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POST-EA INFORMATION PACKAGE INCLUDING AN UPDATED PROJECT DESCRIPTION ALL SEASON ROAD TO PRAIRIE CREEK MINE

APPENDIX 2-1

SUBMITTED IN SUPPORT OF:

Water Licences MV/PC2014L8-0006, and
Land Use Permits MV/PC2014F0013

SUBMITTED TO:

Mackenzie Valley Land and Water Board
Yellowknife, NT X1A 2N7

Parks Canada,
Nahanni National Park Reserve
Fort Simpson, NT X0E 0N0

SUBMITTED BY:

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Vancouver, BC, V6B 4N9

February 2019

APPENDIX 2-1: UPDATED COMMITMENTS TABLE

Acronyms:	TCMMP Traffic Control Mitigation and Management Plan	ROMP Road Operations and Management Plan
	WMMP Wildlife Management and Monitoring Plan	EP Engagement Plan
	RCMP Road Construction Management Plan	WMP Waste Management Plan
	EMP Explosives Management Plan	SCP Spill Contingency Plan
	SECP Sediment and Erosion Control Plan	CLMP Contaminant Loading Management Plan
	PMP Permafrost Management Plan	BPMRP Borrow Pit Management and Reclamation Plan
	RCRP Road Closure and Reclamation Plan	AIA Archaeological Impact Assessment
	ISMP Invasive Species Management Plan	RPMP Rare Plant Management Plan
	ASP Avalanche Safety Plan	SCDP Sundog Creek Diversion Plan
	UPD Updated Project Description	PR Public Registry
	HSERP Health Safety and Emergency Response Plan	
	B Both PC & MVLWB	P Parks Canada
		M MVLWB

ID	Topic	Subtopic	EA Phase	Commitment	Reference	REA Measure, Suggestion	Mgt/Mon Plan	Status	Land Mgr
1	Access control	Check point location	DAR	The security check-point will be moved in summer to a location on the road west of the river crossing.	PR#55 p146	Measure 5.2, Part 2	TCMMP, ROMP	TCMMP Section 7.0 ROMP Section 3.7, Checkpoint at Liard north landing to be installed during construction.	B
2	Access control	Non-mine related vehicles	DAR	Non-mine vehicles, including all-terrain vehicles (ATVs) and snowmobiles will be prohibited on site.	PR#55 p185	Measure 5.2, Part 2	TCMMP, ROMP	TCMMP Section 7.0 ROMP Section 3.7. Checkpoint at Liard north landing to be installed during construction.	B
3	Access Control	Remote camera	Technical Analysis	CZN will consider remote camera use for periods when the (road) checkpoint is not manned. There will be times when traffic is not on the road, at night and during the seasonal spring and fall closure periods when the ice bridge over the Liard River is in either break-up or freeze-up. Trail cameras will be considered on a limited basis for these periods as a check on other road users and caribou occurrence.	PR#370 p5	Measure 5.2, Part 2	TCMMP, ROMP	TCMMP Section 8.0. ROMP Section 3.7. Motion cameras to be installed at checkpoint at Liard north landing during construction. Motion camera's at other locations along the ASR TBD.	B
4	Access control	Reporting	Technical Analysis	CZN will monitor and record non-mining traffic activity on the all-season road, including the establishment of a checkpoint, and report this information annually.	PR#256 p1	Measure 5.2, Part 2	TCMMP	TCMMP Section 8.0 Implemented within the Plan(s)	B
5	Access control	Signage	DAR	Signs will be posted advising road users that the land is the traditional land of the NDDDB, and a request that the road not be used and that no hunting should occur. Signs will also warn of the dangers posed by frequent, heavy mine traffic.	PR#55 p146	Measure 5.2, Part 2	TCMMP, ROMP	TCMMP Sec. 4.1.2, ROMP Sec. 3.9. Signage to be posted at junction ASR/Nahanni Butte Access Road - "Industrial Road – Use at own Risk" and "Entering traditional land of NDDDB - No Hunting".	M

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6	Air Quality	Dust management	DAR	The GNWT (1998) dust suppression guidelines will be implemented at the TTF and along portions of the road located in environments which are more prone to adverse effects from road dust accumulation (e.g. lakes, wetlands), as appropriate, to limit dust generation during the snow free months. Dust management will begin with road surfacing material which is coarse and minimally erodible, where practical. Where dust is problematic, watering will occur as and when required. Vehicles will adhere to speed limits on roads, which will help limit the re-suspension of particulate material.	PR#55 p240		ROMP	Implemented within the Plan(s)	B
7	Air Quality	Dust suppression	DAR	Dust suppression strategies (e.g., water or approved dust suppressant products) will be in accordance with the GNWT dust suppression guidelines.	PR#55 p256		ROMP	ROMP Section 4.5 Implemented within the Plan(s)	B
8	Airstrip operations	Minimum flight altitudes	DAR	Maintain a minimum flight altitude of 600 m except during take-off and landings.	PR#55 p175		WMMP	In the plan	M
9	Airstrip operations	wildlife mitigations	DAR	Develop standard aircraft procedures for flying into and departing from the proposed airstrip to accommodate wildlife, if present on or near the airstrip.	PR#55 p175		WMMP	In the plan	M
10	Community Engagement	Engagement plan	DAR	Future engagement with aboriginal groups and government agencies will continue as described in the Engagement Plan.	PR#55 p159		EP	UPD Section 7	B
11	Community well-being	Access to Nahanni Butte	DAR	CZN will restrict road crews from accessing Nahanni Butte (the only proximal community) by including this requirement in contracts for the work. The only exceptions would be if construction personnel are leaving or arriving at the Nahanni Butte airstrip, in which case they will be required to go directly to and from the airstrip only, and if personnel are invited by, and accompanied by, community members.	PR#100 p74		RCMP		M
12	Concentrate and material transport	Diesel Fuel	Technical Analysis	Diesel fuel will be back-hauled by the concentrate trucks in dedicated tanks, 5,170 L. The tanks will be double-walled, with the capacity of the space between the walls being 110% of the inner tank, or approximately 5,700 L. The tanks will be puncture-resistant.	PR#355 p6		ROMP, SCP	UPD Section 1	B
13	Concentrate and material transport	Sulphuric acid totes	DAR	Containers for sulphuric acid will be totes weighing approximately 1.4 tonnes.	PR#55 p190		SCP		B
14	Concentrate and material transport	Tracking	DAR	Measures for avoiding concentrate dust and potential tracking of concentrate off-site will be adopted (i.e. truck wheel-wash)	PR#55 p139		ROMP, Mine CLMP		B
15	Concentrate and material transport	Transport method	Technical Analysis	CZN would either transport concentrates in bulk using the 'Convey Ore' system, similar to the Red Dog Mine approach, or in bags in a truck box with a lid.	PR#355 p4		ROMP, SCP		B

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16	Contractors	Full qualifications	DAR	CZN will endeavour to ensure that all service providers are fully qualified and responsible to undertake the tasks required prior to issuing contracts.	PR#55 p43			Still the plan but no contracts let yet	B
17	Contractors	Instruction and training	DAR	When hiring contractors, CZN will provide instruction and training, if necessary, to bind all contractors and sub-contractors to corporate policies.	PR#55 p51			Still the plan but no contracts let yet	B
18	Contractors	Terms and conditions	DAR	In order to ensure that its contractors and subcontractors honour and adhere to all commitments made, CZN will ensure, through written contracts, that all such parties are aware and comply with all the terms and conditions that are associated with such permits that are necessary for operations.	PR#55 p43			Still the plan but no contracts let yet	B
19	Cumulative effects monitoring	CIMP	DAR	Monitoring data will be compatible with the NWT Cumulative Impact Monitoring Program, where possible.	PR#55 p283		WMMP	Wildlife baseline and monitoring studies are being developed with Parks Canada, GNWT, and Canadian Wildlife Service, and data compatibility to be considered	B
20	Earthquakes	Pilot vehicle inspection	DAR	If a significant seismic event occurs, it would be prudent for a pilot vehicle to inspect the road before trucks resume travelling on it.	PR#129 p76		ROMP	ROMP Section 5.0 Implemented within the Plan(s)	B
21	Emergency response	Control points	DAR	A Control Point will be established near the mouth of Funeral Creek.	PR#55 p202		SCP		M
22	Emergency response	Control points	DAR	Control Points will be established on two Funeral Creek tributaries at their confluence with the main stem. Similar Control Points will also be established on Sundog Creek in two locations (one just above the main falls and one just before the creek flows onto the fluvial outwash plain), and downstream of the Polje Creek, Tetcela River and Grainger River crossings. An additional control point will be established at the toe of the Silent Hills on the west side since the road section above is considered to have a high risk of a spill.	PR#55 p29		Health, Safety and Emergency Response Plan SCP	Need for control points to mount effective responses to emergency and spill incidents noted these plans	B
28	Emergency response	Emergency equipment	Technical Analysis	We propose to acquire two bladders with a capacity of at least 5,000 L. One would be stationed with a pump at one of the Control Points on an upstream tributary to Funeral Creek. The other bladder would be stored with a pump on the trailer stationed at Cat Camp.	PR#282 p109		SCP	Bladders to be acquired for Spill contingency purposes as noted in the SCP	B
23	Emergency response	Emergency equipment	DAR	A silt or other form of curtain will be stored approximately mid-point between the Mine and Funeral Creek ready for deployment to reduce flow in part of Prairie Creek adjacent to a spill.	PR#55 p202		SCP	Silt curtains/booms to be acquired for Spill contingency purposes as noted in the SCP	M

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24	Emergency response	Emergency equipment	DAR	Equipment at the Control Points will include booms and absorbents in addition to material to create temporary dams, such as board weirs, sand bags and other inert materials that would be stored at the location. Shovels will also be left on site for use in making a dam also. A supply of soda ash will also be kept at Control Points to neutralize an acid spill.	PR#55 p203		SCP	All such equipment and supplies to be acquired and stored in 3 trailers along the ASR for rapid deployment for Spill contingency purposes as noted in the SCP	B
26	Emergency response	Emergency equipment	DAR	A vacuum truck will be on stand-by at the Mine.	PR#55 p204		SCP	Vacuum truck to be acquired and will be on stand-by at the mine for rapid deployment for Spill contingency purposes as noted in the SCP	B
27	Emergency response	Emergency equipment	DAR	CZN has proposed to maintain spill equipment in portable trailers. We will ensure that these or other similar units are heli-portable.	PR#100 p61		SCP	Spill response equipment and supplies to be acquired and stored in 3 trailers along the ASR for rapid deployment for Spill contingency purposes as noted in the SCP	B
29	Emergency response	Emergency protocols	DAR	The tractor/trailer units would provide emergency assistance if mechanical issues or adverse weather conditions occur. In addition, all trucks will have 24 hour communications with road operations and dispatch using either 2 way radio or GPS tracking devices.	PR#101 p45		TCMMP ROMP	TCMMP Section 4.1.3 ROMP Section 3.0 Implemented within the Plan(s)	B
30	Emergency response	Fire prevention training	DAR	Train staff in fire prevention protocols and emergency response procedures.	PR#55 p260		TCMMP ROMP	TCMMP Section 9.0, ROMP Implemented within the Plan(s)	B
31	Emergency response	Incident management system	DAR	For operations, an incident management system will be used to respond to spills.	PR#55 p201		SCP	Incident management system identified in SCP	B
32	Emergency response	Materials management systems	DAR	Appropriate materials management systems will minimize the risk of accidental spills or leakage of concentrate, diesel fuel/ hydrocarbons, and other hazardous materials being shipped to the mine site. This includes ensuring hydrocarbon and chemicals that are hauled along the access road or stored at the TTF are in industry standard containers with appropriate spill containment and management measures in place.	PR#50 p31		RCMP. SCP. WMP	RCMP Section 2.11 Implemented within the Plan(s). UPD Section 1.4.6	B
33	Emergency response	Response teams	DAR	A response team with large equipment will be stationed at the Mine. Another response team will reside at Nahanni Butte.	PR#55 p201		SCP	Response team and large equipment resources identified in SCP	B

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34	Emergency response	Response teams	DAR	For the operating period, the spill response team (at the Mine) will consist of 6 personnel: 1 Supervisor, 1 Safety Watch, and 4 Responders, one of which will be a mechanic.	PR#55 p202		SCP	Response team identified in SCP	B
36	Emergency response	Spill kits	DAR	For operations, comprehensive spill kits will be maintained at the Mine site, Cat Camp, the Tetcela Transfer Facility, Grainger Gap, and the Liard River crossing.	PR#55 p203		SCP	Spill kits to be maintained at the Mine and all maintenance camps as identified in SCP	B
35	Emergency response	Spill kits	DAR	Spill kits will be carried on vehicles with materials appropriate for the loads	PR#55 p203		ROMP TCMMP SCP	ROMP Section 3.8, TCMMP Section 4.2 Implemented within the Plan(s)	B
37	Emergency response	Spill management	DAR	Staff will be trained on the existing spill management plan and procedures to quickly respond to an accidental spill. The plan will include provision for rapid deployment of cleanup crews and for containment and cleanup of spilled material and contaminated surfaces.	PR#55 p185		SCP	Spill response training included in SCP	
38	Emergency response	Spill monitoring program	DAR	In a spill related monitoring program, samples collected for chemistry and benthic community assemblage assessment should include at least one upstream sample (for reference purposes) and multiple downstream samples. All other endpoints would normally include an upstream and downstream sample only. Any spills to Funeral Creek should include an assessment of juvenile occupancy following methodologies developed by Neil Mochnatz, DFO. However, given some spawning bull trout also have to swim past the mine's discharge, it will be important to separate the different effects sources. Consequently, another upstream tributary to Prairie Creek known to host spawning/rearing habitat and previously characterized should be re-assessed concurrently with Funeral Creek. More detail will be provided in the AEMP.	PR#90		SCP Aquatic Effects Monitoring Program	Aquatic monitoring to be conducted as appropriate in relation to spill incidents Juvenile occupancy assessments to be conducted as per the AEMP	B
39	Emergency response	Spill response	DAR	Designated spill control points will occur at key locations along the road, and response materials will be stored at these locations. Trailers stocked with response equipment will also be parked at other locations so that responding crews can hook them up and move them to the spill location.	PR#55 p200		SCP	Spill response equipment and supplies to be acquired and stored in 3 trailers along the ASR for rapid deployment for Spill contingency purposes as noted in the SCP	B
40	Emergency response	Spill response training	DAR	A maintenance crew will be working on the road somewhere between Km 40 and Km 170 (i.e. from Cat Camp to the Nahanni Butte Access Road) and will have spill response training.	PR#55 p201		SCP	Spill response training, response teams included in SCP	B

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41	Employment	Community well-being	DAR	CZN is required to post available employment positions with local Bands, and suitable and available NDDB members have priority. CZN has also committed to give preference to competitive and able consortia with local and northern content for procurement and business opportunities.	PR#55 p147			This is enshrined in existing IBA's	B
42	Engagement	Ongoing engagement	DAR	CZN will continue to engage First Nations throughout the EA process.	PR#55 p159			See UPD Section 7	B
43	Environmental monitoring	General	Technical Analysis	CZN will have local environmental monitors on the all-season road during periods of mine traffic.	PR#355 p16		WMMP	CZN Environmental Monitors are responsible for monitoring throughout construction, operation, and closure. Integral part of EMA, see UPD Sec 7.	B
44	Erosion and sediment control	Minimizing mobilization of sediment	Technical Analysis	CZN commits to implementing erosion and sediment control where construction has the potential to mobilize sediment and result in transport to surface water, and include specific plans for rapid response in the event of an intense precipitation event.	PR#246 p1	Measure 8-1, Part 3: Mitigate Impacts on Water Quality	RCMP. SECP	RCMP, SECP, Section 5.0	B
45	Fish and aquatic habitat, water quality	In-stream works	DAR	All in-stream works will be performed to avoid sensitive life stages of fish. In-stream work will not occur when fish are expected to be spawning. Also, instream work will be avoided if it is predicted that work will result in significant turbidity resulting in the smothering of downstream developing fish embryos. Existing investigations of fish-bearing crossings indicates that only the habitat in the Tetcela River Tributary and Tetcela Main crossing locations occur at a location where bottom substrate is a suitable size for spawning salmonids (i.e., Arctic grayling and whitefish).	PR#90 p13		RCMP. Diversion Design Document (contains BMPs); Fisheries Application	RCMP, Section 5. Detailed designs and construction plans will be included in the fisheries application due at a minimum of several months before construction. Some information was also provided in the draft diversion plan submitted in December, 2018.	B
46	Fish and aquatic habitat, water quality and quantity	Avoid disruption of spawning	DAR	Avoid disruption of the only known spawning location in the area (bull trout in Funeral Creek) during the spawning period (mid-August);	PR#55 p246		Fisheries Application	Detailed designs and construction plans will be included in the fisheries application due at a minimum of several months before construction.	M

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48	Fish and aquatic habitat, water quality and quantity	Blasting	Technical Analysis	At active blast sites during construction, the sites will be inspected during or immediately after rainfall to ensure sediment is either not being produced, or mitigation measures are effective. Confirmatory upstream and downstream turbidity readings will be taken to verify visual conclusions, if necessary. Depending on initial findings and results, a frequency of follow-up inspection will be decided on and implemented until the site is considered inherently stable.	PR#200 p8		RCMP. Fisheries Application	RCMP Section 5.0. Detailed designs and construction plans will be included in the fisheries application due at a minimum of several months before construction.	B
47	Fish and aquatic habitat, water quality and quantity	Blasting	DAR	Blasting impacts on fish will be minimized by utilizing timing window, encouraging fish to move from the blast area, minimizing the required blast energy, and following DFO's operational guidance for blasting.	PR#90 p13		RCMP. Fisheries Application	RCMP. 5.1. UPD, Section .1.4.1.3. Detailed designs and construction plans will be included in the fisheries application due at a minimum of several months before construction.	B
49	Fish and aquatic habitat, water quality and quantity	Crossings	DAR	All crossings will follow DFO's <i>Operational Statements</i> for creek crossings, including span structures and culverts.	PR#55 p244		SECP	Included in the UPD, Section 1.4.2.2. Appendix 1-7, integrated within the detailed stream crossing designs.	B
50	Fish and aquatic habitat, water quality and quantity	Crossings	DAR	In-stream works and crossings will be avoided as much as possible.	PR#55 p244	Measure 8-1, Part 3: Mitigate Impacts on Water Quality	RCMP. SECP	RCMP Section 5.9 Implemented within the Plan(s).	B
51	Fish and aquatic habitat, water quality and quantity	Crossings	Technical Analysis	If temporary (stream crossing) structures are utilized over an extended period (> 3 months), the design flow will be based on a 10 year return period.	PR#282 p40			UPD, Section 1.2.1.1. All temporary stream structures will be removed at conclusion of winter road operations.	B
52	Fish and aquatic habitat, water quality and quantity	Drainage	DAR	A stable road bed will be constructed adjacent to creeks and runoff control will be provided for to minimize the dispersal of sediment during precipitation events;	PR#55 p246	Measure 8-1, Part 3: Mitigate Impacts on Water Quality	RCMP. SECP	RCMP. Implemented within the Plan(s) (Section 5.4)	B

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53	Fish and aquatic habitat, water quality and quantity	Habitat loss offset	DAR	Replace any habitat losses to the satisfaction of DFO	PR#55 p246		Fisheries application	Detailed designs will be included in the fisheries application due at a minimum of several months before construction.	B
54	Fish and aquatic habitat, water quality and quantity	Minimize disturbances	DAR	Disturbance of stream banks and riparian areas at stream crossings will be minimized. Temporary crossing structures will be removed to avoid blockage and erosion.	PR#55 p246	Measure 8-1, Part 3: Mitigate Impacts on Water Quality	RCMP. SECP	Implemented within the Plan(s) (Section 5.8, 5.9)	B
55	Fish and aquatic habitat, water quality and quantity	Overtopping monitoring parameters	Technical Analysis	CZN commits to implementing TSS/turbidity, pH, dissolved oxygen and conductivity monitoring upstream and downstream of Casket Creek during high water events if overtopping of the road surface is occurring, and at any other areas where overtopping of the road surface occurs.	PR#263 p3	8-1, Part 2	fisheries application	Monitoring plans will be included in the fisheries application due at a minimum of several months before construction.	B
56	Fish and aquatic habitat, water quality and quantity	Re-vegetation	DAR	Re-vegetation of riparian areas will be promoted to further reduce the potential for sedimentation.	PR#55 p246	Measure 8-1, Part 3: Mitigate Impacts on Water Quality	RCMP. SECP	Implemented within the Plan(s) Section 5.9	B
57	Fish and aquatic habitat, water quality and quantity	Sundog Creek habitat loss	DAR	Fish habitat against the south bank will be lost, but would be replaced by comparable new habitat to the north. This work would be completed in the late fall when the floodplain is dry apart from isolated deep pools. Any pools would be subject to fish salvage before filling.	PR#55 p148	9-1, Part 1	fisheries application; draft diversion design	Detailed designs will be included in the fisheries application due at a minimum of several months before construction. Plans were also included in the draft diversion design submitted in December 2018.	B

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58	Fish and aquatic habitat, water quality and quantity	Sundog creek realignment morphology	Technical Analysis	Monitoring of the morphology of the new channel will occur to confirm that the new channel is providing habitat similar to the current channel. Monitoring will be conducted to ensure that the new channel is comparable to the existing channel. Monitoring will include field-based hydrological data collection (i.e., velocities and cross sectional profiles), supported by satellite or aerial imagery, when available. If velocities are too high, and higher than those predicted for the existing channel, CZN will make necessary adjustments to the channel during no flow periods. Once the stream has been diverted, bi-annual monitoring (during freshet and low flow) of the channel for the first two years will occur. Subsequently, monitoring will transition to monitoring every second year, or immediately after a 1 in 10 year event or greater.	PR#370 p257	8-1, Part 2; 9-1, Part 1 to 5	fisheries application; draft diversion design	Monitoring plans will be included in the fisheries application due at a minimum of several months before construction. Draft monitoring plans were also included in the draft diversion design submitted in December 2018. Baseline monitoring will begin in May 2019.	B
59	General	Draft management plans	Technical Analysis	CZN will convert the draft management plans and designs from, or referred to, in this EA into final plans and final designs for construction and operation of the road, and follow through on the commitments and design details contained in those plans and designs.	PR#355 p1		RCMP, ROMP, TCMMP, SECP, others	Implemented within the Plans	B
60	General	Recommendations	Technical Analysis	All recommendations by consultants have been accepted by CZN and will be assumed as commitments.	PR#355			See below	
60a	Hydrology			Consultant recommendation regarding stream crossing bridge designs: water levels are for open water flow conditions only; further consideration of ice effects which may affect hydraulic performance is recommended, as is additional modelling to assess effects of road embankments, abutments, or piers which may be proposed.	PRs #355, #118 and #218	n/a	n/a	Additional hydraulic modelling for open water has been performed for bridge crossings with encroachments into the 100-year floodplain.	B
60b	Hydrology			Consultant recommendations regarding Sundog Creek Diversion: (1) Channel realignment is not recommended for the reach from KP 37 to 38 downstream of the major tributary that enters from the north and produces very dynamic channel conditions that would be difficult to control. (2) Where encroachments occur, it is recommended that the channel be excavated on its opposite bank so as to maintain its pre-construction geometry, hydraulic capacity, and water velocities adjacent to the road. This approach will be implemented on the road segment downstream from KP 37 where the channel is less stable due to the major tributary joining Sundog Creek from the north.	PRs #355 and Pages 4 to 20 of PR #178.	n/a	Sundog Creek Diversion Plan Draft	(1) Diversion not proposed for identified reach, KP 37 to 38. (2) Status of channel excavation adjacent to proposed encroachments into the channel needs to be confirmed by Allnorth	P

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60c	Hydrology			Consultant recommendations regarding Sundog Creek Diversion: (1) CZN to commit that the final design will be developed to provide hydraulic/sediment capacity equivalent to the geometry of the existing channel, defined by its geometry, and to mimic the substrate characteristics of the existing channel. (2) The central segment of realigned channel will be expected to exhibit natural channel behaviours, which include lateral shifting. We do not anticipate that lateral shifting would threaten the road within the project life, but monitoring is recommended on an annual basis so that preventative measures could be taken if warranted.	PR#355 and pages 58 to 62 of PR #282.	n/a	Sundog Creek Diversion Plan Draft	(1) Field surveys are planned for 2019 to improve understanding of existing substrate characteristics, to be incorporated into final design. (2) Monitoring of channel shifting is included in Sundog Creek Diversion Plan Draft	P
60d	Permafrost			Operational performance monitoring along the ASR will be performed and documented monthly.		Measure 12-1, Part 4: PMP	PMP	Additional commitment outlined in Section 6.1.1 of the PMP.	B
60e	Permafrost			Operational inspections will be carried out immediately following any wildfire occurring within 100 m of the ASR.		Measure 12-1, Part 4: PMP	PMP	Additional commitment outlined in Section 6.1.1 of the PMP.	B
60f	Permafrost			Geotechnical performance monitoring along the ASR will be performed and documented annually.		Measure 12-1, Part 4: PMP	PMP	Additional commitment outlined in Section 6.1.2 of the PMP.	B
60g	Permafrost			Ground temperature cables will be installed to monitor permafrost features along the ASR.		Measure 12-1, Part 4: PMP	PMP	Additional commitment outlined in Section 6.2 of the PMP.	B
60h	Permafrost			Two fully-instrumented road sections will be installed to monitor overall road performance along the ASR.		Measure 12-1, Part 4: PMP	PMP	Additional commitment outlined in Section 6.3 of the PMP.	B
60i	Permafrost			Climatic data reviews will be performed annually to assess permafrost impacts due to climate change.		Measure 12-1, Part 4: PMP	PMP	Additional commitment outlined in Section 6.4 of the PMP.	B
60j	Permafrost			Pre-construction scouting will be utilized to identify any unexpected permafrost features during ASR construction.		Measure 12-1, Part 3: Design and Construction of the Project	PMP	Additional commitment outlined in Section 7.1 of the PMP.	B
60k	Water Quality	Sediment Control		CZN will develop procedural BMPs as the ASR advances into detailed design.		Measure 8-1, Part 3: Mitigate Impacts on Water Quality	SECP	Additional commitment outlined in Section 4.1 of the SECP.	B

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60l	Water Quality	Sediment Control		CZN will ensure that only areas that must be graded will be cleared during construction.		Measure 8-1, Part 3: Mitigate Impacts on Water Quality	SECP	Additional commitment outlined in Section 5.1.2 of the SECP.	B
60m	Water Quality	Sediment Control		No grubbed materials will be stockpiled within 15 m of the top of bank of any watercourse or wetland. Soil stockpiles will be sloped to minimize erosion, where possible, or bermed around the perimeter.		Measure 8-1, Part 3: Mitigate Impacts on Water Quality	SECP	Additional commitment outlined in Section 5.2.1 of the SECP.	B
60n	Water Quality	Sediment Control		Riparian zones within the footprint of construction will be delineated and fenced off to minimize trespassing and prevent placement of road strippings.		Measure 8-1, Part 3: Mitigate Impacts on Water Quality	SECP	Additional commitment outlined in Section 5.2.2 of the SECP.	B
60o	Water Quality	Sediment Control		Borrow pit access roads made from granular materials will be restricted only to locations that require access after road construction.		Measure 8-1, Part 3: Mitigate Impacts on Water Quality	SECP	Additional commitment outlined in Section 5.2.3 of the SECP.	B
60p	Water Quality	Sediment Control		Borrow pits located in floodplains will not be excavated below the water table.		Measure 8-1, Part 3: Mitigate Impacts on Water Quality	SECP	Additional commitment outlined in Section 5.2.3 of the SECP.	B
60q	Water Quality	Sediment Control		Coarse borrow stockpiles will be located a minimum of 50 m from flowing watercourses, while fine stockpiles will be at least 100 m from flowing watercourses.		Measure 8-1, Part 3: Mitigate Impacts on Water Quality	SECP	Additional commitment outlined in Section 5.2.3 of the SECP.	B
60r	Water Quality	Sediment Control		Equipment crossings through open surface water will be avoided. If a crossing is unavoidable, it will be limited to a one-time event to gain access.		Measure 8-1, Part 3: Mitigate Impacts on Water Quality	SECP	Additional commitment outlined in Section 5.2.4 of the SECP.	B
60s	Water Quality	Sediment Control		Monthly inspections will be performed by the Road Operations Manager at Major Watercourse Crossings, Minor Watercourse Crossings, Road Embankment Cuts, Runoff Controls, Surface Water Diversions, and Borrow Pits.		Measure 8-1, Part 4: Monitoring	SECP	Additional commitment outlined in Section 6.1.1 of the SECP.	B
60t	Water Quality	Sediment Control		Annual inspections of watercourse crossings and drainage structures will be performed by a qualified Hydrotechnical Engineer.		Measure 8-1, Part 4: Monitoring	SECP	Additional commitment outlined in Section 6.1.2 of the SECP.	B

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60u	Water Quality	Sediment Control		Baseline water quality monitoring will be performed based on TSS and Turbidity readings taken upstream and downstream of watercourse crossings. CZN's Environmental Monitors will perform water quality monitoring at all identifiable stream crossing. Monitoring will occur immediately after significant runoff events, weekly during periods of rainfall, and monthly if no effects are indicated. Daily monitoring will occur on streams affected by construction activities. Long-term monitoring will occur annually during freshet and after significant summer storms at each site.		Measure 8-1, Part 4: Monitoring	SECP	Additional commitment outlined in Sections 6.2, 6.3, and 6.4 of the SECP.	B
61	Heritage and cultural resources	Archeological Surveys	Technical Analysis	CZN will include local community members in pre-construction survey crews. A professional archeologist will ensure each crew has the necessary knowledge and information, provide direction and focus to the crews in the field, and undertake independent inspections and verification.	PR#355			See UPD Section 8	
62	Heritage and cultural resources	Road construction and maintenance plan	DAR	A brochure of photographs of heritage resources will be compiled and provided to contractors as part of the Road Construction and Maintenance Plan.	PR#55 p269		RCMP, ROMP	Will be implemented within final RCMP given to contractors.	B
63	Nahanni National Park Reserve	Best practices	DAR	Standard industry best practices will be adhered to during construction.	PR#55 p227		RCMP	Implemented within the Plan(s). Section 1.5.	B
64	Reclamation	Bridges and crossings	DAR	During reclamation, bridges will be removed from stream crossings; abutments will be removed or pushed-back. Material will be pulled-back to recontour side-hill cuts. Erosion control measures will be installed as necessary. Restoration of disturbed areas will be promoted by stabilization measures and vegetation by natural invasion supplemented with available local seed and cuttings.	PR#29 p4	Measure 8-1, Part 3: Mitigate Impacts on Water Quality	SECP. RCRP	Runoff control measures will be installed as outlined in Section 5.2.5 of the SECP.	B
65	Reclamation	Disturbed areas	DAR	Once the road and crossings have been built, disturbed areas will be reclaimed by grading and providing runoff and sediment controls, as necessary.	PR#55 p245	Measure 8-1, Part 3: Mitigate Impacts on Water Quality	SECP. RCRP	Post-construction runoff control is outlined in Section 5.1.3 of the SECP.	B
66	Reclamation	Monitoring	DAR	The progress of reclamation in disturbed areas will be monitored.	PR#55 p246		CRP	Reclamation monitoring is a key element of the RCRP	B
67	Reclamation	Objective	Technical Analysis	After Mine closure, if the access road is also to be closed and reclaimed, CZN is committed to a reclamation goal of restoring pre-disturbance conditions, as much as possible, including the removal of structures no longer required, subject to the engagement and agreement of all parties.	PR#263 p5		RCRP	Closure goals, objectives and implementation details provided in RCRP	B

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68	Reclamation	Re-vegetation	Technical Analysis	Natural encroachment will be used as a re-vegetation strategy in disturbed areas, supplemented with available local seed and cuttings, to avoid the introduction of invasive species sometimes found in seed mixes.	PR#186 p3		RCRP	Natural encroachment (revegetation) is a key element of the RCRP	B
69	Road design	Barge	Technical Analysis	A low draught vessel will be selected, big enough for at least one loaded tractor-trailer unit. Barge selection specifications will include provision for safe and easy loading/unloading and integration with the ramps.	PR#371 p12			See UPD Section 1.4.12	M
71	Road Design	Culverts	DAR	Careful culvert placement and sizing is especially important on slopes that already have significant existing slope instabilities and the potential for new instabilities.	PR#55 p33			UPD. Section 1.4.2.2 and integrated within preliminary road designs	B
72	Road Design	Culverts	DAR	In areas of switchbacks, any road location that receives a culvert on an upslope reach of a stream should also receive a culvert or culverts on the road sections downslope that re- cross the same stream, and water should not be allowed to flow off the ends of switchbacks into inappropriate areas.	PR#55 p33			Integrated within preliminary road designs	B
73	Road design	Culverts	DAR	Careful placement of culverts even where there are no obvious stream channels will help reduce the likelihood of ponding water alongside the road embankment.	PR#55 p236			UPD. Section 1.4.2.2 and integrated within preliminary road designs	B
70	Road Design	Culverts	DAR	Culvert crossings will be designed to avoid creating water drops on the downstream side (i.e., "perched" culverts will be avoided).	PR#90 p15		RCMP	Implemented within the Plan(s). Section 5.9, 5.10	B
75	Road design	Cut-slopes	DAR	If cut-slopes in thaw-sensitive terrain are unavoidable, a much greater need for vigilance in monitoring and maintenance is required.	PR#55 p236	Measure 12-1, Part 4: PMP	PMP	UPD. Section 1.4.1.3. Preliminary road designs reflect avoidance of cut-slopes on thaw sensitive terrain (overland construction)	B
74	Road Design	Cut-slopes	DAR	Cut-slopes in thaw-sensitive terrain should be avoided if at all possible. If cut-slopes in thaw-sensitive terrain are unavoidable, it may be possible to protect some cut-slopes with a drainage blanket to help mitigate the effects of thaw and meltwater, or design near-vertical cut-slopes to allow the organic layer to be draped over the cut-slope to shade and protect it.	PR#55 p236	Measure 8-1, Part 3. Measure 12-1, Part 3: Design and Construction of the Project	SECP. PMP	UPD. Section 1.4.1.3. Preliminary road designs reflect avoidance of cut-slopes on thaw sensitive terrain (overland construction)	B
76	Road design	Footprint minimization	DAR	Confine all season road development activities to the approved winter road corridor to the greatest extent feasible.	PR#55 p266			UPD. Section 1.4.1.1. 95% of winter alignment within ASR footprint.	B
77	Road Design	Grades and slopes	DAR	All reasonable options have been considered to keep maximum grades at 8% or less (preferred). However given the steep mountainous terrain and passes from KP 6 to 30, there are a number of sections with a 10% maximum grade and one short section of 12%.	PR#59 p26			UPD. Sec. 1.4.1.3. Preliminary road designs reflect this approach. Design standards consistent with BCMOFL Engineering Manual.	B

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78	Road Design	Grades and slopes	DAR	The subgrade will be left to settle sufficiently to mitigate winter construction risks.	PR#59 p29		RCMP	RCMP. Section 5.4 Ongoing. Integrated within the construction schedule.	B
79	Road Design	Ground condition	DAR	Construction will be managed such that travel across the ground does not occur when it is in its most vulnerable state.	PR#55 p235	Measure 12-1, Part 3: Design and Construction of the Project	RCMP. PMP	RCMP. Throughout document, avoidance of activities when field conditions are poor.	B
80	Road Design	Ground condition	DAR	Summer/fall subgrade construction is proposed to take place in non-thaw sensitive ground when the ground is seasonally more likely to be relatively dry. The benefit of summer/fall construction in terrain that is not thaw-sensitive is that the construction team will be able to see more clearly where the cross-drainage installations should be placed and backfill placement and compaction will be greatly improved.	PR#55 p235	Measure 12-1, Part 3: Design and Construction of the Project	PMP	UPD. Section 1.2.1.2. Describes the approach in scheduling construction activities. Schedule to reflect season of construction based on terrain and soils.	B
81	Road design	line of sight	Technical Analysis	CZN commits to installing windrows, lumber, or other brush clearing material at intersections with other linear features to discourage access (and limit sightlines) to the road corridor by wildlife and humans.	PR#355 p12		RCMP	RCMP. Section 5.2. Approach to be adapted into construction practices.	B
83	Road Design	Permafrost	DAR	Embankment fill-only (overlanding) techniques are proposed for thaw-sensitive permafrost areas.	PR#55 p235	Measure 12-1, Part 3: Design and Construction of the Project	PMP	UPD. Section 1.4.1.3. Preliminary road designs reflect avoidance of cut-slopes on thaw sensitive terrain (overland construction)	B
82	Road Design	Permafrost	DAR	To minimize impacts related to permafrost, the standard approach taken regarding the cut slope angle will be 1:1 with some variability depending on soil type and site conditions.	PR#59 p19	Measure 12-1, Part 3: Design and Construction of the Project	PMP	UPD. Section 1.4.1.3. Preliminary road designs reflect avoidance of cut-slopes on thaw sensitive terrain (overland construction). This approach will be adopted in for final designs on ice poor, well drained soils.	B
84	Road Design	Pull outs	Technical Analysis	CZN commits to providing a pullout at approximately KP 29-30 for chain-up/chain-off, and turn-offs at approximately 10 km intervals to allow trucks with trailers to turn around.	PR#263 p3			UPD. Section 1.4.1.3	B
85	Road design	Steep terrain	DAR	Proper design and construction of the access road will occur, avoiding steep terrain and hairpin turns as much as possible.	PR#55 p244			UPD. Preliminary and final designs will be completed to avoid poor terrain and alignment.	B

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86	Road Design	Stripping placement	Technical Analysis	CZN commits to not placing road strippings in riparian zones	PR#246 p2	Measure 8-1, Part 3: Mitigate Impacts on Water Quality	RCMP. SECP	RCMP. Section 5.2, 5.3	B
87	Road Design	Sundog Creek	Technical Analysis	Construction of the Sundog re-alignment will occur in summer or fall/early winter when the creek has no surface water. All construction would be conducted continuously and completed within one season. Construction would start at the lower portion of the re-alignment and progress upstream. All proposed stream design characteristics would be constructed continuously to avoid repeated disturbance. If surface water is encountered, the sealed off bottom exit or end would restrict surface water from discharging to other channels. The water would filter through the natural gravels. The reconstructed channel within the natural streambed material would be washed with pressurized water to allow fine sediments to settle into the reconstructed porous rock stream bed, or collect in a sump at the downstream end of the excavation for subsequent removal. Water required for the washing process will be extracted from an adjacent, stable floodplain area. A small filter berm would remain in place until the upper portion is complete and existing channel is ready to be diverted. The re-alignment will be inspected by a qualified professional during the first freshet. In addition, it will be the responsibility of the Road Operations Manager (ROM) to complete formal inspections during spring runoff and after intense summer rainfalls. It is expected that less formal, casual inspections will be done on a regular basis to ensure continued stability of the re-alignment.	PR#282 p41		RCMP	RCMP. Section 5.5 UPD Construction Schedule	P
89	Road Design	Sundog Creek	Technical Analysis	The final (Sundog realignment) design will be developed to provide hydraulic/sediment capacity equivalent to the geometry of the existing channel, defined by its geometry, and to mimic the substrate characteristics of the existing channel.	PR#294 p61		Sundog Creek Diversion Plan Draft	Field surveys are planned for 2019 to improve understanding of existing substrate characteristics, to be incorporated into final design.	P
90	Road design	Water drainage inspections	DAR	Regular inspections will help identify areas where surface water drainage provisions need to be changed or improved.	PR#55 p236	Measure 8-1, Part 4: Monitoring	ROMP. SECP	ROMP. Section 4.2, 5.2.3. SECP Section 6.1.1	B

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91	Road Design	Width	Technical Analysis	CZN commits to a minimum 4 m wide running surface width, and a 5 m wide running surface width where possible (the width would be no less than 4.9 m in the latter areas). There will be widenings at curves.	PR#263 p4			UPD. Section 1.4.1.3. ASR Preliminary designs reflect 5 m wide running surface for full length. Wider at curves. CZN may reduce width to 4 m at specified, very short blasting sections between KP 23 to 29 in final road designs.	B
93	Road Maintenance	Bridge and culvert inspections	Technical Analysis	For Bridge and Major Culverts Inspection, Allnorth proposes: (1) (a) ensure that a qualified person such as a road maintenance supervisor carries out a visual inspection of each bridge or major culvert associated with the road at least once every year after the bridge or major culvert is constructed, and (b) make a record of the inspection. (2) (a) ensure that a qualified person under the direction of qualified Professional Engineer carries out a detailed inspection of each bridge or major culvert associated with the road, and (b) make a record of the inspection, (i) subject to subparagraph (ii), at least once every 3 years after the bridge or major culvert is constructed, or (ii) at such intervals as specified in writing by a professional engineer. The inspection and monitoring program will reflect the crossing risk rankings. Key to the monitoring will be the detection of any changes to channel positions and the potential for erosion with respect to the crossing structures, and consideration of required adaptive management.	PR#200 p27	Measure 8-1, Part 4: Monitoring	ROMP. SECP	ROMP. Section 5.2.3. SECP Section 6.1	B
94	Road Maintenance	Drainage inspection an monitoring plan	Technical Analysis	CZN will develop a suitable inspection and monitoring plan regarding all stream crossing structures, and drainage patterns along the road alignment to maintain natural drainage and to inform adaptive management actions (including location of equipment required for these management actions such as backhoes, steamers and erosion/sediment control devices).	PR#263 p2	Measure 8-1, Part 4: Monitoring	ROMP. SECP	ROMP. Section 4.0, 5.2.3. SECP Section 6.1	B
95	Road Maintenance	General	DAR	Long term road performance would be continually assessed following high water events and changes made accordingly. Ditches will be cleaned as required and maintained, culverts will be cleaned out and restored to ensure full capacity. Additional cross drainage culverts may be installed if required. From time to time, some minor breakdown of the road subgrade may occur, and would be restored.	PR#101 p14		ROMP	ROMP. Section 4.0, 5.0	B

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96	Road Maintenance	Inspections	DAR	During road construction, operations and reclamation, there will be regular inspections by supervisory, maintenance and environmental staff, as well as community monitors. Any evidence of impacts, or conditions that might lead to impacts, will be immediately brought to the attention of the transportation manager. Any obvious problems, such as sediment dispersal, will be rectified immediately by construction/maintenance crews	PR#55 p246	Measure 8-1, Part 4: Monitoring	ROMP. SECP	ROMP. Section 4.0, 5.0. SECP Sections 6.1 and 7.2	B
97	Road Maintenance	Maintenance plan	DAR	A short and long term road maintenance program would be developed at the detailed road design stage.	PR#55 p27		ROMP	ROMP. Section 4.0, 5.0. Ongoing.	B
98	Road Maintenance	Ongoing monitoring	DAR	Following the construction of the road, ongoing monitoring of the road structure will occur. Regular maintenance will be applied which will include rebuilding/adding additional armouring to those sections deemed insufficient as required.	PR#178 p33		ROMP	ROMP. Section 4.0, 5.0	B
100	Road Safety	Design guidelines	Technical Analysis	CZN commits to adhering to road design standards in the B.C. Ministry of Forests, Lands and Natural Resources Operations Engineering Manual as much as possible, and explaining and justifying where these guidelines will not be met.	PR#263 p3		PMP	UPD. Section 1.4.1.3. All design standards are consistent with BCFLNR Engineering Manual. All speed reduced sections are identified with preliminary ASR designs.	B
101	Road safety	Driver impairment	Technical Analysis	Provisions for checking on the condition of drivers before they start their shift will be included, specifically, are they sufficiently rested and not sick, as well as provision for driver relief during their journey if they do not feel fully able to drive safely for any reason. During orientation, all drivers will be warned about the dangers of distraction and not being alert. This will be reinforced in morning meetings prior to initiation of the days' transport activities. Drug and alcohol screening is a standard procedure for all employees and contractors, and will be rigorously enforced and monitored. Any suspicion of impairment noted in morning meetings prior to initiation of the days' transport activities will result in the driver being withdrawn from work that day and subject to testing.	PR#370 p39		TCMMP	TCMMP. Section 4.3	B
102	Road safety	Driver orientation	DAR	Drivers will receive an orientation package describing the road and specific sections/conditions before driving the road for the first time, and they will be required to read it. Drivers will check in and out, and be in communication with control during the journey.	PR#55 p202		TCMMP	TCMMP. Section 4.3	B

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103	Road Safety	Engineering standards	Technical Analysis	At the detailed design stage, using the MOFLNR Engineering Manual standards, sections with restricted line of sight will be speed reduced accordingly and posted.	PR#364, Oboni IR#5			UPD. Section 1.4.1.3. All design standards are consistent with BCFLNR Engineering Manual. Speed reduced sections identified in preliminary ASR designs	B
104	Road Safety	Management plans	Technical Analysis	Management plans developed for the winter road (PR#55, Section 6.7) will be reviewed for use with the ASR to confirm applicability to summer conditions.	PR#355		TCMMP	TCMMP. Implemented within the Plan(s).	B
105	Road safety	Mitigations	Technical Analysis	During the detailed design phase and subsequent pre-operations planning, CZN proposes to consider the following additional mitigations: 1) Additional operator restraint devices, and possibly modified seat-belt arrangements; other safeguards, such as a mechanism that prevents the operation of the unit if the seatbelt is not engaged. 2) Cargo safety, particularly anchoring; options that stabilize the bases of items to be transported, as well as 'top-down' anchoring. The potential for forward and sideways energy will be considered. 3)For the road sections noted as requiring further review for additional mitigations, we propose to look into moderate widening (0.5-1 m) of the normal road width (5 m) in those locations considered to be specifically at risk of an off-road excursion. Widening should be feasible for the km sections 12.3-17 and 53.5-57.4. Widening of km 25.2-28.7 will be difficult because of the common occurrence of upslope rock cuts. Widening of this section in places may still be possible by steepening the downslope, for example by the use of gabions anchored onto underlying rock. CZN successfully used this approach to restore the road bed in several sections along Prairie Creek after the 2006 and 2007 floods. 4) The road sections to be reviewed for additional mitigations will be considered for perimeter barriers in locations where they are deemed necessary, which may or may not be the same locations selected for widening. Barriers could take the form of an earth berm if space is suitable, or narrower barriers such as cables or guardrails. 5) Following the completion of road construction, and before operations commence, an operational level risk assessment will be completed with the road team including supervisors, operators and maintenance staff. Additional risk mitigation measures will be considered	PR#407 p9			UPD. Section 1.4.1.3. All design standards are consistent with BCFLNR Engineering Manual. Final designs are ongoing and subject to review/approval by Technical Review Panel. General road running width is 5 m, wider in curves. Use of barriers will be considered within final ASR designs. Operational level risk assessment will be conducted prior to hauling operations.	B

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109	Road Safety	Operations plan	Technical Analysis	The Road Operations Plan will be updated to incorporate GNWT Road Operation Guidelines, for review and approval by the regulator(s) prior to relevant operations.	PR#246 p2		ROMP	Implemented within the Plan(s)	B
106	Road Safety	Operations plan	Technical Analysis	Implement CZN's Road Operations Plan (see PR#135)	PR#355		ROMP	Implemented within the Plan(s)	B
107	Road Safety	Operations plan	Technical Analysis	The Road Operations Plan will define how vehicle speeds will be monitored and enforced.	PR#355, as per PR#192, PCA IR 16		TCMMP, ROMP	TCMMP Section 8, Implemented within the Plan(s)	B
108	Road Safety	Operations plan	Technical Analysis	The Road Operations Plan will be revised to abide by and enforce GNWT commercial truck loading restrictions, and adequately justify any variance from these allowances with respect to truck and trailer configurations.	PR#355, as per PR#192, PCA IR 16		ROMP	ROMP Section 3.8.1	B
111	Road safety	Speed limits	DAR	Suitable speed limits will be posted on the All Season Road.	PR#55 p183		ROMP, TCMMP	ROMP Section 3.9, TCMMP Section 4.1	B

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112	Road safety	Systems to regulate road safety and performance	Technical Analysis	CZN will rely on the systems established by federal and provincial authorities to regulate the safety and performance of the commercial transport industry, e.g. National Safety Code Registrations, to ensure requirements with respect to: driver qualifications and regular certification; hours of service operations; vehicle inspections (daily and semi-annually); pre-trip assessments; maintenance records and reporting. The status of an operator will be subject to: audits; suspensions; and removal of National Safety Code Registration, if necessary. CZN is committed to ensuring the safe transportation of personnel and goods, and will adopt, at a minimum, and under the responsibility of a Road Operations Manager, standard industry operating procedures for all vehicles supporting the mine operation. These standards would include: daily tailboard meetings with operators to review any specific or unique road conditions which can impact the safe and efficient operation of the transportation fleet; weekly safety meetings of all personnel utilizing the road regularly; radio call procedures; daily pre and post trip inspections of all commercial vehicles, which would include brake checks, and inspection reports, completed by the operator; reporting procedures for all near misses and incidents and the appropriate actions to follow; and procedures for routine inspections of cargo and general truck conditions to be completed during the daily transportation cycle. CZN will ensure that all carriers (including its own) that are transporting dangerous goods will provide proof of Transportation of Dangerous Goods training and certification of the drivers. In addition, it will be confirmed that the operators of the unit possess appropriate TDG containment and response equipment. For the non-categorized dangerous good, CZN will ensure that all carriers are operating to the minimum standard of the National Safety Code Cargo Containment, Standard 10.	PR#370 p38		ROMP	ROMP Section 3.8.1	B
113	Road safety	Winter chains	DAR	A winter driving policy, requiring tire chains to be used on haul trucks in the mountains (Phase 1 KP 0-29) to increase traction when necessary, will be adopted.	PR#55 p183		ROMP	ROMP Section 3.8	B
114	Terrain, soil, permafrost and karst topography	Avalanche recommendation follow-up	Technical Analysis	CZN will be following up on the recommendations in the (Alpine Solutions) report (re. avalanches) at the appropriate time in advance of winter road construction.	PR#178 p2		ASP	UPD Section 22	B

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115	Terrain, soil, permafrost and karst topography	Avalanches	Technical Analysis	The avalanche assessment and map prepared previously for the road (PR#129) will be incorporated into an appropriate Road Operations Plan.	PR#355		ASP	In ASP. Referred to in ROMP	B
116	Terrain, soil, permafrost and karst topography	Avalanches	Technical Analysis	CZN commits to considering avalanche risks in the design of bridges and crossings and the placement of construction camps, for review and approval by the regulator(s) prior to construction of each structure .	PR#246 p3			UPD Section 22	B
117	Terrain, soil, permafrost and karst topography	Best practices	DAR	Construction in accordance with best standard industry practices in relation to soil disturbance, hydrology maintenance and construction in permafrost areas will be employed.	PR#55 p267		RCMP. PMP	RCMP Section 4.0	B
120	Terrain, soil, permafrost and karst topography	Borrow source development and management plans	DAR	If permafrost is a factor in the general area of a borrow pit, water should not be allowed to pond on it and create a surface thaw condition leading to permafrost degradation.	PR#59 p87	Measure 12-1, Part 3: Design and Construction of the Project	RCMP. PMP	RCMP Section 5.6	B
124	Terrain, soil, permafrost and karst topography	Borrow source development and management plans	DAR	Some general guidelines for borrow sources are: minimize the surface area of the open cut; grade slopes to reduce slumping; grade material storage and working areas to promote drainage and avoid standing water; and, restore the borrow source when construction is completed by grading slopes to match the natural ground and drainage of the surrounding area, and replacing overburden.	PR#55 p33	Measure 8-1, Part 3.Measure 12-1, Part 3: Design and Construction of the Project	SECP. PMP	SECP Section 5.2.3. Permafrost mitigations to be used in borrow pits are outlined in Section 5.6 of the PMP.	B
118	Terrain, soil, permafrost and karst topography	Borrow source development and management plans	Technical Analysis	Individual borrow source development and management plans will be prepared for each borrow source that will incorporate site-specific recommendations relating to permafrost, as necessary.	PR#351 p1	Measure 12-1, Part 3: Design and Construction of the Project	PMP	General borrow pit development recommendations relating to permafrost are outlined in Section 5.6 of the PMP. Site-specific recommendations for each pit will be included in future Borrow Pit Management and Reclamation Plans for each pit.	B
125	Terrain, soil, permafrost and karst topography	Borrow source development and management plans	Technical Analysis	During detailed design, borrow sources will be sampled according to the guidance of a professional ARD geochemist. Any borrow with a positive identification of ARD/ML potential will not be used. The remaining borrows will be used only if these are considered to pose a low risk to the environment and subject to mitigation procedures that may be defined by a professional ARD/ML geochemist.	PR#200 p16		Geochem Verification Program	UPD Section 13	B

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119	Terrain, soil, permafrost and karst topography	Borrow source development and management plans	Technical Analysis	A "Detailed Borrow Site Plan and Design" (DBSPD) for each selected borrow location will be completed prior to construction.	PR#350 p1		BPMRP	UPD Section 1.4.3	B
121	Terrain, soil, permafrost and karst topography	Borrow source development and management plans	DAR	If permafrost is present and cannot be avoided in the pit development area, mitigation plans must be in place for dealing with any thawing of slope materials, and for the control and filtration of any resulting melt-water.	PR#59 p87	Measure 8-1, Part 3. Measure 12-1, Part 3: Design and Construction of the Project	SECP. PMP	SECP Section 5.2.3. Permafrost mitigations to be used in borrow pits are outlined in Section 5.6 of the PMP.	B
122	Terrain, soil, permafrost and karst topography	Borrow source development and management plans	Technical Analysis	Where permafrost is encountered in borrows, either the borrow will not be used, or it will be used subject to mitigation by a professional geotechnical engineer to avoid significant impacts in terms of development and reclamation.	PR#200 p17	Measure 12-1, Part 3: Design and Construction of the Project	PMP	Borrow Pit development guidelines in permafrost are included in Section 5.6 of the PMP.	B
123	Terrain, soil, permafrost and karst topography	Borrow source development and management plans	Technical Analysis	CZN is committed to avoiding and minimizing water table exposure. Borrow sources located in floodplains will not be excavated below the water table. Extracting or excavating ditch depths below normal flood plain level will be avoided. Borrow source investigations will be completed during the detailed design stage to determine water table levels. A BSMRP will be completed on every selected borrow source including detailed, site specific extraction and reclamation plans, including borrow extraction within floodplains subject to water table influence. A minimum 50 m buffer will remain between the active portion of the floodplain (Q2) and the borrow source, or mitigation provided as necessary if this isn't possible (e.g. Sundog talus). During the detailed design stage, borrow sources subject to impact by high water flows (Q100) will be guarded, as necessary, by a berm 1 m above the determined Q100 elevation. During detailed design, borrow pit stability, potential risk from active stream channel and high water flows will be reviewed and appropriate protection measures included in the BSRMP.	PR#370 p124	Measure 8-1, Part 3: Mitigate Impacts on Water Quality	SECP	Floodplain considerations for borrow pits are outlined in Section 5.2.3 of the SECP.	B
126	Terrain, soil, permafrost and karst topography	Earthquakes	Technical Analysis	CZN will take into account the risk of earthquakes in the design and construction of permanent infrastructure and bridges, for review and approval by the regulator(s) prior to construction of permanent infrastructure and bridges.	PR#246 p2	Measure 5-1, Part 2: Panel Mandate		Part of the follow-up investigation and design process.	B

ID	Topic	Subtopic	EA Phase	Commitment	Reference	REA Measure, Suggestion	Mgt/Mon Plan	Status	Land Mgr
127	Terrain, soil, permafrost and karst topography	Environmentally sensitive areas	DAR	Any borrow pits incorporating tall cut slopes or adjacent to environmentally sensitive areas will be monitored for any evidence of slope instability during any excavation operations.	PR#59 p79		BPMRP	UPD Section 1.4.3	B
128	Terrain, soil, permafrost and karst topography	Investigation and monitoring plan	Technical Analysis	CZN commits to developing a permafrost monitoring plan as a permit condition, an outline of which was provided on the Tetra Tech letter dated April 3, 2017 (PR #484, p.23) informed by a detailed investigation of permafrost along the road alignment.	PR#246 p2	Measure 12-1, Part 4: PMP	PMP	A draft Permafrost Monitoring Plan is included in Section 6.0 of the PMP.	B
129	Terrain, soil, permafrost and karst topography	Permafrost investigation	Technical Analysis	CZN will undertake a suitable site investigation program to further investigate permafrost issues during the detailed design process (see Tetra Tech, April 3, 2017), and will implement appropriate mitigations during road construction activities to address those issues.	PR#320 p11	Measure 12-1, Part 1: Introduction. Measure 12-1, Part 2: Permafrost Investigations	PMP	Future site investigation details are outlined in Section 5.1 of the PMP.	B
130	Terrain, soil, permafrost and karst topography	Quarry guidelines	Technical Analysis	Where excavation of borrow below the road grade cannot be avoided, CZN commits to applying appropriate guidelines (i.e. quarry guidelines). These considerations will be described in the development plans for these borrow sources, for review and approval by the regulator(s) prior to borrow pit development.	PR#246 p1		BPMRP	UPD Section 1.4.3	B
131	Terrain, soil, permafrost and karst topography	Sediment influx to watercourses	Technical Analysis	The potential for sediment influx to watercourses will be considered as part of detailed terrain stability assessment.	PR#320 p25			Already considered in road development and crossing design plans, but will be further assessed in detailed design phase.	B
132	Terrain, soil, permafrost and karst topography	Soil disturbance	DAR	For wet, ice rich, or permafrost sections, typical overland construction will include no disturbance of the natural ground layer and placing timber horizontally in a corduroy style to help support the road subgrade.	PR#59 p23	Measure 12-1, Part 3: Design and Construction of the Project	PMP	UPD. Section 1.4.1.3	B

ID	Topic	Subtopic	EA Phase	Commitment	Reference	REA Measure, Suggestion	Mgt/Mon Plan	Status	Land Mgr
135	Terrain, soil, permafrost and karst topography	Stability monitoring	Technical Analysis	Areas at high-risk due to potential slope stability or ground stability issues will be monitored. A professional engineer will determine a monitoring frequency (minimum monthly) and specify the required qualifications of the inspector. Monitoring will be undertaken by local monitors under the guidance and instruction of an engineer, with inspection by the engineer on a pre-determined frequency. A major rainfall event or abnormally high spring thaw event is considered to be one that causes runoff sufficient to create erosive force, indicated by highly turbid water in local streams. A significant seismic event is considered to be one that is clearly felt either at the Mine or in neighbouring communities, and is recorded by the Geological Survey. After a significant runoff or seismic event, all sections of the road will be checked by proximal staff before the 'all clear' is given for travel.	PR#370 p5	Measure 5-1, Part 2: Panel Mandate	ROMP	Areas at high-risk of potential slope instability are outlined in Section 5.1 of the Mapping Summary Report. Monitoring is outlined in Prairie Creek Geotechnical Evaluation and DAR Sections and in Section 5.2 of the ROMP.	B
136	Terrain, soil, permafrost and karst topography	Subsidence feature mapping	DAR	Subsidence features on the Ram Plateau between Km 59 and Km 84, within about 200 metres of the road, will be mapped. These features will be reviewed annually and any change in conditions documented.	PR#55 p225	Measure 5-1, Part 2: Panel Mandate	ROMP	Terrain Stability Mapping has been completed for the area, outlined in Appendix A of the Mapping Summary Report and monitoring plan outlined in Section 5.2 of the ROMP.	P
137	Terrain, soil, permafrost and karst topography	Terrain stability assessment	Technical Analysis	CZN will complete a more in depth terrain stability assessment (including identification of risks and mitigations) with a focus on areas identified as unstable and potentially unstable in their terrain mapping, and will provide this information for review and approval by the regulator(s) prior to construction in those areas of focus.	PR#246 p3	Measure 5-1, Part 2: Panel Mandate	N/A	Current terrain stability assessment is outlined in the Mapping Summary Report and risk matrix outlined in Section 7.2.2 of the Prairie Creek Geotechnical Evaluation and DAR.	B

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138	Terrain, soil, permafrost and karst topography,	High risk area contingencies	Technical Analysis	Site-specific contingencies for high-risk areas are as follows: Carry out at least monthly visual inspections for areas designated high-risk due to potential slope stability or ground stability issues until seasonal baselines for behavior of the area are established; When the baselines are established, carry out regular visual inspections for areas designated high- risk due to potential slope stability or ground stability issues. A suggested schedule for inspection of those areas would include at least one inspection prior to spring freshet to confirm that culverts are free-draining, then monthly during the thaw season, and at least once during the winter for areas with hazards that exist also in winter (for example, for rock fall that is freeze/thaw-related); and, carry out inspections for high-risk areas within 24 hours of major rainfall events, abnormally high spring thaw events or significant seismic events, and/or prior to mine traffic travelling the road. Where problems are detected, they would be repaired or corrected in a timely manner, and prioritized in accordance with the urgency of the problem.	PR#282 p2	Measure 5-1, Part 2: Panel Mandate	ROMP	Detailed site-specific contingencies for high-risk areas are outlined in Section 7.3.3 of the Prairie Creek Geotechnical Evaluation and DAR and in Section 5.2 of the ROMP.	B
139	Terrain, soil, permafrost and karst topography, fish and aquatic habitat	Rockfall measures	Technical Analysis	Locations where rock fall measures are needed and could be successfully implemented will be chosen at the time of detailed design, taking into account the likely frequency and anticipated volumes of rock fall at a particular location, as well as the likely success of other measures that could be implemented in addition to or instead of physical solutions. For example, netting may be more useful on blind corners, whereas signage may be more appropriate at locations where sight distances are good in rock fall areas. Suitable protection solutions for existing out-dipping rock slopes along the route will be developed where necessary at the time of detailed design. Debris flow/flood locations will be specifically evaluated during detailed design to determine if some benefit would be realized with the use of a deflection berm.	PR#282 p217	Measure 5-1, Part 2: Panel Mandate	ROMP	A summary of recommended realignments and mitigations was completed, outlined in Section 6.3 of the Mapping Summary Report. More detailed rock fall measures will need to be completed during detailed design.	B
140	Terrain, soils, permafrost and karst topography	Borrow source development and management plans	Technical Analysis	The development, working and restoration of borrow sources will be carefully planned and carried out to reduce or avoid negative effects including permafrost thaw and soil erosion.	PR#55 p236	Measure 12-1, Part 3: Design and Construction of the Project	PMP	General borrow pit development recommendations relating to permafrost are outlined in Section 5.6 of the PMP. Site-specific recommendations for each pit included in future BPMRP for each pit.	B

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141	Terrain, soils, permafrost and karst topography	National Parks Caving Directive	DAR	Parks Canada is preparing a National Parks Caving Directive which may have information of value in karst terrain, and will be consulted.	PR#129 p79		PMP	Thermokarst information is included in Section 5.8 of the PMP. Discussed in Section 8.1.3 of the Preliminary Geotechnical Evaluation and DAR Sections. National Parks Caving Directive will be consulted once the document becomes available.	P
142	Vegetation	Clearing	DAR	Brush and debris from clearing the right of way will be windrowed adjacent to the right of way, with breaks every 100 m. Trees felled will be bucked or removed.	PR#2 p4		RCMP. RCRP	RCMP Section 5.0	B
143	Vegetation	Invasive Species	Technical Analysis	Access and use of the road by unauthorized persons will be deterred to the extent possible because off-road vehicles could introduce invasive species. Road use monitoring is proposed at, or west of, the Liard River crossing on the all season access road.	PR#186 p44	Measure 11-2, Part 3: Mitigation	TCMMP	TCMMP Section 7	B
145	Vegetation	Invasive species management plan	Technical Analysis	The Invasive Species Management Plan is adaptive and will evolve as the project evolves and invasive species are, or are not, detected. The four key principles are prevention, detection, control and restoration.	PR#186 p2	Measure 11-2, Part 4: Invasive Species Management Plan	ISMP	Adaptive Management is discussed in Section 4.6 and prevention, detection, control and restoration are discussed in Section 4 of the Invasive Species Management Plan	B
144	Vegetation	Invasive species management plan	DAR	An invasive species management plan will be developed and implemented to ideally prevent, or if necessary, control the establishment of invasive plant species in off-site vegetation communities adjacent to the roadway.	PR#55 p185	Measure 11-2, Part 4: Invasive Species Management Plan	Invasive Species Management Plan	See the Invasive Species Management Plan	B
146	Vegetation	Invasive species mitigation	Technical Analysis	Re invasive species, highway trucks and/or trailers headed for the Mine will pass through a wheel-wash during non-frozen conditions and be cleaned of any debris before leaving the Liard River crossing.	PR#186 p44	Measure 11-2, Part 3: Mitigation	Invasive Species Management Plan	UPD. Section 1.4.12 Wheel wash facility will be located at Liard south barge lease.	B
147	Vegetation	Rare plant survey	Technical Analysis	An early (spring) rare plant survey will be completed prior to construction for the flowering periods of plant families such as Ranunculaceae (buttercups) and Rosaceae (rose), for the all season road project footprint. The resulting data from the vegetation survey will be incorporated into adaptive management plans and may result in further mitigation actions. A RPMP will be developed as necessary.	PR#282 p4	Measure 11-1, Part 1: Baseline Surveys	RPMP	Two rare plants were found. See Sections 5 and 6 of the RPMP for management and mitigation recommendations	P

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149	Vegetation	Stockpile placement	Technical Analysis	Stockpiles will be placed on non-vegetated or sparsely vegetated areas to minimize disturbance to vegetation, where possible.	PR#355		BPMRP	UPD. Section 1.4.4	B
150	Vehicle maintenance	Inspections for leaks	DAR	Vehicles will be properly maintained and inspected for leaks, and drip pans will be used for stationary equipment.	PR#55 p192		ROMP	ROMP. Section 3.0	B
152	Water and sediment quality, vegetation, wildlife	Contaminant loading management plan	Technical Analysis	CZN commits to updating its contaminant loading management plan in consultation with ECCC and Parks, with approval required before concentrate haul commences.	PR#246 p2		ROMP. CLMP	Soil & veg monitoring included in ROMP. Concentrate now to be hauled in containers. Mine CLMP to be revised.	B
151	Water and sediment quality, vegetation, wildlife	Contaminant loading management plan	DAR	Follow the existing draft Contaminant Loading Management Plan and soil sampling along the road bed both before and during haul operations.	PR#55 p184		ROMP	In the ROMP	B
153	Water quality and quantity	Peatland drainage	DAR	Natural drainage patterns along the haul road will be preserved to maintain the natural function and processes of peatland habitats adjacent to the haul road.	PR#55 p185			UPD. Section 1.4.2.2 and integrated within preliminary road designs	B
154	Water quality and quantity	Refuelling	DAR	Trucks and equipment will be refuelled away from any stream, lake, wetland or other water body, per industry standards.	PR#55 p267		RCMP, ROMP, SCP	RCMP Section 2.9. ROMP Section 3.0	B
155	Water quality and quantity	Water extraction volumes	Technical Analysis	Water extraction from lakes will be limited according to lake volume as follows: Mosquito and Km 70 1%; Km 115 and Km 121 5%; Km 139 and Km 141 2%. Withdrawal rates noted above are based on each summer season. Withdrawal volumes will be tracked either by using an in-line flow meter, or by recording the number of fills of tanks of known capacity. Records will be kept and can be provided at regular intervals along with other road monitoring data.	PR#355 p4		RCMP	UPD Section 1.4.8	
156	Water quality and quantity	Watercourse crossings	Technical Analysis	CZN commit to performing the geotechnical and hydrological investigations required prior to final design of the watercourse crossings	PR#200 p26			UPD. Section 1.4.2.2	B
157	Water quality and quantity, aquatic habitat	Fuel	DAR	Fuel caches will be located on flat, stable terrain, or in a natural depression, away from slopes leading to water bodies, located above the Q100 high water mark, outside the defined riparian area of proximal bodies of water, will not be stored on the surface of frozen lakes or streams, will have secondary containment for stationary fuel containers with a capacity greater than 230 L, and the containment will be 10 percent greater than the capacity of the largest fuel container.	PR#59 p53		RCMP. SCP	RCMP Section 2.9 UPD. Section 1.4.6	B

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158	Water quality and quantity, aquatic habitat	Sediment control	Technical Analysis	Sediment control measures will be installed for any disturbed soils where there is a risk of sediment migration to surface water.	PR#246 p2	Measure 8-1, Part 3: Mitigate Impacts on Water Quality	SECP. RCMP	SECP Section 5.0. RCMP Section 5.0	B
159	Water quality and quantity, aquatic habitat	Stockpile placement	Technical Analysis	CZN commits to placing any stockpiles of rock and coarse material 50 m from flowing watercourses, and soil or fine material at least 100 m from flowing watercourses. Where this is not possible (e.g. in tight canyons or valleys), CZN will implement enhanced erosion and sediment control measures to avoid impacts.	PR#246 p1	Measure 8-1, Part 3: Mitigate Impacts on Water Quality	SECP. RCMP	SECP Section 5.2.3. RCMP Section 5.11 UPD. Section 1.4.4	B
160	Wildlife	Barging	DAR	Cease barging activities if Wood Bison are observed crossing the river near the barge location.	PR#55 p255	6-2, Part 3 Developer to prepare and implement a WMMP	WMMP. ROMP	ROMP, p.11	B
161	Wildlife	Baseline wildlife surveys	Technical Analysis	Additional baseline wildlife surveys for forest and wetland birds are planned for the May to June window, with input from ECCC and Parks Canada. The resulting data will be incorporated into adaptive management plans and may result in further mitigation actions. A suitable operations phase monitoring program will be developed with input from Parks Canada. At the time of the baseline bird survey, additional waterfowl and cliff-nesting raptor surveys may be conducted concurrently, and the black bear habitat potential maps may be updated with any new relevant information.	PR#282 p3	Measure 6-1, Part 1 Wildlife baseline information collection, monitoring, mitigation, and adaptive management program	Wildlife Management and Monitoring Plan	Baseline bird surveys and black bear habitat suitability mapping completed. Monitoring programs for construction and operations being developed in consultation with Parks Canada, ECCC, and GNWT. Adaptive management outlined in the WMMP	B
163	Wildlife	Bear den surveys	Technical Analysis	Pre-clearing denning surveys identified for Grizzly Bears also extends to Black Bears. Environmental Monitors will survey for wildlife dens in favourable denning habitat (e.g., borrow sources) prior to clearing.	PR#186 p9	6-2, Part 3 Developer to prepare and implement a WMMP	RCMP	RCMP Section 2.3, 5.2	B
162	Wildlife	Bear den surveys	Technical Analysis	Survey crews will conduct ground-based reconnaissance den surveys from KP 170 to KP 36. These ground-based surveys will cover the entire 134 km (KP 36 to 170) along the proposed all season road. An aerial den survey will focus on the area along the proposed all-season road (KP 36 to 170) with: 1) moderate and high denning potential, 2) known den(s) identified during the ground-based surveys, and 3) proposed winter clearing (after October 1). Ground and aerial surveys will include areas overlapping with the previously developed winter road. The aerial survey will consist of flying evenly spaced transects, with a higher survey intensity in areas of previously identified dens.	PR#341 p4	6-2, Part 3 Developer to prepare and implement a WMMP	WMMP	Pre-clearing denning surveys identified in the WMMP	B

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164	Wildlife	Caribou	DAR	An alert system will be used to warn personnel of Woodland Caribou and other sensitive wildlife in the local area by relaying sighting information to vehicles/aircraft and equipment operators and on-site personnel.	PR#55 p184	6-3 Reducing the risk of vehicle collisions with wildlife	TCMMP, ROMP	TCMMP Section 5.4 ROMP Section 3.10	B
165	Wildlife	Caribou	Technical Analysis	If caribou are reported on the road or within 500 m of it, traffic or activity will cease at least 500 m from (or at first observation of) the animal(s) and all headlights turned off until the animal moves off at least 100 m away from the road or 5 minutes after last visual. Once traffic resumes, speed reduced to half the posted speed limit, 30 km/hr, within 1 km of the sighting.	PR#186 p18	6-2, Part 3 Developer to prepare and implement a WMMP	TCMMP, ROMP	TCMMP Section 5.4 ROMP Section 3.10	B
166	Wildlife	Caribou	Technical Analysis	If caribou are reported beyond 500 m of the road, traffic speeds are to be reduced to half the posted speed limit, 30 km/hr, within 1 km of the sighting.	PR#186 p19	6-2, Part 3 Developer to prepare and implement a WMMP	TCMMP, ROMP	TCMMP Section 5.4 ROMP Section 3.10	B
167	Wildlife	Community engagement	DAR	The wildlife and wildlife habitat mitigation and monitoring plan will include annual engagement with members of the Naha Dehe Dene Band to monitor measureable parameters of effects.	PR#55 p184	6-1, Part 3 Wildlife monitoring programs	Wildlife Management and Monitoring Plan	Annual engagement, roles of the Technical Advisory and Road Oversight Committees, and annual reporting are outlined in the WMMP	B
168	Wildlife	Data sharing	DAR	The Dehcho Land Use Planning Committee (and others as requested) will be provided with the post-construction digital footprint of the all season access road and associated facilities to incorporate into ongoing cumulative effects monitoring across the Dehcho.	PR#55 p256		Wildlife Management and Monitoring Plan	The post-construction digital footprint of the all-season access road and associated facilities to be provided in association with the annual summary report, as outlined in the WMMP	B
169	Wildlife	Den and nest avoidance	DAR	Project employees and contractors will avoid all known or suspected den and nest sites.	PR#55 p257		RCMP	RCMP Section 3.3	B
170	Wildlife	Education program	DAR	An education program of wildlife related policies and mitigation will be provided to all Project employees and contractors, including a bear awareness program to ensure employees and contractors are informed of bears and other potentially dangerous wildlife and the level of risk.	PR#55 p184		RCMP	RCMP Section 3.2RC	B
171	Wildlife	Fuel	DAR	Fuel storage facilities will meet industry standards for tank construction, location and spill containment.	PR#55 p183		RCMP. SCP	RCMP Section 2.9 UPD. Section 1.4.6	B
172	Wildlife	Harlequin duck	Technical Analysis	Conduct any in-stream bridge construction work and in-stream Sundog re-alignment/armouring outside Harlequin duck occurrence (late April to mid-Sept) or when no flow.	PR#186 p21	6-2, Part 3 Developer to prepare and	Wildlife Management and	This Harlequin Duck mitigation and pre-construction monitoring	P

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				Should in-stream work be required during this time, the Environmental Monitor will first survey the area for the presence of Harlequin ducks within 500 m of the activity (both upstream and downstream) and in-stream work will cease if a Harlequin duck is present.		implement a WMMP	Monitoring Plan	outlined in the WMMP	
173	Wildlife	Harvesting	DAR	Prohibit hunting, trapping, harvesting, and fishing by site employees and contractors.	PR#55 p227	6-2, Part 3 Developer to prepare and implement a WMMP	RCMP	RCMP Section 3.5	B
174	Wildlife	Measureable parameters of effects	DAR	Amend the existing draft Wildlife Mitigation and Monitoring Plan, as necessary, to include the monitoring of measureable parameters of effects.	PR#55 p256	6-1, Part 3 Wildlife monitoring programs	WMMP	See revised WMMP	B
175	Wildlife	Pets	DAR	Pets will be prohibited along the all season access road.	PR#55 p185	6-2, Part 3 Developer to prepare and implement a WMMP	RCMP	RCMP Section 3.4	B
176	Wildlife	Pika	Technical Analysis	Within collared pika range and where talus is present, CZN commits to avoiding talus to the extent possible, and conducting presence/not detected collared pika surveys in all borrow sources selected for development and along the proposed all-season road alignment that disturbs talus. CZN commits to conducting pika surveys to determine their presence prior to development (e.g., road alignment, borrow sources) in pika habitat. Should pika's occupy a proposed borrow source or portion thereof, prior to development, a replacement borrow source or an unoccupied portion of the same source (as some sources are large) will be selected for use (after confirming that no pika's occur within a sufficient buffer distance identified by a biologist).	PR#341 p13	6-2, Part 3 Developer to prepare and implement a WMMP	WMMP	Pre-construction pika monitoring and mitigation for the life of the access road, including borrow development, is outlined in the WMMP	B
179	Wildlife	Pika	Technical Analysis	Additional mitigation, beyond that previously identified in the DAR (e.g., low truck volumes, reduced traffic speeds, dust suppression, response to accidental spills, prohibit littering) specific to collared pika are: prohibit storage of snow, including along roadside snow banks, on or within 10 m of talus habitat (within pika range); prohibit the disturbance of talus habitat (within pika range) year round unless pre-disturbance presence/not detected surveys have been completed and pikas were determined to be not present; and if required, determine a sufficient buffer distance from which borrow construction can occur near active pika habitat, based on guidance from a biologist.	PR#370 p85	6-2, Part 3 Developer to prepare and implement a WMMP	WMMP	Road/vehicle practices and procedures to manage hazards to pika and pika habitat for the duration of the Project are outlined in the WMMP including a sufficient buffer distance based on guidance from a biologist	B

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181	Wildlife	Policy	DAR	Wildlife will have the right-of-way, obligating drivers to stop (when safe to do so) for wildlife seen on or immediately adjacent to the road, to allow them to move away.	PR#55 p184	6-2, Part 3 Developer to prepare and implement a WMMP	TCMMP, ROMP RCMP	TCMMP Section 5.4 ROMP Section 3.10 RCMP Section 3.3	B
180	Wildlife	Policy	DAR	A no hunting policy will apply for all Project employees and contractors while working and/or at the Mine site.	PR#55 p183	6-2, Part 3 Developer to prepare and implement a WMMP	RCMP	RCMP Section 3.5	B
183	Wildlife	Problem Bears	DAR	Implement a protocol for dealing with problem bears, with a designated chain of responsibilities for ensuring worker safety and efficient and speedy resolution of incidents.	PR#55 p257	6-2, Part 3 Developer to prepare and implement a WMMP	RCMP	RCMP Section 3.3	B
184	Wildlife	Regulatory agency notification	DAR	The appropriate regulatory agencies (i.e., GNWT ENR and Parks Canada) will be contacted to receive additional direction regarding any new wildlife issues that arise.	PR#55 p258	6-2, Part 3 Developer to prepare and implement a WMMP	RCMP	RCMP Section 3.3	B
187	Wildlife	Reporting	DAR	Wildlife sightings along the access road and airstrip will be reported and evaluated, and if a problem area is identified, corrective management options for traffic and Project-related activities will be considered.	PR#55 p227	6-3: Reducing the risk of vehicle collisions with wildlife	TCMMP, ROMP	TCMMP Section 5.4 ROMP Section 3.10	B
186	Wildlife	Reporting	DAR	Report annual updates and results of the Wildlife Mitigation and Management Plan, Road Operations Plan, and inspections and enforcements.	PR#55 p215		TCMMP, ROMP	TCMMP Section 9.0, ROMP Section 7.0	B
188	Wildlife	Retarder Brakes	Technical Analysis	The use of engine retarders for braking will be discouraged but not prohibited since some road sections contain steeper portions, and drivers should retain the option to use any form of braking if necessary for safety.	PR#100 p47	6-2, Part 3 Developer to prepare and implement a WMMP	ROMP	ROMP Section 3.8	B
189	Wildlife	Snow removal practices	DAR	Snow removal practices along the access road and airstrip will avoid high snow banks, so that wildlife can readily move off as vehicles/aircraft approach.	PR#55 p184	6-2, Part 3 Developer to prepare and implement a WMMP	ROMP	ROMP Section 4.1.2	B
190	Wildlife	Technical advisory committee	DAR	Issues and considerations regarding wildlife populations and effects will be discussed during the Technical Advisory Committee (TAC) meetings proposed by CZN in EA0809-002. TAC meetings will include the all season road.	PR#55 p211	6-2, Part 3 Developer to prepare and implement a WMMP	WMMP	Annual engagement, roles of the Technical Advisory and Road Oversight Committees, and annual reporting are outlined in the WMMP	B

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191	Wildlife	Trumpeter swans	DAR	Pumping water from ponds occupied by Trumpeter Swans is prohibited during nesting.	PR#55 p215	6-2, Part 3 Developer to prepare and implement a WMMP	WMMP	Trumpeter Swan mitigation outlined in WMMP, which also includes Mitigation Audit monitoring by Environmental Monitor to ensure mitigations are being followed.	B
192	Wildlife	Use of explosives	Technical Analysis	Blasting is prohibited if caribou are observed within 1 km of the blast site until the animal moves out of the area.	PR#186 p17	6-2, Part 3 Developer to prepare and implement a WMMP	RCMP. WMMP EMP	RCMP Section 5.10	B
193	Wildlife	Waste management plan	DAR	The Waste Management Plan will prohibit littering, purposely feeding wildlife, and storing attractants accessible to wildlife. All waste foods and human garbage will be incinerated consistent with current industry good management practices to minimize wildlife attraction to the local area. Adaptive management will be applied to waste management practices. If wildlife are found to be attracted to the site (i.e., problem wildlife) additional management practices, if required, will be adopted.	PR#55 p185	6-2, Part 3 Developer to prepare and implement a WMMP	RCMP. WMMP. WMP	RCMP Section 2.11	B
194	Wildlife	Waste removal	DAR	Solid waste will be organized and stored securely so that it does not attract wildlife, will be removed from the site progressively as the operation is under way, and will be incinerated using a proper manner of incineration.	PR#59 p44		RCMP. WMP	RCMP Section 2.11	B
195	Wildlife	Waste removal	DAR	Non-combustible solid waste will be removed from sites by the end of construction and operation.	PR#59 p44		RCMP. WMP. RCRP	RCMP Section 2.11	B
196	Wildlife	Waste removal	DAR	Adaptive management will be applied to waste management practices. If wildlife are found to be attracted to the site (i.e., problem wildlife) additional management practices, if required, will be adopted.	PR#55 p185	6-2, Part 3 Developer to prepare and implement a WMMP	WMP. RCMP. WMMP	In WMP. RCMP Section 2.11	B
197	Wildlife	Western toads	Technical Analysis	CZN commits to collaborating with GNWT to enable a breeding pond survey by local environmental monitors in summer to detect the presence of Western toad in water bodies proximal to the road alignment between the Nahanni Butte access road and the Liard River. The survey will be conducted either before or after the early stage of construction (subgrade placement) to better understand the occurrence of Western toad in this area and potential need for mitigation during fall migration. If Western toad presence is confirmed in this area, the survey will be expanded progressively to other areas proximal to the road on the west side of the Liard River.	PR#263 p2		WMMP	Western toad breeding pond monitoring plan outlined in the WMMP outlines collaboration with GNWT	M

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198	Wildlife	Wildlife monitoring and mitigation plan updates	DAR	The existing draft WMMP will be updated to include all season monitoring and species potentially affected by all season access road/ airstrip use. Additional considerations include: mortality thresholds for additional species at risk (e.g., Trumpeter Swan, Collared Pika), Moose, and Dall's Sheep; monitoring, evaluating, and reporting harvest pressure, particularly along the Nahanni Range portions of the outfitter zone located outside the NNPR boundary; and, educating and promoting First Nations voluntary reporting of harvests from along the all season access road. If excessive use of the road occurs by non-residents, and hunting pressures or safety concerns result, additional access control measures will need to be considered involving local communities and government agencies.	PR#55 p34		WMMP. ROMP	Monitoring and adaptive management included in WMMP. Re harvest monitoring, see UPD Section 25	B
199	Wildlife	Wildlife sighting logs	DAR	Wildlife sighting logs are to be completed by all Project employees and contractors for wildlife sightings (e.g., Dall's Sheep, caribou, Wood Bison) with respect to species, location along the access road/ airstrip, numbers, and reaction to Project activity. If a problem area is identified, corrective measures will be considered.	PR#55 p184		TCMMP, ROMP	TCMMP Section 5.4 ROMP Section 3.10	B
200	Wildlife	Winter road management	DAR	The small portion of the winter road not used for all season access will be managed to prevent predator and non-Project related travel of the corridor, if necessary.	PR#55 p185	7-2: Harvest monitoring program (for the developer)	RCMP. WMMP	Openings to the ASR will be blocked. However, issue is moot since winter road sections not used are in open terrain or have already grown in.	B
201	Wildlife	WMMP Revisions	Technical Analysis	The proposed mitigation measures noted in DAR Addendum, Appendix E, Appendix C will be integrated into a revised draft of the WMMP.	PR#355 p12	6-2, Part 3 Developer to prepare and implement a WMMP	WMMP	Mitigation listed in Appendix C (<i>Summary of Potential Project Sources and Effects Mitigation</i>) integrated into the WMMP	B
202	Wildlife	Yellow Rails	Technical Analysis	Re Yellow Rails, natural drainage patterns will be maintained throughout the boreal forest zone, by careful placement of culverts and regularly inspecting drainage measures to identify areas that do, or might unexpectedly, pond water. Follow best management practice (Environment Canada, 2009): <ul style="list-style-type: none"> • 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 night-time activities (including light and noise) near breeding wetlands • No mowing of potential habitats when dry 	PR#186 p19	6-2, Part 3 Developer to prepare and implement a WMMP	WMMP. ROMP	UPD. Section 1.4.2.2 and integrated within preliminary road designs	B

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203	Wildlife mitigation and monitoring plan	Wildlife	DAR	ENR's Woodland Caribou Best Management Practices for Industrial and Commercial Activities (once developed) will be incorporated into the wildlife monitoring program, where feasible, to manage or mitigate habitat impacts and sensory disturbances on Woodland Caribou.	PR#55 p185	6-2, Part 3 Developer to prepare and implement a WMMP	WMMP	This commitment is included within the WMMP during the Mitigation Audit monitoring program and annual reporting	B
204	Wildlife, fish and aquatic habitat	Use of machinery	DAR	Machinery used in road building will arrive on site in a clean condition, free of any fluid leaks, invasive species and noxious weeds. Machinery will be operated outside of wetted channels in such a way as to minimize disturbance of banks and channel bed. Fording of fish-bearing streams will most likely not be required, but if needed, will be limited to once-over-and-back, with prior Inspector approval. Temporary crossing structures or at minimum, swamp mats, will be applied to protect banks and stream beds if rutting is likely to result during fording. Equipment will be washed, refueled or serviced away from streams and in such a way as to prevent deleterious substances from entering the water. Fuel and other materials for machinery will also be stored in such a way as to prevent any deleterious substances from entering the water.	PR#90 p14		RCMP. ISMP	RCMP Section 2.14	B
205	Wildlife, vegetation, fish and aquatic habitat	Sanitary and grey water	DAR	Sanitary and grey water will either be collected in tanks for subsequent transfer to trucks for off-site disposal at suitable locations, or processed locally (sumps), meeting the required standards for effluent dispersal. Specific locations will have approved plans which meet the regulatory requirements and site specific conditions.	PR#59 p44		Fisheries Application . WMP. WMMP	See UPD Section 1.4.7.4. Detailed designs and BMPs will be included in the fisheries application due at a minimum of several months before construction.	B
206	Wildlife, water quantity	Policy	DAR	Significant changes to water levels while pumping water from a known Beaver pond in the fall and winter periods will be avoided.	PR#55 p185	6-2, Part 3 Developer to prepare and implement a WMMP	WMMP	This mitigation is included in the WMMP and applicable for the duration of the Project. The WMMP also includes Mitigation Audit monitoring by CZN Environmental Monitor to ensure mitigations are being followed	B

New Commitments from EA Technical Report Response, Hearing and Closing, and UPD

ID	Topic	Subtopic	EA Phase	Commitment	Reference	REA Measure, Suggestion	Mgt/Mon Plan	Status	Land Mgr
207	Wildlife	Harvesting	Tech Rpt response	CZN agrees to provide support to NBDB to develop a harvest monitoring program to track and report on patterns and levels of harvest associated with the road, and to include this in the WMMP.		7-2: Harvest monitoring program (for the developer)	WMMP	Harvest Monitoring is a prime function of the checkpoint station. The Harvest Monitoring program is outlined in the WMMP including adaptive management decided with the Technical Advisory Committee	B
208	Wildlife	Caution Zones	Tech Rpt response	CZN will develop a more formal, detailed approach to identifying and communicating seasonal "wildlife caution zones. Road operations will be controlled using a Journey Management System (JMS). This system will include driver journey and incident logs which are compiled and wildlife sightings logged. Sightings will include the nature of the sighting and the location based on landmark and kilometre post (which will be sign-posted). The information will be noted by the driver at his next stop, and possibly by radio dispatch if animals are proximal to the road. Once a trend has emerged (which may occur over a few weeks), it will be discussed at pre-travel tail-gate meetings. Once an occurrence becomes common in terms of location, the road operations Supervisor will consider formalizing the caution zone with signage, although drivers will already be aware, and will have received instructions regarding caution. Road maintenance crews and environmental monitors will also be on the road, and they will also record wildlife sightings and provide the records for collation.			TCMMP, ROMP, WMMP	TCMMP Section 5.4 ROMP Section 3.10	B
209	Wildlife	Boreal caribou	Tech Rpt response	CZN will revise its WMMP to incorporate Commitment #6 from the technical session.			WMMP	Windrows, lumber or other brush clearing material to be installed during construction to reduce predator and non-Project travel and line-of-sight	B
210	Water Quality	ARD/ML	Tech Rpt response	All representative units will be sampled at all potential borrow source locations in order to identify any acid rock drainage and/or metal leaching potential that would impact water quality. Testing will be completed using acid-base accounting and metal leaching test methods to characterize representative units.			Geochem Verification Program	UPD Section 13	B

ID	Topic	Subtopic	EA Phase	Commitment	Reference	REA Measure, Suggestion	Mgt/Mon Plan	Status	Land Mgr
211	Water Quality	Sediment	Tech Rpt response	The SECP will be reviewed and finalized before commencing construction. Erosion and sediment control measures will be in place when constructing around fish-bearing waters. Appropriate setback distances from fish-bearing waters will be determined and implemented based on site conditions for the storage of potential TSS generating materials. Monitoring will be completed during construction periods, prior to spring freshet, and when rainfall events are forecast to ensure sediment and erosion control mitigation measures are effective.		Measure 8-1, Part 3: Mitigate Impacts on Water Quality, and Measure 8-1, Part 4: Monitoring	SECP. RCMP	RCMP, in Section 5.0	B
212	Water Quality	Sediment	Tech Rpt response	Comprehensive Project monitoring of TSS and turbidity will be completed and mitigation adjusted if needed.		Measure 8-1, Part 4: Monitoring	SECP	Sediment monitoring outlined in Sections 6.2 and 6.3 of CZN SECP.	B
213	Concentrate and material transport	Dust	Tech Rpt response	Monitoring of annual soil, snow, dustfall, and ambient dust sampling will be included in the CLMP. This will include trigger or action levels and adaptive management plans			CLMP. ROMP	Soil & monitoring in the ROMP. Dust fall in CLMP. Snow monitoring not appropriate for an all season road.	B
214	Fish and aquatic habitat, water quality and quantity	Fish Passage	Tech Rpt response	<p>CZN will implement all available best management practices to avoid, mitigate, or offset serious harm, as defined in the Fisheries Act, as a result of water crossing construction, operation, and decommissioning. This includes, but is not limited to: appropriate design of water crossings to facilitate passage at both high and low flows; bank stabilization by protecting and restoring riparian vegetation; adhering to timing windows to avoid spawning, incubation, and hatch times for all species using the water courses, and the installation and maintenance of sediment and erosion control measures.</p> <p>An appropriate water crossing maintenance and monitoring plan will be in place to ensure that barriers to fish passage do not form over time as a result of crossing damage due to ice blockage, flooding or movement of debris, such as may occur at freshet.</p>		Measure 8-1, Part 1, 2, 3	SECP. ROMP	UPD Section 1.4.2.2 ROMP Section 4.0, 5.0. SECP Sections 5 and 6.	B

ID	Topic	Subtopic	EA Phase	Commitment	Reference	REA Measure, Suggestion	Mgt/Mon Plan	Status	Land Mgr
215	Heritage and cultural resources	Archaeological Surveys	Tech Rpt response	The Terms of Reference for the proposed all season road AIA (PRD #379) will be developed in collaboration with, and approved by, Parks Canada. The AIA will incorporate systematic shovel testing as well as ground sleuthing in areas of enhanced archaeological potential based on: (1) elevated areas of archaeological potential identified in the GIS Potential Model Categories 1-4 outlined in the AOA and further clarified in the TOR developed with Parks Canada; (2) areas of project impacts including borrow sources, water course crossings including bridge and culvert installation, borrow access roads, camps, staging areas, right of way and road realignments; and (3) incorporating traditional knowledge from Indigenous communities that may have knowledge of the project area including place names, traditional land use and harvesting in areas proximal to the footprint of an all season road.				See UPD Section 8. Mostly already done but main AIA to come.	B
216	Heritage and cultural resources	Archaeological resource protection	Tech Rpt response	The Cultural Heritage Protection Plan and heritage resource booklet will incorporate the findings of the AOA and AIA. Parks Canada will have an opportunity to review the content of the Cultural Heritage Protection Plan. The Cultural Heritage Protection Plan and heritage resource booklet will be used to provide training and direction on the accidental recovery of heritage resources during the construction phase. Within the Cultural Heritage Protection Plan, mitigations associated with the accidental discovery of heritage resources in NNPR shall stipulate that all work is stopped and Parks Canada is contacted for advice prior to proceeding.				Plan will be developed after main AIA. Also, these measures already in draft LUP (UPD Appendix 8)	B
217	Water Quality	Sediment	Tech Rpt response	CZN shall develop a detailed program to monitor the short-term effects of construction on surface water quality.		Measure 8-1, Part 4: Monitoring	SECP	Short-term sediment monitoring outlined in Section 6.3 of CZN SECP.	B
218	Water Quality	Sediment	Tech Rpt response	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.		Measure 8-1, Part 4: Monitoring	SECP	Long-term sediment monitoring outlined in Section 6.4 of CZN SECP.	B

ID	Topic	Subtopic	EA Phase	Commitment	Reference	REA Measure, Suggestion	Mgt/Mon Plan	Status	Land Mgr
219	Water Quality	Grey Water	Tech Rpt response	<p>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.</p> <p>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 Parks Canada prior to construction, and will include:</p> <ul style="list-style-type: none"> a. a design of the grey water septic system being proposed, b. the soil stratification for all proposed locations, c. the depth of the water table, d. the distance to nearest water course/ water body and potable water source. <p>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.</p>			WMP. RCMP. ROMP	UPD Section 1.4.7.4. Grey water management practices included in the WMP	
220	Water Quality	Brown Water	Tech Rpt response	<p>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:</p> <ul style="list-style-type: none"> a. a design of the sewage treatment system being proposed in accordance with accepted standards and guidelines, b. in the case of a septic system, a soil stratification for all proposed locations, c. the depth of the water table, d. the distance to nearest water course/ water body and potable water source. 			WMP	UPD Section 1.4.7.4. Grey water management practices included in the WMP	
221	Emergency Response	Spill plans	Tech Rpt response	<p>Spill Contingency and Response Plans will be informed by the updated road design, operation plans and risk assessment. They will address separate phases of the project, including: construction, operations, and closure. Each Spill Contingency and Response Plan is to be developed and approved prior to each project phase.</p>			SCP	The SCP will be informed by the updated road design, operation plans and risk assessment and will be modified to address each phase of the ASR project	

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222	Permafrost	Monitoring	Tech Rpt response	A draft Permafrost Monitoring and Response Action Plan will be completed after detailed design and before construction, with plan review and update within 12 months of the completion of construction.		Measure 12-1, Part 4: PMP	PMP	Draft program outlined in Sec. 6.0 of the PMP. Draft Action Plan outlined in Sec. 7.0 of the PMP.	B
223	Road Design	Permafrost	Tech Rpt response	<p>The detailed road design is subject to review and approval by Parks Canada for portions of the road within the NNPR prior to construction. The road design shall include:</p> <ul style="list-style-type: none"> • Design report, drawings and construction specifications that are signed and stamped by a professional engineer. • A road design informed by industry best practices, including, Transport Association of Canada (2010). Guidelines for Development and Management of Transportation Infrastructure in Permafrost Regions. May 2010. • A road design that considers the construction, operations and closure phases of the project. <p>Factual reports that document the site specific geotechnical and permafrost investigations and results utilized in the production of the road detailed design will be included.</p>		<p>Measure 12-1, Part 2: Permafrost Investigations</p> <p>And</p> <p>Measure 12-1, Part 3: Design and Construction of the Project</p>	PMP	UPD. Section 1.0. Preliminary ASR road designs, ongoing.	P
224	Reclamation	Plans	Tech Rpt response	<p>CZN will 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.</p> <p>A draft detailed reclamation plan, including monitoring plan, is subject to review and approval by Parks Canada prior to construction, with an update after construction. The reclamation plan will include:</p> <ul style="list-style-type: none"> • 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. 			RCRP	Closure objectives and implementation details provided in RCRP	B

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225	Wildlife	Pika	Tech rpt Att. 1	CZN will update the WMMP to include a Collared Pika monitoring program in collaboration with Parks Canada and the GNWT to monitor potential effects associated with the proposed all-season road.		6-1, Part 3: Wildlife monitoring programs	WMMP	See WMMP	B
226	Wildlife	Trumpeter Swans	Tech rpt Att. 1	<p>Frequent, long-term and large disturbances, multiple sources of disturbances, and noise emissions greater than 50 dB (or greater than 10 dB above ambient) will be avoided within 800 m of observed Trumpeter Swans.</p> <p>Mitigation and monitoring efforts will be focused in sections where the Project overlaps the Southeastern Mackenzie Mountain Key Migratory Habitat Site (NT Site 17).</p> <p>CZN will ensure mitigation and construction monitoring efforts will focus on areas where the Project overlaps key migratory bird habitat (including between KM 98 to 117), and where Trumpeter Swans are observed (including between KM 98 to 117).</p> <p>Construction activities (if critical for development, including crushing but excluding blasting) may occur within 800 m of observed Trumpeter Swans (from April 1 to September 30) with the assistance of a CZN Environmental Monitor.</p>		6-2, Part 3 Developer to prepare and implement a WMMP	RCMP. WMMP	RCMP Section 3.3, 5.1	B

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227	Wildlife	Migratory birds	Tech rpt Att. 1	<p>All phases of the Project will be carried out in a manner that protects migratory birds and avoids harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests or eggs.</p> <p>A scientifically sound approach to determine the likelihood of nesting birds will be used in the event that clearing or disturbance cannot be scheduled outside of the nesting season. If necessary, the use of non-intrusive search methods (e.g., point counts) could be undertaken to conduct an area search, for evidence of nesting, prior to the commencement of clearing.</p> <p>If necessary, migratory bird surveys will carried out by an avian specialist with experience with migratory birds and migratory bird behaviour indicative of nesting (e.g., singing birds, alarm calls, distraction displays, carrying nesting material or food).</p> <p>Results from all pre-clearing surveys will be reported in the annual wildlife monitoring report.</p> <p>Options such as avoiding, adapting, rescheduling or relocating activities, will be considered and implemented if there are indications of migratory bird nests where disturbance activities that have the potential to disturb or destroy nests are proposed.</p> <p>All disruptive activities in the nesting area will be halted if migratory bird nests containing eggs or young are discovered. An appropriate buffer zone (i.e., setback distance) will be determined and observed until the young have naturally and permanently left the vicinity of the nest. Buffer zones will be appropriate for the species and take into consideration the intensity of the disturbance and the surrounding habitat. Buffer zones will also be adjusted after assessing their effectiveness.</p> <p>A buffer zone for forest songbirds will be included in Appendix C of the WMMP.</p> <p>If required, ECCC will be contacted for advice and/or additional mitigation measures.</p> <p>All of the above recommendations will be incorporated into the next revision of the WMMP.</p>		6-2, Part 3 Developer to prepare and implement a WMMP	RCMP. WMMP. EMP	RCMP Section 3.3,5.1, UPD Section 1.4.1.3. Clearing scheduled during non-nesting periods.	B

ID	Topic	Subtopic	EA Phase	Commitment	Reference	REA Measure, Suggestion	Mgt/Mon Plan	Status	Land Mgr
228	Wildlife	Species at Risk	Tech rpt Att. 1	<p>Section 2.3.2 of the Updated Draft WMMP will be revised to reflect that the general prohibitions for migratory birds and aquatic species listed on Schedule 1 apply wherever these species are found.</p> <p>Table 1 of the Updated Draft WMMP will be revised to reflect current status of species listed on Schedule 1 of SARA or assessed by COSEWIC. Table 1 will be revised and included as part of the annual monitoring reports to aid in remaining aware of status changes while minimizing the number of revisions to the WMMP. The Species at Risk Registry will be consulted on a regular basis to maintain the most current information, including new COSEWIC assessments and/or species added to Schedule 1 of SARA.</p> <p>If species at risk are encountered or affected by the Project, the primary mitigation measure will be avoidance. Contact with or disturbance to each species, its habitat, and/or its residence will be avoided.</p>			WMMP	Commitments outlined here are included in applicable sections of the WMMP	
229	Wildlife	Avian Species at Risk	Tech rpt Att. 1	<p>ECCC will be consulted regarding migratory bird mitigation measures and advice for Project areas outside the Nahanni National Park Reserve.</p> <p>The absence of nesting avian species at risk (and other migratory birds) will be confirmed in borrow and gravel pits prior to commencing disruptive activities during the general nesting period (May 1 to August 20). If work commences, monitoring for the absence of nests at borrow and gravel pits will continue throughout activities.</p> <p>Staff and contractors will be made aware of the conservation status of all species at risk that could be encountered at the Project. Staff and contractors will also be made aware of the potential of species at risk to use anthropogenic habitats and structures for nesting, the reporting protocol and all appropriate mitigation measures.</p>			WMMP	Mitigations outlined here are included in the WMMP, including a Mitigation Audit program and staff/contractor education and awareness training	
230	Wildlife	Boreal caribou	Tech rpt Att. 1	<p>CZN will consult with the GNWT regarding the adequacy of the proposed mitigation and monitoring measures for Boreal Caribou.</p>			WMMP	Discussions with GNWT have begun regarding proposed mitigation and monitoring. WMMP provided for review	

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231	Wildlife	Pika	Tech rpt Att. 1	CZN will include in its final WMMP the Collared Pika commitments outlined in its response to MVEIRB IR#5 (PR 320), and will conduct long-term monitoring of Collared Pika abundance and patch occupancy in talus habits within 300 m of the road, with input on study design from the GNWT and Parks Canada. The resulting data from surveys will be incorporated into adaptive management plans and may result in further mitigation actions.		6-1, Part 3: Wildlife monitoring programs 6-2, Part 3: Developer to prepare and implement a WMMP	WMMP	Practices and procedures to manage hazards to pika and pika habitat are outlined in the WMMP as well as pika effects monitoring and adaptive management	
232	Permafrost	Investigation	Tech rpt Att. 2	Detailed geotechnical investigations will be undertaken, including geophysical surveys, to better define the locations and characteristics of permafrost soils. Detailed geotechnical/geophysical investigations are required for both the road and borrow/quarry sources. The potential of icing and drainage blockage along the road will be identified during detailed design. Transport Association of Canada (2010) Guidelines for Development and Management of Transportation Infrastructure in Permafrost Regions will be followed. A design for closure will be developed that allows CZN to walk away.		Measure 12-1, Part 1: Introduction, and Measure 12-1, Part 2: Permafrost Investigations	PMP	Plans for future permafrost investigation are outlined in Section 5.1 of the PMP.	B
233	Fish	Authorization	Tech rpt Att. 3	CZN will apply for a Fisheries Act Authorization (Paragraph 35(2)(b) Fisheries Act Authorization [Normal Circumstances]) which will include an offset plan and monitoring plan. The aquatic habitat (below the HWM) and under the planned footprint of the diversion berm will be included in habitat accounting.		8-1, Part 2, 4	fisheries application	Application for a fisheries act authorization will be completed several months prior to road construction	B
234	Fish	Habitat	Tech rpt Att. 3	CZN will implement natural channel design principles into the proposed constructed channel. CZN will also apply natural features (e.g., boulders) at regular intervals to mimic habitat currently available in the old channel, and ensure that the new channel provides similar flow capacity, velocities (throughout) and habitat as the current channel.		9-1, Part 1	fisheries application; diversion design	Detailed designs will be included in the fisheries application due at a minimum of several months before construction.	P
235	Fish	Flows	Tech rpt Att. 4	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.		9-1, Part 1 to 5	fisheries application; diversion design	Revised hydraulic modeling will be included in the fisheries application due at a minimum of several months before construction.	P
236	Fish	Habitat Offset	Tech rpt Att. 7	CZN will continue to work with DFO, Parks Canada and Aboriginal groups to identify suitable offsetting opportunities.			fisheries application; SCDP.	Communications with DFO and Parks Canada on-going. Offset details contained in SCDP.	B

ID	Topic	Subtopic	EA Phase	Commitment	Reference	REA Measure, Suggestion	Mgt/Mon Plan	Status	Land Mgr
237	Fish	Riparian Veg.	Tech rpt Att. 7	CZN will follow standard best management practices for the removal of riparian vegetation, where practical and feasible.			fisheries application;	BMPs will be included in the fisheries application due at a minimum of several months before construction.	B
238	Road	Design and Risk	Hearing	An independent technical review panel will be formed. The mandate of the panel would be to recommend road design principles. Improvements and/or updates to the existing risk assessments would be part of the panel's scope. The panel would be free to make recommendations regarding the proposed road operations and maintenance requirements to promote safety and reduced risk. Panel member selection will include a short list of potential candidates who are Professional Engineers, have worked on previous road projects in the North and are free from conflict with CZN's engineering team and Oboni Riskope. Three panel members will be selected and the scope and mandate for their work will be agreed with them, followed by the preparation of a report detailing the selection process and panel terms of reference. This report would be submitted to the Mackenzie Land and Water Board, the GNWT and Parks Canada for comment.				UPD Section 3.	B
239	Littoral Zone	Lake Levels	Closing	CZN will install water gauge stations at the lakes from which water will be withdrawn for dust control. CZN will create a monitoring program, with input from DFO and Parks Canada, based on the water gauge stations, specifying when lake level readings will be taken and outlining actions to be taken if recharge assumptions are not met.				UPD Section 1.4.9.	B
240	Water Quality	Sundog Creek	Closing	The TSS and turbidity of the Sundog Creek realignment will be monitored before and after realignment, until such time as the data supports a conclusion that water quality is no longer being affected by the realignment. The monitoring will may lead to adaptive management if thresholds or triggers are exceeded.		9-1, Part 2 to 5	fisheries application; diversion design	Baseline monitoring will begin during the Spring of 2019	P
241	Risk Assessment	Updated risk assessment	Hearing	Canadian Zinc will provide an updated risk assessment as part of detailed design.	PR#532			Part of the design development plan.	B
242	Access Control	Liard crossing location	Hearing	Canadian Zinc will commit to routing the Liard River winter crossing completely through the territorial land surface lease on the north shore of the Liard River.	PR#532		TCMMP	Consistent with design drawings in the UPD, Appendix 1-16	M
243	Access Control	Surface leases	Hearing	Canadian Zinc will exercise its right to control access on the surface leases	PR#532		TCMMP. ROMP	Noted as such in the plans.	M

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244	Emergency Response	Plans	Hearing	Canadian Zinc commits to an emergency response plan that includes emergencies other than spills.	PR#532		HSERP	Plan covers all emergencies.	B
245 *	Wildlife	Incidents		Regular reporting and analysis of the wildlife mitigations and monitoring programs are a component of the adaptive management process, whereby the data are analyzed for issues or potential problems, such as seasonal concentration areas or sections along the Access Road that have a higher risk of incidences or near miss occurrences. Results of these analyses will contribute to annual summary reports and comprehensive reports every five years. The annual summary reports will be provided to regulators and First Nations groups.			WMMP	In the plan	B
246 *	Hydrology	Sundog Diversion		Parks Canada has expressed concern over reliance on a single method of flow estimation, and recommended that "CZN shall provide at least one supplementary hydrotechnical calculation (based on existing information) for Sundog Creek as a check to support or correct the hydraulic model utilised for Sundog Creek." Canadian Zinc committed to provide this and has initiated a review of existing climate data to be used in a hydrologic model approach.				See UPS Section 6.2	P

* New