

**EA1415-01 Prairie Creek All Season Road Project**  
**Final List of Undertakings – Technical Session June 13-16, 2016**

<b>Undertaking #</b>	<b>Undertaking</b>
<b>Day 1</b>	
Undertaking #1	CanZinc will identify implications (cost and other) of containing and disposing of brown water offsite (instead of using soak-away sumps).
Undertaking #2	Parks and CanZinc will discuss need for additional assessment of ecosystems that will be disturbed so as to tailor reclamation approaches (and potentially further examination of potentially permanent impacts, e.g. those associated with permafrost degradation) and report to the Board.
Undertaking #3	CanZinc will follow up with DFN in relation to recent changes to project (changes to alignment) and implications for aquatic resources, and report to the Board.
Undertaking #4	CanZinc will provide information (in table form) to correlate the habitat assessments conducted on specific water crossing areas in light of KP changes made recently.
Undertaking #5	GNWT will provide the water sampling program on the Inuvik to Tuk Highway (sampling during highway construction). <ul style="list-style-type: none"> <li>Completed.</li> </ul>
Undertaking #6	DFO will provide report on No Net Loss projects and monitoring statistics.
Undertaking #7	CanZinc, DFO and Parks Canada will communicate on outstanding information requirements and analysis related to fish and fish habitat loss/gain (including locations of blasting, guidelines and management), to enable DFO to reach a determination and inform the board prior to the hearing phase (before technical reports). DFN/LKFN would like to be part of this conversation as well – but not the initial technical aspects.
Undertaking #8	CanZinc, Parks, and ECCC (and possibly GNWT) will meet and report back regarding appropriate water monitoring approaches including: parameters (turbidity, pH, DO and conductivity), frequency, sampling locations and application of an adaptive management approach. <b>CanZinc has agreed to this as a commitment and not an undertaking</b>
Undertaking #9	CanZinc will provide additional information on the removal of water from standing water, including identifying the water bodies, and how a maximum withdrawal of 10% of volume will be determined and over what time period.
Undertaking #10	Parks will provide additional vegetation data for the record.
<b>Day 2</b>	
Undertaking #11	CanZinc will provide a map showing where the road alignment crosses unglaciated areas and describe if and how this information affects predictions of impacts on species at risk and on rare plant assemblages.

Undertakings List - June 28, 2016

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Undertaking #12	CanZinc will provide information on skills and experience available in the communities and show how these align with those required by the project (as listed in the DAR).
Undertaking #13	Review board will post 2009 rare plant report (from MVLWB registry) to the public record for this EA. <ul style="list-style-type: none"> <li>Completed</li> </ul>
Undertaking #14	CanZinc will confirm whether the original effects assessment for the winter road considered loss of habitat and habitat fragmentation for migratory birds and avian species at risk.
Undertaking #15	Parks Canada will provide a written description to CanZinc on its expectations regarding baseline wildlife data collection, effective long-term monitoring, , and adaptive management – and when this information is needed (i.e. during EA, permitting, prior to operations, etc).
Undertaking #16	CanZinc will provide information on areas of sensitive wildlife and vegetation by road segment (including alternative segments and distinct borrow locations) in order to allow a risk assessment to account for these in terms of consequences from a spill. Parks Canada will provide any additional existing and known information to support this undertaking.
Undertaking #17	CanZinc will provide their significance conclusions for each individual wildlife species that is a valued component in this EA.
Undertaking #18	Parks will provide information on what is important with respect to restoring natural drainage patterns at closure and why.
Undertaking #19	CanZinc will calculate missing curvature data for section KP34-39 and provide this information.
Undertaking #20	CanZinc will describe the basis for the engineer's conclusions that the road can be constructed without the use of run-away lanes and/or railings, with reference to sections of the road that have steeper grades, tighter curves, and narrower running surfaces. CanZinc will also provide examples of other resource roads that face similar circumstances and where similar design decisions have been made.
<b>Day 3</b>	
Undertaking #21	CanZinc will provide a map indicating the location of the old winter access road to the old Wolverine airstrip (winter use airstrip).
Undertaking #22	CanZinc will describe its approach to end of winter season demobilization and shutdown of road construction including: when shutdown/demobilization will occur, the conditions that will trigger demobilization, who to consult on making this decision, drainage and surface water management considerations, and the removal of temporary infrastructure and equipment.
Undertaking #23	CanZinc will clarify: i) the exact footprint (in square meters) of the channel that is being lost and potentially degraded by the road in the area of the Sundog Creek realignment.  Suggested addition from Parks Canada: ii) and the detailed methodology that was used to calculate these data. Description of the methodology should include aerial photography

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	showing areas that were deemed to identify: i) areas lost and potentially degraded, ii) floodplain habitat, and iii) vegetated and non-vegetated areas within the floodplain of the Sundog alignment.
Undertaking #24	CanZinc will provide a more detailed version of Table 2 in Allnorth memo (PR# 178) that shows the individual road segments and their contributions to the total estimated area occupying the active floodplain, or within the channel, to better understand and assess habitat lost due to encroachments.
Undertaking #25	CanZinc will provide information on design flow (return period) requirements for major temporary crossing related to the length of time the crossings are expected to be in place.
Undertaking #26	<p>As requested by CanZinc during the Technical Session, this detailed wording has been prepared by Board staff and consultants to clearly outline the information being requested on this topic: Following feedback from CanZinc and discussion with CanZinc and their consultants on June 23 and 24, the undertaking has been revised as follows.</p> <p>CanZinc will provide additional information on the proposed Sundog realignment to describe the existing environment, key characteristics of the proposed diversion that will maintain the natural hydrologic and sediment regime, and outline monitoring, maintenance and mitigation plans. The document will include:</p> <ol style="list-style-type: none"> <li>1. Additional commentary on landslide influences on historic channel position in the reach to be provided.</li> <li>2. The diversion concept has already been provided at a conceptual level, with initial hydraulic analysis to confirm feasibility and annotated images to show alignment. Tetra Tech EBA will assist CZN in providing a preliminary design including details of the proposed diversion berm at the upstream end. We will also provide commentary on our expectations regarding hydraulic performance and sediment movement. The preliminary design will be based on the alignment and LiDAR elevation data as of 2012. We would want to obtain additional channel bed profile and substrate information prior to developing the final design. Our recommendation is for CZN to commit that the final design will be developed to provide hydraulic/sediment capacity equivalent to the existing channel and will mimic the habitat characteristics of the existing channel. The final design will also consider the risks of new</li> </ol>

Undertakings List - June 28, 2016

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	channel avulsion, and any measures required to minimize those risks.
	3. Monitoring/maintenance plans to be described.
Undertaking #27	CanZinc will provide a prioritized list of road crossings, in terms of likelihood of disruption. Hazards could include avulsion, rockfall, avalanche, etc.
Undertaking #28	CanZinc will provide information on how the design and construction of the realignment can minimize sediment impacts during construction and operation phases.
Undertaking #29	CanZinc will provide information on measures to minimize riparian disturbance during culvert and crossing installation and measures to restore riparian zones and areas around crossings.
Undertaking #30	This item was initially identified as an Undertaking, but the questions posed by Board staff and consultants regarding peak flows at crossings were resolved during discussion at the technical session.
Undertaking #31	Combined with Undertaking #29.
Undertaking #32	CanZinc will provide anticipated quantity and timing of sediment accumulation (signed by a qualified professional) related to the Sundog Creek realignment. Based on this information, CanZinc will provide the anticipated frequency, extent, and methods of dredging (and other maintenance activities, including disposal of dredged material), and estimates of impacts on fish, fish habitat, and other aquatic life due to these activities (annually and over life of the project).  If CanZinc determines dredging is not needed in the Sundog realignment, supporting evidence for this conclusion is required.
Undertaking #33	CanZinc will provide the report on its offset project at Casket creek for the record.
Undertaking #34	Parks Canada will provide the Derek Ford report on karsts for the record.
<b>Day 4</b>	
Undertaking #35	ECCC to provide examples of mitigation measures to prevent release of contaminants during transport of lead zinc concentrate along roadways, including references to relevant Red Dog and Pine Point examples.
Undertaking #36	CanZinc will provide detail on assumptions on how effects to people (e.g. traffic and stationary crews) were considered related to geohazards (Table 7.2.2-1 in DAR Appendix 2).
Undertaking #37	Confirm whether road length calibration was completed in preparing Table A1 (PR#187), and if so provide the relevant details.
Undertaking #38	CanZinc to confirm its estimates of maximum potential traffic volume (or range) on the road to considered as part of the scope of this development.
Undertaking #39	CanZinc will provide information on the determination 13 hour cycle time estimated for the return trips

Undertakings List - June 28, 2016

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	from the mine to the Liard transfer facility.
Undertaking #40	CanZinc will provide general information regarding the range of instability conditions (e.g. landslide, rockfall, tension cracks, etc.) that may be encountered along the road and the appropriate mitigations to address them.
Undertaking #41	<p>GNWT Department of Transportation to provide information on the following questions related to the developers use of highway 7:</p> <ul style="list-style-type: none"> <li>• Does GNWT have the information it needs from CanZinc to determine how much work and resources it will take to accommodate the proposed traffic?</li> <li>• How long would it take for the GNWT to make the necessary road improvements to Hw 7 and the Nahanni Butte access road?</li> <li>• Describe how local residents will be impacted by road construction, and over what period of time.</li> <li>• If improvements will occur over multiple years, what traffic volume and gross vehicle weight of haul traffic is appropriate while improvements are being made.</li> <li>• Has the GNWT determined if it will allow the larger payload vehicles (73.2T 9-axle vehicles) for use on the roads? If the larger GVW is approved by GNWT, how would this change the GNWT's schedule and impact to road improvements?</li> </ul>
Undertaking #42	CanZinc to provide return periods for earthquake events of magnitude 4.0 or higher, and how many earthquakes of this magnitude have occurred in the last 10 years.
Undertaking #43	CanZinc to provide return periods for earthquakes of similar magnitude as the 1985 and 1987 events or higher.
Undertaking #44	<p>As requested by CanZinc during the Technical Session, this detailed wording has been prepared by Board staff and consultants to clearly outline the information being requested on this topic: Following feedback from CanZinc and discussion with CanZinc and their consultants on June 23 and 24, the undertaking has been revised as follows.</p> <p>The historic air photo interpretation identified slope displacements in areas of natural terrain along the road alignment. These areas are generally denoted on the terrain stability maps as 'slide blocks'. The areas are also defined by the mapped presence of tension cracks. These areas have been mapped between the following changes:</p> <p>Km 40.5 to 41.5 Km 69.25 to 70.25 Km 83.75 to 85</p>

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	<p data-bbox="436 233 1039 331"> Km 97.75 to 99.25  Km 104 to 106 (preferred alternate alignment)  Km108 to 109.5 (preferred alternate alignment) </p> <p data-bbox="436 370 1738 602"> The interpretation of these areas to date is based on a review of several years of historic air photos. Different mechanisms of instability are inferred for the various areas. In some areas the instability is inferred to be within glaciofluvial deposits, whereas in others, it is inferred that the displacements occurred within the bedrock. The presence of permafrost and the degradation of permafrost may be significant factors in explaining the ground displacements in these areas. The historic air photo interpretation identified recent displacements on the 1994 air photos at Km 69.5 to 70.25, as well as at Km 104 to 106 and Km 108 to 109 of the preferred alternate alignment. </p> <p data-bbox="436 641 1738 911"> It is possible the road could be affected by future displacements of the natural terrain in these areas. It is also possible that the formation of cuts or fills for the proposed all season road could adversely affect terrain stability in the areas of adjacent natural terrain. The potential impacts in this respect are expected to be related to the nature and depth of the instability at each area, which are uncertain at this stage. In addition, the appropriate mitigation solution in these areas could vary, depending on the nature of the instability. It is assumed that these uncertainties and considerations will be fully addressed in the terrain stability assessment process that is to be carried out for areas of 'potentially unstable' and 'unstable' terrain along the alignment as part of the detailed design. </p> <p data-bbox="436 950 1738 1013"> In light of these considerations, the following undertaking is requested in respect of the Environmental Assessment process: </p> <ul data-bbox="485 1019 1738 1403" style="list-style-type: none"> <li>• Ensure all these areas are highlighted as 'potentially unstable' or 'unstable' terrain on the terrain stability maps so they are 'flagged' for future terrain stability assessment.</li> <li>• Review whether the area from Km 69.25 to Km 70.25 can be avoided by re-locating the alignment towards the west and, if not, provide the reasons why not.</li> <li>• Review whether the preferred alternate alignment can be altered between Km 104 and Km 106 to reduce the length that is within the area where recent slide block development was identified on the 1994 air photos and if not, provide the reasons why not.</li> <li>• Review whether the area from Km 108 to Km 109.5 along the preferred alternate alignment can be avoided by re-locating the alignment towards the northeast and, if not, provide the reasons why not.</li> </ul>

Undertakings List - June 28, 2016

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	<ul style="list-style-type: none"> <li>• Provide a range of mitigation options for these areas to account for: <ul style="list-style-type: none"> <li>○ The uncertainties regarding the mechanisms of terrain instability</li> <li>○ The possibility of the road being affected by future displacements of the adjacent natural terrain slopes and the possibility of the formation of cuts or fills for the proposed road causing instability in the adjacent areas of natural terrain.</li> </ul> </li> </ul>
Undertaking #45	CanZinc will provide a list of camp locations/intermediate rescue locations along the road, and a listing of substances and associated quantities that could be stored at these locations during and after construction (to support Oboni Riskope assessment).
Undertaking #46	<p>To understand spill management for areas of very high and high risk levels (as noted in Table 7-3 of the DAR Addendum) and areas of significant karst terrain (approximately 53.6 to 64.5), CanZinc will provide more specific details regarding spill response, mitigations, and clean up including: the reasonable and worst cases for fuel, concentrate, and acid, during winter and summer conditions.</p> <p>For the reasonable and worst-case scenario, please describe:</p> <ol style="list-style-type: none"> <li>a. the volume of spill;</li> <li>b. the assumptions about environmental conditions (e.g., day versus night, weather conditions, interactions with surface water, terrain conditions, etc.);</li> <li>c. the assumptions regarding spill response deployment and equipment;</li> <li>d. the estimated timeline for initial containment to mitigate mobility of the spilled materials.</li> </ol>