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**PARKS CANADA AGENCY'S
CLOSING ARGUMENTS TO THE
MACKENZIE VALLEY ENVIRONMENTAL IMPACT
REVIEW BOARD**

**RESPECTING
THE PRAIRIE CREEK ALL SEASON ROAD
PROPOSED BY THE
CANADIAN ZINC CORPORATION**

MAY 26, 2017

Parks Canada (PC) is pleased to provide its closing arguments to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) for the Prairie Creek All Season Road Project Environmental Assessment (EA 1415-01). These closing arguments have been developed after reviewing and assessing the evidence and information provided during all phases of the Environmental Assessment (EA) against the Terms of Reference and Parks Canada's legislative and policy requirements. Parks Canada serves in this EA as both an expert advisor and a responsible minister (regulator) for the portion of the proposed all season road within Nahanni National Park Reserve (NNPR).

On March 10, 2017 PC provided recommendations to the MVEIRB on a number of outstanding issues through a technical report (Public Registry #452). At the public hearings in Fort Simpson PC spoke to a number of these issues in consideration of CZN's April 7th, 2017 response to PC's technical report (PRD#484).

PC's closing arguments consider the issues presented at the April, 2017 Public Hearings in Fort Simpson, and the most recent Commitments Table provided on the public registry (PRD#485).

Parks Canada's role in protecting fish and fish habitat

During day 2 of the final hearings the MVEIRB legal counsel asked DFO a question regarding DFO's responsibility within Nahanni National Park Reserve to deal with serious harm to fish and damage and destruction of fish habitat. DFO indicated that it is their role to issue a Fisheries Act Authorization within the park and that they work closely in collaboration with PC (PRD#525, page 149)

PC agrees with DFO that it is their responsibility to issue a Fisheries Act Authorization however we would like to make it clear to the MVEIRB that within Nahanni National Park Reserve, PC also has a legal and regulatory obligation to protect fish and fish habitat. This legal requirement is outlined in the regulatory authorities provided to PC through the *Canada National Parks Act*. Examples of relevant authorities include: Section 10 of the *National Parks General Regulations* which prohibits removal, defacing, damaging or destroying of any flora; and section 4(1) of the *National Parks Wildlife Regulations* which prohibits hunting, disturbing, holding in captivity, destroying or removal of any wildlife, including fish.

PC works collaboratively with DFO with respect to our shared mandates for the protection of fish and fish habitat within national parks.

Parks Canada's Role under Section 79 of the SARA

During the Final Hearings, the MVEIRB requested clarification regarding Parks Canada's role under section 79 of the *Species at Risk Act*¹. It is PC's understanding that in the case of the CZN All Season Road EA, the term "person" in section 79 (1) of the SARA refers to both the MVEIRB as well as each MVRMA decision maker, which includes both the federal minister (Minister of Indigenous and Northern Affairs) and the responsible ministers as defined in subsection 111(1) of the MVRMA. As a result, the section 79 SARA duties are shared between the "persons" which includes PC.

Parks Canada's Closing Arguments

Parks Canada views the MVEIRB EA process and the Parks Canada regulatory process as complimentary. The MVEIRB provides an opportunity for an independent evaluation of environment effects, involvement of Indigenous people in the decision-making², and a transparent process facilitating public involvement. Through the MVEIRB's decisions, the residents of the Mackenzie Valley can rest assured that the projects in the Mackenzie Valley will not cause significant adverse environmental effects. In order to assure this, section 128(1)(b)(ii) of the MVRMA states:

"On completing an environmental assessment of a proposal for a development, the Review Board shall, where the development is likely in its opinion to have a significant adverse impact on the environment, recommend that the approval of the proposal be made subject to the imposition of such measures as it considers necessary to prevent the significant adverse impact"

Parks Canada's regulatory process implements the MVEIRB's decisions and measures through authorizations. In this way, the MVEIRB, Parks Canada, Indigenous groups and residents of the

¹ *Species at Risk Act*

79 (1) Every person who is required by or under an Act of Parliament to ensure that an assessment of the environmental effects of a project is conducted, and every authority who makes a determination under paragraph 67(a) or (b) of the [Canadian Environmental Assessment Act, 2012](#) in relation to a project, must, without delay, notify the competent minister or ministers in writing of the project if it is likely to affect a listed wildlife species or its critical habitat.

(2) The person must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans.

(3) The following definitions apply in this section.

person includes an association, an organization, a federal authority as defined in subsection 2(1) of the [Canadian Environmental Assessment Act, 2012](#), and any body that is set out in Schedule 3 to that Act. (*personne*)

² Mackenzie Valley Environmental Impact Review Board. March 2004. Environmental Impact Assessment Guidelines, section 1

Mackenzie Valley work together through the EA and regulatory process to ensure projects do not have significant adverse impacts on the environment and in doing so ensuring the protection of ecological integrity of national parks.

In this EA process PC found that the lack of baseline information resulted in recommended measures that were seeking information rather than focusing on mitigating effects. Several of our outstanding issues outlined below pertain to baseline data collection. In our September 30, 2017 letter to the MVEIRB (PRD #308), PC identified that there were specific baseline information requirements for EA1415-01 that had not been met and which were necessary for a full examination of the potential for significant adverse impacts. We identified that these outstanding requirements for birds (forest birds, waterfowl, migratory birds and avian species at risk), Collared Pika, and vegetation were the responsibility of the proponent, as per the Terms of Reference for the Developer's Assessment Report. This baseline information has not been provided to date and is still necessary for a determination of significant adverse effects, which we detail in the following closing arguments.

These closing arguments provide PC's recommendations to the MVEIRB in support of the MVEIRB fulfilling their role in ensuring the proposed development will not have significant adverse impacts on the environment.

The following sections reflect the issue numbering used within PC's technical report.

ISSUE 2: Magnitude of impacts to the Northern Mountain Population of Woodland Caribou

There are potential significant adverse impacts arising from the proposed project to Northern Mountain Caribou, a population of Special Concern on Schedule 1 of the *Species at Risk Act* (SARA). Examples of potential significant adverse impacts to Northern Mountain Caribou are outlined in PC's technical report (PRD #452, page 14). Supporting evidence for the characteristics and likelihood of these impacts is provided by a body of scientific literature demonstrating the adverse impacts of human infrastructure such as resource roads on woodland caribou (For example, on the Public Registry: PRD #430, 429, 434, 435, 436, 441). Please note that our technical report incorrectly identified this caribou population as COSEWIC listed only (Special Concern). Section 79 of the SARA requires us to identify adverse effects of projects on the species, ensure that measures are taken avoid/lessen effects, and to monitor them.

CZN has indicated that the potential for disturbance related effects on the Northern Mountain Population of Woodland Caribou is low because the project area is "outside the defined species range," and "well outside known calving and wintering areas" for Northern Mountain caribou (PRD #102).

PC disagrees with CZN's conclusion and characterization of the baseline data on Northern Mountain Caribou in the project area. CZN's assertions that the project area is outside the defined species range is based on incorrect and outdated information which does not take data from PC's ongoing collaring project into account. 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, as well as the recent satellite collar data confirm caribou in the project area and their year-round presence. The DAR also states that the project area is "well outside known calving and wintering areas" for caribou; however, there is reference to multiple observations of caribou calves in the mine camp logs, including one calf reported as early as 01 June (DAR Addendum, Appendix E). The conclusion in DAR Addendum, Appendix E, that potential disturbance related effects on the Northern Mountain Population of Woodland Caribou are low is inconsistent with information provided in the submission. Section 7.3 cites several references showing that caribou avoid roads, and active roads to a greater extent than inactive ones (ex. Dyer *et al* 2002, Polfus *et al* 2011, Oberg 2001). 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 an impact.

From PC's perspective, the use of the project area by caribou is considered important. Based on the preliminary results of PC's collaring of 18 female caribou in the vicinity of the project area, the majority of these animals spend part of the year in the Prairie Creek valley, and migrate northwest in summer. 3 of these caribou (17% of the collared animals) spent the entire year in close proximity to the project area including crossing of the proposed road. The movement patterns of two collared individuals in the Sundog Lake area supports the idea that they may comprise a small, sedentary population. Within the project area, the Sundog Lake drainage has previously been characterized as having the highest likelihood of caribou-vehicle conflict in the winter, in addition to the Mackenzie Mountains near the mine site (PRD #97). The more recent finding of year-round caribou occupancy in the Sundog Lake area points to a higher likelihood of significant adverse impacts. There has never been a census completed for Northern Mountain Caribou in the study area; therefore it is unknown at this time how many caribou are part of the sedentary and migratory groups that reside in or seasonally use the study area. The TOR asks for effects on local populations to be identified, and caribou using habitat in the project area comprise such a local population, particularly sedentary animals in the vicinity of the project year-round.

PC provided both the raw collaring data as well as our preliminary analysis to CZN in March 2017. Differences in the analysis of the raw data undertaken by CZN have resulted in a somewhat difference interpretation of the data. PC notes that the main difference between CZN and PC's respective kernel density maps is that group size (ie. the number of caribou in the group that the collared individual was with at the time of collaring) has been used to weight the data in the CZN maps. PC did not weight the data using group size, as this information cannot be directly correlated with the population size and intensity of habitat use, particularly in seasons outside of the winter animals were collared in. CZN's conclusion that "caribou concentrations are in discrete areas to the north and west of the proposed access road" (PRD #539) disregards data showing year round occupancy of the Sundog Lake drainage by caribou, albeit an unknown number. For example, our data show that collared female PC15-08 has a small home range (573 km²) centered around the proposed all season road alignment, which she crossed 6 times between December 2015 and December 2016 (PRD # 472).

CZN has proposed various mitigations to protect Mountain Caribou (commitments # 164, 165, 166, 192, 199, 203). PC is pleased that CZN has made commitments to prevent adverse impacts to Northern Mountain Caribou; however, formal commitments to date do not address the need for systematic long-term monitoring of Northern Mountain caribou with an adaptive management framework as outlined in measure 2 of PC's Technical Report. This is essential to ensure that mitigations are effective at preventing significant adverse impacts to caribou, to address impacts detected by monitoring, and to satisfy our SARA s. 79 responsibilities.

Unless CZN updates their Commitments Table to include our requested measure 2, **PC submits that the Board should recommend PC's measure 2 (as outlined in PC's technical report) in their Report of Environmental Assessment in order to prevent potential significant adverse impacts to Northern Mountain Caribou.**

Measure 2 will manage project effects through the Wildlife Mitigations Plan (WMP). It is expected that the WMP will outline the caribou monitoring plan and will identify a suite of mitigations (including thresholds and triggers) that will be implemented given the monitoring results. The WMP will be reviewed and approved by PC as a condition of a permit. It is expected that the adaptive management framework outlined in the WMP will be activated through an annual review of monitoring results within an annual report.

PC believes that potential significant adverse impacts to Northern Mountain Caribou can be mitigated through the implementation of this measure and all commitments.

ISSUE 3: Baseline requirements, effects assessment and monitoring of potential impacts to Collared Pika

There are potential significant adverse impacts from the proposed project to Collared Pika, which is a Species of Special Concern on Schedule 1 of the SARA. Examples of potential significant adverse impacts to Collared Pika are outlined in PC's technical report (PRD #452, page 18).

Currently there is insufficient information on baseline distribution and abundance of pika in the study area for PC to determine the likelihood of significant adverse impacts resulting from the proposed project.

CZN has concluded that the potential for significant adverse effects on Collared Pika is low (PRD # 484). However, CZN has made a number of commitments with regards to pika (PRD# 485). CZN has committed to conducting presence/not detected surveys for pika between km 12-39 (commitment #176), has identified mitigations specific to pika (commitment #179), and committed to long-term monitoring (#198, 2 unnumbered commitments, subtopic "Pika").

PC believes that there is insufficient basis for the Proponent to conclude that there is a low potential for significant adverse effects, due to a lack of baseline information on the distribution and abundance of pika.

Information on the abundance or population size of pika in the study area is necessary for baseline and future monitoring, to meaningfully detect project impacts on the species. CZN's proposed surveys only allow detection of change in distribution and do not provide adequate information to detect changes in population. For example, pika could in theory suffer a 90% decline in population yet still be present, thus presence/absence surveys would not be adequate to detect projects effects. As a result, PC believes this type of survey will not provide adequate baseline information to inform the mitigations and monitoring legally required under SARA.

Based on conversations with CZN, PC's understanding is that CZN has informally committed to conducting Collared Pika surveys that will demonstrate relative abundance of pika, not just presence/absence, with data collection in the summer of 2017.

PC is pleased that CZN has made commitments to prevent adverse impacts to pika; however, formal commitments to date do not address these key concerns: survey methodology, timing of baseline data collection, an updated effects assessment based on complete baseline information, and an adaptive management framework within the Wildlife Mitigation Plan (WMP) to address complete baseline information and impacts detected by monitoring, as outlined in measures 3, 4 and 5 of PC's technical report.

Unless CZN updates their Commitments Table to reflect our requested measures 3, 4 and 5, **PC submits that the Board should recommend PC's measures 3, 4 and 5 (as outlined in PC's technical report) in their Report of Environmental Assessment in order to mitigate potential significant adverse impacts to Collared Pika.**

Measures 4 and 5 will manage project effects through the WMP. It is expected that the WMP will identify a suite of mitigations (including thresholds and triggers) that will be implemented given the updated baseline information and monitoring results. The WMP will be reviewed and approved by PC as a condition of a permit. It is expected that the adaptive management framework outlined in the WMP will be activated through an annual review of monitoring results within an annual report.

PC believes that potential significant adverse impacts to Collared Pika can be mitigated through the implementation of these measures and all commitments.

ISSUE 4: Baseline requirements, effects assessment and monitoring of potential impacts to Forest Birds, Waterfowl, Migratory Birds and Avian Species at Risk

There are potential significant adverse impacts to forest birds, waterfowl and migratory birds, including several SARA-listed species, resulting from the proposed all season road. Examples of potential significant adverse impacts to birds are outlined in PC's letter to the Board (PRD #308, page 4).

Currently there is insufficient baseline information on birds in the study area for PC to determine the likelihood of significant adverse impacts resulting from the proposed project.

CZN has concluded that the potential for significant adverse effects on birds is low (PRD # 484).

PC disagrees with this conclusion and believes that there is insufficient basis for the proponent to conclude there is a low potential for significant adverse effects, due to a lack of baseline information on birds. We note that the baseline data provided does not meet the requirements of the TOR for the all season road EA.

Direct habitat loss and loss of habitat effectiveness could have a significant adverse impact on local populations of bird species and communities in the project area. Specific mitigations to reduce the significance of impacts on individual species may be required depending on the lifecycle and sensitivity of species. For this reason it is essential to have baseline information on bird species present in the project area, as well as their estimated population size and use of habitats within the project area to effectively mitigate significant adverse impacts to birds.

CZN has made a number of commitments with regards to birds (#161, 2 unnumbered commitment, subtopic "Migratory Birds"). In addition, PC is pleased that CZN is working towards the collection of baseline information on birds in May-August 2017 (PRD #518). PC is working with CZN and ECCC in the design of a baseline bird study and will continue to collaborate on the development and implementation of the program.

PC is pleased that CZN has made commitments to prevent adverse impacts to birds; however, formal commitments to date do not address these key concerns: timing of baseline data collection, an updated effects assessment based on complete baseline information, a systematic monitoring program, and an adaptive management framework within the Wildlife Mitigation Plan to address complete baseline information and impacts detected by monitoring, as outlined in measures 6, 7 and 8 within PC's technical report.

Unless CZN updates their Commitments Table to reflect our requested measures 6, 7 and 8, **PC submits that the Board should recommend PC's measures 6, 7 and 8 (as outlined in PC's technical report) in their Report of Environmental Assessment in order to mitigate potential significant adverse impacts to birds.**

Measures 7 and 8 will manage project effects through the Wildlife Mitigation Plan. It is expected that the plan will identify a suite of mitigations (including thresholds and triggers) that will be implemented given the updated baseline information and monitoring results. The plan will be reviewed and approved by PC as a condition of a permit. It is expected that the adaptive management framework outlined in the plan will be activated through an annual review of monitoring results within an annual report.

PC believes that potential significant adverse impacts to birds can be mitigated through the implementation of these measures and all commitments.

ISSUE 5: Baseline requirements and effects assessment of vegetation

There are potential significant adverse impacts from the proposed project to vegetation. Examples of potential significant adverse impacts to vegetation are outlined in PC's technical report (PRD #452, page 26).

Currently there is insufficient information on vegetation (rare plants) in the study area for PC to determine the likelihood of significant adverse impacts resulting from the proposed project.

CZN has concluded that the potential for significant adverse effects on vegetation is low (PRD # 484). However, CZN recognizes that there are gaps in the baseline data and has committed to completing a pre-construction early season (spring) rare plant survey for the all season road footprint, and to developing a Rare Plant Management Plan (PRD #485, commitment #147).

PC believes that there is insufficient basis for the proponent to conclude that there is a low potential for significant adverse effects, due to a lack of baseline information on vegetation, specifically rare plants.

Due to the rare terrain types (e.g., karst, glacial refugia) in the project area, there is a higher potential for rare, valued and protected plants. As a result, there is a need to conduct fine-scale field assessments in representative habitats and high priority areas for rare, valued and protected plants.

Based on conversations with CZN, PC's understanding is that CZN will be conducting a spring rare plant survey in 2017. PC has offered support for this survey.

PC is pleased that CZN is working towards addressing baseline data gaps and mitigating adverse impacts to vegetation; however, formal commitments to date do not address these key concerns: survey methodology, timing of baseline data collection, an updated effects assessment based on complete baseline information, and an adaptive management framework within the Rare Plant Management Plan (RPMP) to address complete baseline information, as outlined in measures 9 and 10 of PC's technical submission.

PC notes that the Rare Plant Management Plan was not included in CZN's table of monitoring and management plans (Hearing Undertaking 10, PRD# 539).

Unless CZN updates their Commitments Table to reflect our requested measures 9 and 10, PC submits that the Board should recommend PC's measures 9 and 10 (as outlined in PC's technical report) in their Report of Environmental Assessment in order to mitigate potential significant adverse impacts to vegetation.

Canadian Zinc has committed to developing a Rare Plant Management Plan (RPMP). Measure 10 will manage project effects through the RPMP. It is expected that the RPMP will identify a suite of mitigations (including thresholds and triggers) that will be implemented given the updated baseline information. The RPMP will be reviewed and approved by PC as a condition of a permit.

PC believes that potential significant adverse impacts to vegetation can be mitigated through the implementation of these measures and all commitments.

ISSUE 6: Baseline requirements for archaeological impact assessment including traditional knowledge

The proponent has provided commitments reflecting PC's recommended measures 11 and 12 outlined in PC's technical report and concerning cultural resources. Currently these commitments do not have a number associated with them however they are listed in the Commitments Table under the subtopics of "Archaeological Surveys" and "Archaeological resource protection" (PRD#485). With these commitments in place, PC is confident that any impacts to heritage resources as a result of the proposed project will not be significant.

ISSUE 7: Confidence in the hydraulic model of flow in the Sundog Creek realignment

Within the Commitments Table (PRD#485), the proponent has provided the following commitment with regards to the modeling of hydraulic flow in Sundog Creek:

- Hydraulic modelling of the Sundog realignment will be refined during detailed design considering the hydraulic model results for the preliminary design as well as comments by others, and updated hydraulic model results will be provided. The final design will be subject to field modification to accommodate selective use and placement of larger size alluvium materials as may be encountered during construction.

PC is in agreement with CZN on their approach to refine the modelling during the detailed design.

ISSUE 8: Water withdrawal for dust control

The proposed all season road will require dust control measures involving the withdrawal of water from local water bodies. Water withdrawal has the potential to impact water levels which could affect the aquatic ecosystem, the riparian zone, and species that depend on it.

Without recharge rate volumes, PC is unable to determine if there will be significant adverse impacts over the long-term from water withdrawals. CZN has not provided any data on recharge rates for the lakes in question, and to add to this uncertainty, future years may be complicated by climate change. This will impact precipitation and evaporation rates, and hydrological processes associated with the warming of permafrost.

Measures 14 and 15 of PC's technical report recommend the installation of water gauges allowing the proponent to monitor lake levels with regards to predetermined lake level

thresholds, results from this monitoring would then feed into an adaptive management approach should the assumptions regarding recharge not be correct.

Unless CZN updates their Commitments Table to reflect our requested measures 14 and 15, **PC submits that the Board should recommend PC's measures 14 and 15 (as outlined in PC's technical report) in their Report of Environmental Assessment in order to prevent potentially significant adverse cumulative impacts from water withdrawal to the aquatic ecosystem, the riparian zone, and species that depend on it.**

Canadian Zinc has committed to developing an Aquatic Effects Management and Monitoring Plan (AEMMP). Measures 14 and 15 will manage project effects through the AEMMP. It is expected that the AEMMP will identify a suite of mitigations (including thresholds and triggers) that will be implemented given updated monitoring information. The AEMMP will be reviewed and approved by PC as a condition of a permit.

PC believes that potential significant cumulative adverse impacts from water withdrawal can be mitigated through the implementation of these measures and all commitments.

ISSUE 9: Water quality monitoring

There is potential for reductions in water quality where the project is in proximity to waterbodies from modified/alterd surface and groundwater flows leading to channel modifications, increased susceptibility to erosion, siltation, and detrition of vegetation and habitat for fish and other wildlife. PC's technical report recommends the development of both a short and long term surface water quality monitoring program including some of the details expected within these programs. The purpose of these proposed monitoring programs is to ensure changes to water quality are identified and mitigations are put in place in a timely fashion so as to avoid or reduce potential significant adverse impacts.

Within the Commitments Table (PRD#485) CZN has outlined the following commitments related to water quality monitoring:

- Comprehensive Project monitoring of TSS and turbidity will be completed and mitigation adjusted if needed.
- CZN shall develop a detailed program to monitor the short-term effects of construction on surface water quality.
- CZN will develop a detailed long-term (i.e., multi-year) program to monitor water quality at a subset of road crossing sites (both upstream and downstream), at water bodies (e.g., lakes and wetlands) located adjacent to the road. This program will require a reduced sampling effort (i.e., frequency) compared to the short term program. Sampling intervals will be spring freshet and after significant summer storms.

PC is pleased to see that CZN has committed to monitor water quality through both short and long term monitoring programs, however, the current commitments do not indicate whether

these programs will occur at the Sundog Creek realignment. Specifically, CZN states in their response to PC's technical report (PRD#484) that "The realigned Sundog Creek should not require long-term monitoring for water quality since after the initial short-term adjustment period, realignment behavior will be natural and the same as other parts of the creek." PC believes that the re-alignment of Sundog Creek is a significant undertaking within the ecosystem. The proponent assumes the system will behave the same as other parts of the creek, and that monitoring for long-term stability and hydraulic performance will be sufficient to detect issues with the realignment. However, without long term monitoring of ecologically meaningful parameters such as turbidity and TSS, they will not know if this assumption is correct. PC continues to recommend that both short and long term monitoring of Sundog Creek be required with programs designed to detect changes in water quality and adaptive management to avoid or reduce impacts.

PC also notes that baseline analysis of turbidity and TSS should be completed prior to and during construction so that the site specific relationship between turbidity and TSS can be validated.

Unless CZN updates their Commitments Table to reflect our requested measures 17 and 18, specifically including the Sundog Creek realignment, **PC submits that the Board recommend PC's measures 17 and 18 (as outlined in PC's technical report) in their Report of Environmental Assessment in order to prevent potentially significant adverse effects to water quality.**

Canadian Zinc has committed to developing an Aquatic Effects Management and Monitoring Plan (AEMMP). Measures 17 and 18 will manage project effects through the AEMMP. It is expected that the AEMMP will outline the details of the short and long term water quality monitoring programs (including thresholds and triggers). The AEMMP will be reviewed and approved by PC as a condition of a permit. It is expected that the adaptive management framework outlined in the plan will be activated through an annual review of monitoring results within an annual report.

PC believes that potential significant adverse effects to water quality can be mitigated through the implementation of these measures and all commitments.

ISSUE 10: Short term loss of habitat (Macroinvertebrates)

CZN's proposed realignment of a section of Sundog Creek will result in temporary impacts to the benthic community that various taxa, including fish, forage on. CZN indicates that the magnitude of these impacts is low. PC disagrees with this conclusion and believes there is uncertainty regarding the duration, magnitude, reversibility and therefore significance of these impacts over the short term.

Rerouting and training of the stream channel in Sundog Creek will impact the composition and abundance of the benthic macroinvertebrate community. Recovery of the benthic

macroinvertebrate community composition in the realigned section of Sundog Creek to a condition reflecting the upstream non-disturbed area may take multiple years (rationale outlined in PC's technical report, pages 37 and 38).

PC's technical report recommends that CZN develop a program to monitor the duration of reductions in the ecological performance of the realigned section of Sundog Creek using benthic macroinvertebrates as a biological indicator. This would include an adaptive management plan to address any adverse impacts.

CZN, through Hatfield has indicated that the utility of the study proposed by PC is low, while the cost is unreasonably high. Their opinion is based on a number of empirical factors:

- Anticipated low abundance of benthic invertebrates within the diversion area
- The small relative area
- The low importance of benthic drift to downstream fish populations

Currently, the proponent has provided no data to demonstrate the benthic community. It is not uncommon for these system to have a low abundance of benthic invertebrates; however, that does not reduce the role this community has in this system. Benthic communities are a key link in the energy transfer in these systems, and although the proponent indicated that this system is oligotrophic, it does not make this link any less important.

Though the proponent has characterised the realignment as a relatively small area, PC still believes that it is a significant undertaking within the system especially considering the proposed fish habitat offset in the area.

PC submits that the MVEIRB recommend PC's measures 19, 20 and 21 (as outlined in PC's technical report) in their Report of Environmental Assessment in order to prevent potentially significant adverse effects to the benthic community in the rerouted section of Sundog Creek.

Canadian Zinc has committed to developing an Aquatic Effects Management and Monitoring Plan (AEMMP). Measures 19, 20 and 21 will manage project effects through the AEMMP. It is expected that the AEMMP will outline the details of the monitoring program (including thresholds and triggers). The AEMMP will be reviewed and approved by PC as a condition of a permit. It is expected that the adaptive management framework outlined in the plan will be activated through an annual review of monitoring results within an annual report.

PC believes that potential significant adverse effects of the realignment of Sundog Creek on the benthic community can be mitigated through the implementation of these measures and all commitments.

ISSUE 11: Management of grey water and sewage at construction camps

The management of grey water and sewage associated with construction camps has the potential to effect local surface water and shallow ground water through the release of nutrients, pathogens, heavy metals and pharmaceutical compounds.

Within our Technical Report PC provided a number of recommendations for the management of both grey water and sewage at construction camps within NNPR (measures 22, 23, 24 and 25)

Within the Commitments Table (PRD#485) CZN has outlined the following commitments related to the management of grey water and sewage:

Grey Water

All grey water within NNPR will be managed through a septic system as outlined in the Yukon Government's Standards and Guidelines. This will include the simple filtration of grey water to remove any solid material prior to disposal into the environment.

CZN will provide a grey water management plan for the development, management and decommissioning of all grey water septic systems within NNPR. This plan must be approved by PC prior to construction, and will include:

- a design of the grey water septic system being proposed,
- the soil stratification for all proposed locations,
- the depth of the water table,
- the distance to nearest water course/ water body and potable water source.

All camps of a temporary nature (with a wastewater system that serves a non-permanent population) will have a closure plan submitted as part of preliminary design. The closure plan will detail how the treatment works will be decommissioned upon camp closure.

Sewage

If CZN chooses to treat brown water (sewage) for camps at km 65 and 87 within NNPR rather than at an approved off site location, a sewage management plan will be completed prior to construction for the development, management, decommissioning and closure of the proposed sewage treatment systems at each site. This plan will include:

- a design of the sewage treatment system being proposed in accordance with accepted standards and guidelines,
- in the case of a septic system, a soil stratification for all proposed locations,
- the depth of the water table,
- the distance to nearest water course/ water body and potable water source.

In addition to these commitments, in response to the PC's technical report (PRD#484), CZN provided the qualification "that the treatment of grey water is by simple filtration prior to disposal".

PC would like to indicate to the MVEIRB that we do not accept this qualification. According to the Yukon Government's Guidelines for Grey Water Disposal³, grey water will be treated and disposed of through a septic tank and disposal field (Septic System).

In terms of sewage disposal, in response to the PC's technical report (PRD#484), CZN has indicated that they will either store brown water for off-site disposal, or treat it on-site in a suitable treatment plant, with effluent disposal via a soak-away.

PC would like to indicate to the MVEIRB that we will not accept a "soak-away" for effluent disposal. If disposal of treated effluent from an on-site wastewater treatment system is the proponent's desired approach, then disposal to ground shall be via a properly designed effluent disposal field as per the Yukon Government's Guidelines for Sewage Disposal⁴.

ISSUE 12: Spill contingency and response planning

Within PC's technical report and at the final hearings PC recommended that Spill Contingency and Response Plans be informed by an updated risk assessment, as well as updated road design and operation plans. PC also recommended that the Spill Contingency and Response Plans address each phase of the project, including: construction, operations, and closure.

In response to PC's technical report (PRD# 484) CZN agreed with PC's recommendation to update the Spill Contingency and Response Plans based on the updated road design and operations plans for the road. CZN's position was re-affirmed during the public hearing (PRD# 524, page 95, line 9 -11).

During the public hearing, PC questioned CZN on the road characteristics about km 23.5 to 28.1 and the apparent inconsistencies in its description in the various documents (PRD# 524, page 94, line 10-23). Based on CZN's response during the public hearing, PC's statement regarding road characteristics for road section km 23.5 to 28.1 as provided in PC's technical report are correct. Thus, this road section is a high risk location for spills and should be considered as such in the updated risk assessment.

Unless CZN updates their Commitments Table to reflect our requested measure 26, PC submits that the Board recommend PC's measure 26 (as outlined in PC's technical report) in their

³ Yukon Territorial Government (YTG). 2012. *Environmental Health Services Guidelines for Grey Water Disposal at Remote Camps*. Yukon Health and Social Services. Updated June 2016. Available online at: <http://www.hss.gov.yk.ca/pdf/greywaterguidelines.pdf>

⁴ Yukon Territorial Government (YTG). 2016. *Design Specifications for Sewage Disposal Systems*. Yukon Health and Social Services. March 2012. Available online at: http://www.hss.gov.yk.ca/pdf/septic_guide.pdf

Report of Environmental Assessment in order to prevent potentially significant adverse impacts effects to the environment from spills associated with the proposed all season road.

PC believes that significant adverse impacts to the environment from spills associated with the proposed all season road can be mitigated through the implementation of this measure and all commitments.

ISSUE 13: Risk assessment completed to assess consequences of vehicle accidents

Within PC's technical report and at the final hearings PC recommended that the detailed design and operations of the road shall be informed by an updated risk assessment of accidents and malfunctions to mitigate accident occurrence and the associated consequences. Additionally, the risk assessment is to consider all phases of the project: construction, operation and closure; for each phase may give rise to specific risks of accidents and malfunctions.

In response to PC's technical report (PRD# 484, page 21) CZN committed to completing an operational risk assessment on the entire road prior to operations. The objectives of the operational risk assessment were described by CZN during the public hearing (PRD# 524, page 126, line 6-13). CZN described this operational risk assessment as an assessment of the road once it is constructed to identify and further mitigations for spills and accidents that may be controlled through road operations (e.g., speed). This type of risk assessment is not completed during the design phase and does not inform the detailed design of the road.

During the public hearing, PC questioned Oboni if their risk assessment considered the construction and closure phases of the road, or only the operations phase. Oboni's response was that the risk assessment addresses the heavy traffic years (PRD# 524, page 171, line 1-16), ie. the operations phase, not the construction and closure phases of the project. Therefore, risk of accidents and malfunctions has not been fully assessed for the construction and closure phases as was required by the Terms of Reference 7.2.2. PC also notes that the Review Board's adequacy review of the DAR concluded that CZN did not meet the requirements of the Terms of Reference for completion of a risk assessment (PRD# 77, section 7). Thus, CZN's risk assessment as represented in the DAR was inadequate to address the construction and closure phases of the project.

With regards to the timing for updating the risk assessment, Oboni noted that the risk assessment is used to inform decisions on risk of a project from inception to construction, including maintenance (PRD# 524, page 173, line 14-17). Further, Oboni recommended the risk assessment be used as a design support throughout decision-making and throughout the life of the project, as opposed to completing a design and then analyzing the risk (PRD# 524, page 174, line 5-14).

PC submits that the Board recommend PC's measure 27 (as outlined in PC's technical report) in their Report of Environmental Assessment in order to inform spill response, road design and road operation and mitigate accident occurrence and the associated consequences.

Timing of Risk Assessment

CZN has indicated that detailed road design and an updated risk assessment can be completed after permit/licence issuance (e.g., Land Use Permit, Water Licence, etc.), as a condition of the permit/licence. This raises some concerns for PC as a minimum level of design and assurances from an updated risk assessment will be required for PC to consider in permitting, should the project proceed to that phase. Section 6(2) of the *Mackenzie Valley Federal Areas Waters Regulations* outline information requirements for all watercourse crossings. In addition, other recent road projects in the north (Inuvik to Tuktoyaktuk Highway, Baffinland Iron Mines Corporation, Mary River Project) have provided a high level of road design at the permit application stage.

Thus, it is recommended that CZN engage with PC to discuss the expectations with regards to the level of road design and associated risk assessment that shall accompany their application for permits/licences.

Independent Panel

At the public hearing, CZN tabled the option to develop an independent panel to inform the updated risk assessment (PRD# 528, page 243, line 21 to page 244, line 15). PC notes that the Review Board has recommended the creation of an independent panel for other projects in the region to further mitigate against potential impacts⁵. PC is supportive of the approach to develop an independent panel to advise CZN; however, the panel's mandate and roles remain to be defined.

Overall, it is recommended that an independent panel be created to help design the all-season road and the updates to the risk assessment for accidents and malfunctions to further minimize potential significant impacts. **PC submits that the Board recommend a measure to address this mitigation in their Report of Environmental Assessment, as follows:**

CZN shall establish an independent panel to provide an independent review of the updated risk assessment, road design and road operations plans, road closure and reclamation plans, and advise on the permitting/licensing, design, construction, operation and maintenance of the road over the life of the Project, inclusive of the design, construction, operation, closure and post-closure phases. The panel will provide recommendations to CZN to ensure that impacts from the road are minimized and the road is safe. The panel at a minimum will:

- review and provide recommendations for the risk assessment, road design and road operations plans;
- review the road operation, and

⁵ MVEIRB (2016) Report of Environmental Assessment and Reasons for Decision, Dominion Diamond Ekati Corporation Jay Project. EA1314-01.

MVEIRB (2013) Report of Environmental Assessment and Reasons for Decision, Fortune Mineral Limited NICO Project. EA0809-004.

- review the closure design and performance.

CZN will engage with PC and other pertinent stakeholders on the panel composition and tasks. CZN will submit the review panel's terms of reference to PC for review and approval.

The panel is to advise CZN on the project. The panel shall not replace any review and approval process required as part of the licensing/permitting of the project. The panel cannot create any new legal powers or duties and cannot alter the power and duties established by the *National Parks Act* and other relevant Acts. Thus, the Panel does not approve any plans that may be requirements of CZN permits/licenses/authorizations. The panel is also not responsible for the design, management or supervision of the Project or any activities related to the Project.

ISSUE 14: Permafrost considerations - Borrow Pits

There are potential significant adverse impacts from the proposed project to permafrost in borrow pit locations. Examples of potential significant adverse impacts include permafrost degradation and thaw settlement resulting from the thermal disturbance of the borrow pit construction and operations.

In our technical report PC outlined a number of recommendations including (PRD # 452, measures 28-30).

It is PC's understanding that CZN has agreed to these recommendations and that each borrow source management plan will include the specific details for permafrost monitoring and follow-up actions. Referring to PC's measures 28-30, CZN indicated that "PC's recommendations will be addressed by the planned geotechnical and permafrost investigations" (PRD # 484, pg. 23). In addition, CZN unnumbered commitment (PRD# 485 Topic "Permafrost", Subtopic "Investigations") addresses some aspects of these measures.

Unless the Commitments Table is updated to reflect what was outlined in the final hearings with regards to permafrost in borrow pit locations, **PC submits that the Board should recommend PC's measures 28, 29, and 30 (as outlined in PC's technical report) in their Report of Environmental Assessment in order to mitigate potential significant adverse impacts to permafrost in borrow pit locations.**

Measures 28-30 will manage project effects through Borrow Source Management Plans. It is expected that each Borrow Source Management Plan will identify a suite of mitigations (including thresholds and triggers) that will be implemented given the updated baseline information from geotechnical investigations and monitoring results. The Borrow Source Management Plans will be reviewed and approved by PC as a condition of a permit

PC believes that significant adverse impacts to permafrost in borrow pit locations can be mitigated through the implementation of these measures and all commitments.

ISSUE 15: Permafrost considerations - All Season Road

There are potential significant adverse impacts from the proposed project to permafrost along the all-season road alignment. Examples of potential significant adverse impacts include permafrost degradation and thaw settlement resulting from the thermal disturbance associated with road construction.

In locations where permafrost disturbance/change may occur, appropriate mitigations should be factored into the road design to limit the potential for adverse effects during construction, operation and closure phases of the road. Further, to mitigate against the potential for permafrost degradation, appropriate monitoring and response action planning is required. To prevent potential significant adverse impacts from the all-season road through proper permafrost management and monitoring, PC recommended measures 31 and 32 (PRD # 452).

It is PC's understanding that CZN has agreed to these recommendations. Specific to road design, CZN has indicated that "in essence, we are in agreement with the recommendation, but with the clarification that detailed design will occur after permit issue. Review and approval before construction would be a condition of the permit" (PRD #484). Please refer to the "Timing of Risk Assessment" section in Issue 13 above for PC's concerns related to this proposed timing for detailed design.

Specific to permafrost monitoring, CZN has stated this will occur during the geotechnical investigations that are completed to inform road design (PRD# 524, page 99, line 13 to page 100, line 10), construction (PRD# 524, page 101, line 11-24) and operations (PRD# 524, page 104, line 4-13), as per PC's recommendations.

Unless the final Commitments Table is updated to reflect what was outlined in the final hearings with regards to permafrost monitoring, **PC submits that the Board should recommend PC's measures 31 and 32 (as outlined in PC's technical report) in their Report of Environmental Assessment in order to mitigate potential significant adverse impacts to permafrost in locations along the all-season road alignment.**

CZN committed to complete a draft Permafrost Monitoring and Response Action Plan "after detailed design and before construction, with plan review and update within 12 months of the completion of construction (PRD # unnumbered commitment, Topic "Permafrost", Subtopic "Monitoring). However, a permafrost monitoring plan for operations would be different than the permafrost monitoring that may result from the geotechnical investigations and construction. Therefore, PC recommends that the permafrost monitoring completed with the geotechnical investigations, that supports road design, be included in the road design report. It is recommended that the road design report also document the permafrost monitoring required during construction. It is expected that the Permafrost Monitoring and Response Action Plan will identify a suite of mitigations (including thresholds and triggers) that will be implemented given the updated baseline information from geotechnical investigations and monitoring results from the construction phase. The Permafrost Monitoring and Response Action Plan will be reviewed and approved by PC as a condition of a permit. PC notes that

although CZN has committed to preparing this plan, it is not included in CZN's table of monitoring and management plans (Hearing Undertaking 10, PRD# 539).

PC believes that significant adverse impacts to permafrost in locations along the all-season road can be mitigated through the implementation of these measures and all commitments.

ISSUE 16: Restoration of the proposed project

There are potential significant adverse impacts from the proposed project to ecosystems that can be mitigated by proper restoration. Examples of such potential significant adverse impacts include long-term changes in the abundance and composition of plant species and communities as a result of altered biotic and abiotic conditions (drainage, soil conditions) and trajectory of succession within and near the project footprint. These impacts are outlined in PC's technical report (PRD #452, page 53).

CZN has made a number of commitments with regards to restoration (PRD #485, commitment #56, 64, 65, 66, 67, 68, 140, and 153). In their most recent and unnumbered commitment in the table, CZN has committed to:

"...provide a detailed reclamation plan by vegetation / terrain type to demonstrate that ground stabilization and revegetation will be implemented in a timely manner that meets industry accepted best practices. Ripping and roughening of surfaces will be included.

A draft detailed reclamation plan, including monitoring plan, is subject to review and approval by PC prior to construction, with an update after construction.

The reclamation plan will include:

- Detailed information on the short term (beginning during construction and continuing until properly-timed revegetation) and long term (beginning with revegetation and continuing into the post-closure phase) methods and timelines for restoration, including how borrow sources in floodplains will be addressed to ensure that bermed areas are properly reclaimed, that water is prevented from ponding, and that sediment / deleterious substances are prevented from entering watercourses.
- Methods and materials that are consistent with ecological restoration objectives
- Monitoring plan to evaluate the effectiveness of these mitigation and reclamation measures including targets (ex. percent cover) thresholds for adaptive management, and strategies for implementing adaptive management."

PC appreciates that CZN has committed to preparing reclamation plans generally as per PC's recommended measure 33 (PRD# 452). However, PC notes that CZN has indicated in their response to our technical report that restoration will "rely on natural invasion for revegetation supplemented with available local seed and cuttings" (PRD #484, page 24), whereas previous

commitments (#64 and 67) specify natural re-vegetation as the sole method. PC would like to clarify that natural re-vegetation is one type of restoration method however this method will not necessarily be effective for all vegetation/terrain types. It is PC's expectation that restoration methods will follow PC's standards and industry accepted best practices as committed to by CZN, including the use of local seeds and cuttings.

Parks Canada requests that CZN modify past commitments to reflect their more recent commitment that is consistent with PC's measure 33.

Measure 33 will manage project effects through the Road Closure and Reclamation Plan (RCRP). It is expected that the RCRP will identify a suite of mitigations (including thresholds and triggers) that will be implemented given the monitoring results. The RCRP will be reviewed and approved by PC as a condition of a permit. It is expected that the adaptive management framework outlined in the RCRP will be activated through an annual review of monitoring results within an annual report.

PC believes that potential significant adverse impacts to ecosystems can be mitigated through the implementation of this measure and all commitments.