome	<i>Bromus squarrosus</i>
Downy Brome	<i>Bromus tectorum</i>
Large-seeded False Flax	<i>Camelina sativa</i>
Shepherd's Purse	<i>Capsella bursa-pastoris</i>
Siberian Pea-tree	<i>Caragana arborescens</i>
Wild Caraway	<i>Carum carvi</i>
Common chickweed	<i>Cerastium fontanum</i> ( <i>C. glomeratum</i> , <i>Cerastium vulgatum</i> )
Nodding Chickweed	<i>Cerastium nutans</i>
Dwarf Snapdragon	<i>Chaenorhinum minus</i>

**Table 1: Invasive Species Documented in the NT**

ENGLISH NAME	SCIENTIFIC NAME
Lamb's Quarters	<i>Chenopodium album</i>
Maple-leaved Goosefoot	<i>Chenopodium simplex</i> ( <i>Chenopodium hybridum</i> var <i>igantospermum</i> )
Creeping Canada Thistle	<i>Cirsium arvense</i>
Hairy Bugseed	<i>Corispermum villosum</i>
Narrow-leaf Hawksbeard	<i>Crepis tectorum</i>
Herb Sophia	<i>Descurainia sophia</i>
Thyme-leaf Dragonhead Nettle	<i>Dracocephalum thymiflorum</i>
Creeping Wild Rye	<i>Elymus repens</i> ( <i>Agropyron repens</i> , <i>Elytrigia repens</i> )
Siberian Wild Rye	<i>Elymus sibiricus</i>
Common Dog Mustard	<i>Erucastrum gallicum</i>
Black Bindweed	<i>Fallopia convolvulus</i> ( <i>Polygonum convolvulus</i> )
Hard Fescue	<i>Festuca trachyphylla</i>
Steppe Fescue	<i>Festuca valesiaca</i>
Brittle-stem Hemp	<i>Galeopsis tetrahit</i>
Catchweed Bedstraw (Cleavers)	<i>Galium aparine</i>
Low Cudweed	<i>Gnaphalium uliginosum</i>
Showy Baby's-breath	<i>Gypsophila elegans</i>
Tall Baby's-breath	<i>Gypsophila paniculata</i>
Common Sunflower	<i>Helianthus annuus</i>
Barley	<i>Hordeum vulgare</i>
Mexican Summer-cypress (Burningbush)	<i>Kochia scoparia</i>
Prickly Lettuce	<i>Lactuca serriola</i>
Common Dead Nettle	<i>Lamium amplexicaule</i>
European Stickseed	<i>Lappula squarrosa</i> ( <i>Lappula echinata</i> )
Dense-flower Peperwort	<i>Lepidium densiflorum</i>
Garden Pepperwort	<i>Lepidium sativum</i>
Ox-eye Daisy	<i>Leucanthemum vulgare</i> ( <i>Chrysanthemum leucanthemum</i> )
Butter-and-Eggs	<i>Linaria vulgaris</i>
Common Yellow Flax	<i>Linum usitatissimum</i>
Annual Rye Grass	<i>Lolium multiflorum</i>
Perennial Rye Grass	<i>Lolium perenne</i>
Bird's-foot Trefoil	<i>Lotus corniculatus</i>
Dwarf Mallow	<i>Malva neglecta</i>
Pineapple Weed	<i>Matricaria discoidea</i> ( <i>M. matricarioides</i> ; <i>M. suaveolens</i> )
Black Medick	<i>Medicago lupulina</i>
Alfalfa	<i>Medicago sativa</i>
White Sweet-clover	<i>Melilotus albus</i>
Yellow Sweet-clover	<i>Melilotus officinalis</i>
Yellow Ball Mustard	<i>Neslia paniculata</i>

**Table 1: Invasive Species Documented in the NT**

ENGLISH NAME	SCIENTIFIC NAME
Sainfoin	<i>Onobrychis viciifolia</i>
Wild Parsnip	<i>Pastinaca sativa</i>
Common Canary Grass	<i>Phalaris canariensis</i>
Common Timothy	<i>Phleum pratense</i>
Nipple-seed Plantain	<i>Plantago major</i>
Annual Bluegrass	<i>Poa annua</i>
Flat-stem Bluegrass	<i>Poa compressa</i>
Striate Knotweed	<i>Polygonum achoreum</i>
Prostrate Knotweed	<i>Polygonum aviculare (Polygonum buxiforme)</i>
Spreading Alkali Grass	<i>Puccinellia distans</i>
Common Buttercup	<i>Ranunculus acris</i>
Curly Dock (Yellow Dock)	<i>Rumex crispus</i>
Procumbent Pearlwort	<i>Sagina procumbens</i>
Tall Rye Grass (Tall Fescue)	<i>Schedonorus arundinaceum (Lolium arundinaceum; Festuca arundinacea)</i>
Cultivated Rye	<i>Secale cereale</i>
Two-row Stonecrop	<i>Sedum spurium</i>
Common Ragwort	<i>Senecio vulgaris</i>
Rough Bristlegrass	<i>Setaria verticillata</i>
Green Bristlegrass	<i>Setaria viridis</i>
Green Bristle Grass	<i>Seteria viridus</i>
Balkan Cathfly	<i>Silene csereii</i>
Corn Mustard	<i>Sinapis arvensis</i>
Tall Hedge Mustard	<i>Sisymbrium altissimum</i>
False London Rocket	<i>Sisymbrium loeselii</i>
Field Sow Thistle	<i>Sonchus arvensis</i>
Common Sow-thistle	<i>Sonchus oleraceus</i>
False Spiraea	<i>Sorbaria sorbifolia</i>
Corn Spurrey	<i>Spergula arvensis</i>
Garden Spinach	<i>Spinacia oleracea</i>
Common Starwort	<i>Stellaria media</i>
Common Tansy	<i>Tanacetum vulgare</i>
Red-seeded Dandelion	<i>Taraxacum erythrospermum (T. laevigatum; T. scanicum)</i>
Common Dandelion	<i>Taraxacum officinale</i>
Intermediate Quackgrass	<i>Thinopyrum intermedium</i>
Field Pennycress / Stinkweed	<i>Thlaspi arvense</i>
Yellow Goatsbeard	<i>Tragopogon dubius (major)</i>
Alsike Clover	<i>Trifolium hybridum</i>
Red Clover	<i>Trifolium pratense</i>
White Clover	<i>Trifolium repens</i>



**Table 1: Invasive Species Documented in the NT**

ENGLISH NAME	SCIENTIFIC NAME
Scentless Chamomile (False Mayweed)	<i>Tripleurospermum inodorum</i> ( <i>Tripleurospermum perforata</i> , <i>Atrichia perforata</i> )
Bread Wheat	<i>Triticum aestivum</i>
Long-leaf Speedwell	<i>Veronica longifolia</i>
Tufted Vetch (Bird Vetch)	<i>Vicia cracca</i>
Johnny-jump-up	<i>Viola tricolor</i>
Brome Six-weeks Grass	<i>Vulpia bromoides</i>

## 6.0 EFFECTS ASSESSMENT

Given the low traffic volumes anticipated for the all season road and the application of additional mitigation strategies as outlined within this Framework, the extent, magnitude, and certainty of potential effects from invasive species introduction are considered low and reversible.

Overall, the significance of effects from invasive plants is expected to be low. No residual effects are anticipated assuming the appropriate application of mitigation strategies.

## 7.0 CLOSURE

We trust this letter meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,  
Tetra Tech EBA Inc.



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# APPENDIX C

## TETRA TECH EBA'S GENERAL CONDITIONS

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# GENERAL CONDITIONS

## NATURAL SCIENCES

This report incorporates and is subject to these "General Conditions".

### 1.0 USE OF REPORTS AND OWNERSHIP

This report pertains to a specific site, a specific development or activity, and/or a specific scope of work. The report may include plans, drawings, profiles and other supporting documents that collectively constitute the report (the "Report").

The Report is intended for the sole use of Tetra Tech EBA's Client (the "Client") as specifically identified in the Tetra Tech EBA Services Agreement or other Contract entered into with the Client (either of which is termed the "Services Agreement" herein). Tetra Tech EBA does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Report when it is used or relied upon by any party other than the Client, unless authorized in writing by Tetra Tech EBA.

Any unauthorized use of the Report is at the sole risk of the user. Tetra Tech EBA accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Report.

Where Tetra Tech EBA has expressly authorized the use of the Report by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these General Conditions as well as any limitations on liability contained in the Services Agreement with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these General Conditions and the Services Agreement prior to making any use of the Report. Any use made of the Report by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Report and any other form or type of data or documents generated by Tetra Tech EBA during the performance of the work are Tetra Tech EBA's professional work product and shall remain the copyright property of Tetra Tech EBA.

The Report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of Tetra Tech EBA. Additional copies of the Report, if required, may be obtained upon request.

### 2.0 ALTERNATIVE REPORT FORMAT

Where Tetra Tech EBA submits both electronic file and hard copy versions of the Report or any drawings or other project-related documents and deliverables (collectively termed Tetra Tech EBA's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed version archived by Tetra Tech EBA shall be deemed to be the original. Tetra Tech EBA will archive the original signed and/or sealed version for a maximum period of 10 years.

Both electronic file and hard copy versions of Tetra Tech EBA's Instruments of Professional Service shall not, under any circumstances, be altered by any party except Tetra Tech EBA. Tetra Tech EBA's Instruments of Professional Service will be used only and exactly as submitted by Tetra Tech EBA.

Electronic files submitted by Tetra Tech EBA have been prepared and submitted using specific software and hardware systems.

Tetra Tech EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

### 3.0 STANDARD OF CARE

Services performed by Tetra Tech EBA for the Report have been conducted in accordance with the Services Agreement, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Report.

Tetra Tech EBA professionals are bound by their ethical commitments to act within the bounds of all pertinent regulations. In certain instances, observations by Tetra Tech EBA of regulatory contravention may require that regulatory agencies and other persons be informed. The client agrees that notification to such bodies or persons as required may be done by Tetra Tech EBA in its reasonably exercised discretion.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of Tetra Tech EBA.

### 4.0 ENVIRONMENTAL ISSUES

The ability to rely upon and generalize from environmental baseline data are dependent on data collection activities occurring within biologically relevant survey windows.

### 5.0 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with Tetra Tech EBA with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for Tetra Tech EBA to properly provide the services contracted for in the Services Agreement, Tetra Tech EBA has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

### 6.0 INFORMATION PROVIDED TO TETRA TECH EBA BY OTHERS

During the performance of the work and the preparation of this Report, Tetra Tech EBA may have relied on information provided by persons other than the Client.

While Tetra Tech EBA endeavours to verify the accuracy of such information, Tetra Tech EBA accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

## 7.0 GENERAL LIMITATIONS OF REPORT

This Report is based solely on the conditions present and the data available to Tetra Tech EBA at the time the data were collected in the field or gathered from publically available databases.

The Client, and any Authorized Party, acknowledges that the Report is based on limited data and that the conclusions, opinions, and recommendations contained in the Report are the result of the application of professional judgment to such limited data.

The Report is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present at or the development proposed as of the date of the Report requires a supplementary investigation and assessment.

It is incumbent upon the Client and any Authorized Party, to be knowledgeable of the level of risk that has been incorporated into the project design or scope, in consideration of the level of the environmental baseline information that was reasonably acquired to facilitate completion of the scope.

The Client acknowledges that Tetra Tech EBA is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of property, the decisions on which are the sole responsibility of the Client.

## 8.0 JOB SITE SAFETY

Tetra Tech EBA is only responsible for the activities of its employees on the job site and was not and will not be responsible for the supervision of any other persons whatsoever. The presence of Tetra Tech EBA personnel on site shall not be construed in any way to relieve the Client or any other persons on site from their responsibility for job site safety.