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

APPENDIX 1-10

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:

Canadian Zinc Corporation
Vancouver, BC, V6B 4N9

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BORROW PIT MANAGEMENT AND RECLAMATION PLAN

Prairie Creek Mine Access Road

1 BACKGROUND

Canadian Zinc Corporation (CZN) is seeking to begin operation of the Prairie Creek Mine located in the south west corner of the Northwest Territories approximately 555 kilometers west of Yellowknife, 330 kilometres north of Fort Nelson, B.C.

The “Prairie Creek Mine Access Road” is a 184 km proposed route connecting the mine site to Highway 7 near the community of Nahanni Butte. The construction of this all season access road will require borrow material from defined locations to support the construction of road subgrade, running surface, road protection and stabilization, stream protection and stabilization, operational areas such as camps, load-outs, airstrip, and bridge construction. Borrow material will also be required for long term road maintenance, such as sanding, and required minor road upgrades and repairs.

To date, the original alignment contains a total of 82 borrow locations identified with 28 locations listed as back-up locations or if the alternate alignment is selected, 86 borrow locations identified, with 30 locations listed as back-up locations. This would include all types of borrow, clay/silt/sand for subgrade, aggregate for subgrade or running surface, or rock quarry to serve as subgrade, road surfacing (crushing required), or road/stream stabilization or protection. The borrow areas have been defined with limited sample data collected. A detailed site evaluation, including improved sampling, will be conducted to select the appropriate borrow location, and quantify borrow area/volume. A “Detailed Borrow Site Plan and Design” (DBSPD) would be completed on those sites selected for borrow location.

2 SCOPE

This plan is intended to provide general management guidelines and approaches to develop, extract, and reclaim all borrow sources located “outside” the prescribed road right of way clearing. It will include all areas disturbed outside of this right of way, including access roads for borrow material. Borrow material extraction within the road right of way is addressed in a companion document titled “Road Construction and Maintenance Plan”.

A “Detailed Borrow Site Plan and Design” (DBSPD) would be completed for each selected borrow location. This site specific, detailed design would provide any unique directions in regards to development, extraction, and reclamation on a site by site basis, and would reflect the following:

- Buffer strips or zones between borrow and riparian zones of water bodies.
- Surface water runoff from the borrow site cannot directly enter a natural water body. Water will be directed away and be allowed to naturally filter through forested areas or bogs to minimize soil erosion. If surface water cannot be directed away from the water body, then appropriate



water settling structures, capable of handling the water quantity, must be installed to allow natural settling and filtering of the water.

- Re-direct all surface water away from the borrow location to prevent surface water entering, and ponding, in the borrow area.
- Slope stability, with final contouring and shaping.
- The presence, quantity, and extent of permafrost and/or ice rich soils.
- Nature and location of any required access roads.

3 RESPONSIBILITY AND AUTHORITY

CZN will have final ownership of the access road and supporting infrastructure and will have responsibility and authority to enact, and delegate, this plan. As the project progresses and contractors are established, CZN will direct and forward responsibilities, as required. CZN will ensure, either directly or via delegated authority, that all conditions of regulatory permits are met.

4 STRIPPING AND GRUBBING

Prior to initial stripping, the borrow area shall be clearly defined and field marked. The site will be inspected jointly with CZN's designated environmental monitor (EM), road construction foreman, and equipment operator(s) working on the site. The EM will clearly review with the road construction crew the DBSPD specifically for that site identifying all concerns and unique situations relating to that site. This would include all necessary precautions regarding surface water management, sedimentation, and erosion protection. Depending on the season of activity, unique seasonal precautionary measures may be required, such as a nesting bird survey during spring/early summer. However, the EM will be responsible for addressing these measures and giving the construction foreman the 'all clear' before work commences. Necessary procedures and plans will be made available to all parties; check lists will be marked and signed off. Stripping and grubbing will then proceed when all aspects of the DBSPD have been formally reviewed.

The Stripping and Grubbing process would implement the following:

- The DBSPD would identify a prescribed area designated for temporary storage of stripped material. Stripped material would include all material not useable for road construction which includes organic top soil, woody material, roots, un-useable mineral soils, and ice rich soils. If topsoil and organic material are in sufficient quantity, they will be stored separately.
- The prescribed area to store stripped material would be located to allow access for future reclamation activities.
- All prescribed precautionary measures would be taken, such as installation of silt fences and settling arrangements. These measures may not be required during winter borrow development, but must be in place if the borrow and/or stored material will remain after winter.



- Equipment operators must be familiar in identifying various types of stripping material, and actively sort and separate organic top soils, large woody debris, un-useable mineral soils, and ice rich soils.
- Following the completion of stripping, all piles will be secured properly for erosion/sedimentation protection, surface water management including water bars and ditches if required. If borrows are developed in winter, only those piles that will remain after winter need be secured. Borrow sources identified as permanent will require additional, long term stabilization and protection measures for the stripped waste piles to ensure long term future reclamation access. These measures would be defined in the DBSPD.
- All attempts will be made to only clear sufficient area to meet road construction obligations and expand the borrow size as required. This is particularly important with larger borrow locations to avoid a greater disturbed area than what was initially intended and required to meet construction requirements.

It is important to note that borrow sources located in mountainous areas may have very thin top soils with small diameter trees and shrubs, and may not produce large stripped volumes. Limited stripped volume may limit the options available for future borrow site reclamation.

5 TEMPORARY VS PERMANENT BORROW SOURCES

The borrow pits would be defined as temporary or permanent. The majority of borrow sources would be temporary, generally utilized for construction only and being active for up to 3 years. Reclamation would follow after the pit is declared inactive and when site conditions allow.

Permanent sources would include those sources primarily utilized for future road repairs and improvements, road surfacing, winter sanding operations, and rock quarries for future rip rap, stream and road armoring. In the selection process, the permanent borrow sources would preferably be located within close proximity to the main access road, however limited availability of suitable borrow, particularly in the eastern half of the road, may dictate the selected permanent borrow sources. The timing of reclamation of permanent borrow sites will be based on long term future demand and available volume. Reclamation of these sites will occur within 1 year of being considered "not needed", or otherwise as part of the final reclamation of the main access road.

6 FROZEN SOILS / PERMAFROST / ICE RICH SOILS

Given the location of the project, either frozen soils and/or permafrost conditions may be encountered. Investigations prior to the DBSPD should detect and identify most permafrost/ice rich conditions, and would be part of the selection of borrow locations and description of appropriate measures if selected. Borrow sites with significant permafrost/ice rich would only be utilized if no other reasonable source is available. If these locations are utilized, the following would be implemented:

- Small concentrations or volumes could be removed and stored with (but separated from) the stripping and grubbing pile. The material would then be restored during the reclamation process.



- Larger concentrations or volumes with permafrost/ice rich material would be stockpiled to allow the natural thawing, water drainage, and drying process to occur over time until the material can be utilized in the road structure. Additional measures will be taken to manage the thawing process which would include using either a well drained base underneath the stockpile to aid the draining process, or provision for management of seepage, sediment and the potential for sloughing.
- Borrow sources with permafrost will have additional un-disturbed clearance defined around the perimeter to account for potential future settling and slumping.
- Water ponding in and around the permafrost will be avoided as it tends to accelerate the thawing process.
- Buffer strips between external borrow sources and the road right of way will be maintained, as necessary, to allow natural settling to occur without degrading the road structure.

7 ARD AND HIGH SULPHUR CONTENT SHALE

The potential for acid rock drainage (ARD) material or high sulphur content shale will be further assessed as part of borrow site investigation, although the potential is considered to be low given the current knowledge of local geology. Any suspect material on visual examination will be subject to testing. Depending on results, the site will be rejected or a specific material management plan developed, such as separate storage of material for later placement at the bottom of the pit during reclamation. The same approach applies if such material is not found during the initial investigation, but is subsequently suspected during pit development.

8 ACCESS ROADS

The majority of identified borrow is within close proximity to the proposed road right of way. Short access roads (<100m) may be required to access borrow volume, and the disturbed area is included in the defined area. A total of 12 borrow sites may require access roads outside the defined borrow area.

The following standards will apply to access roads connecting borrow locations to the road right of way:

- Running surface width of 3.5m and 15m wide right of way clearing.
- Ditching only as required for temporary borrow sources. Permanent access roads will be ditched as required to maintain natural drainage patterns.
- Pullouts only as required to maintain equipment productivity
- When possible, winter access roads will be constructed (snow and ice) to avoid additional stripping.
- Stripped material will be placed to one side, typically the lower side, to be available for future reclamation.



- Standard operating procedures would be followed for any stream crossing. Winter access only would utilize ice/snowfill, and permanent roads would require similar crossing approaches as applied on the main access road. Based on the pit access roads as presently defined, all but one avoids any significant stream. BP 47A & B requires a stream crossing

9 WASTE AREAS

The same practices and procedures utilized for borrow extraction will be applied to any waste areas. Following stripping and grubbing, waste material will be deposited within the prescribed area and compacted as required to ensure future stability. The final waste pile will be contoured and shaped to fit the site location with preferably 3:1 slopes (minimum 2:1 for fine material, steeper for coarse rock material).

The road construction process may generate some natural material undesirable for construction, either woody debris, timber volume, or stripped overburden which cannot be disposed of within the existing road right of way. If this situation is encountered, this material may be wasted in a nearby, suitable disturbed area such as a depleted borrow location. The standard reclamation approach would be followed.

10 ROCK QUARRIES

A number of rock quarry pits have been identified for the project. The characteristics of most rock quarries will not allow the normal shaping, contouring, and reclamation approach as other borrow sources. As rock quarries become depleted or decommissioned, the rock face would be left in a stable condition. Proper signage would be placed at any entry points to those quarries which have a significant risk related to rock stability or rock fall. Additional measures will be developed if the pit constitutes a hazard to humans or wildlife. Access roads will be deactivated to discourage entry.

11 RECLAMATION

The reclamation of all borrow and waste areas is required to enhance the natural re-vegetative process and help establish a stable ecosystem. The goal of reclamation is to enable the disturbed area to return to productive use in the context of the surrounding area. The reclamation process will re-vegetate and restore temporarily disturbed areas in a manner that is environmentally sound; will reduce erosion and transport of sediment-laden water; and is consistent with sustainable development. The primary areas that will require reclamation are the borrow/waste pits and their temporary access roads.

CZN will ensure that the onsite reclamation activities include but are not limited to the following:

- Temporary support facilities and camp infrastructure, including buildings, equipment, surplus construction materials and wastes from the work site(s), will be removed and subsequently re-used or disposed of in appropriately authorized facilities.
- Excavations (if any) will be backfilled i.e. excavations other than the borrow pits.



- Topsoil will be salvaged and stored where possible and warranted for later use in reclamation.
- Equipment operators will be trained on how to identify and separate surface soil from subsoil.
- Salvaged soils will be protected, as necessary, for future use in reclamation/restoration activities.
- Stockpiled soils will be located and flagged during periods of longer storage so they will not be disturbed until required for reclamation. Stability and the appropriateness of storage areas will be considered if the volume of soil is large. In any event, stockpiled soils will be stored to prevent erosion.
- Coarse woody debris, if available, may be used for erosion protection.
- During clearing and grubbing of new borrow pits, large woody debris and suitable snags will be stockpiled separately for potential later use during reclamation. Other organic material will be stripped and stockpiled within the Project area
- During reclamation, any stockpiled organic material will be utilized in the best way to achieve reclamation objectives.
- Any surplus material disposed of into new or existing borrow pits will be done as follows:
 - i. Surplus material will preferably not be used as top dressing during final re-contouring.
 - ii. Surplus material will not be placed so as to 'contaminate' stockpiled organic material.
 - iii. If a berm is required to store surplus material in excess of what can be placed to fill extracted depressions, the berm will be installed on the road side of the borrow pit, where possible.
- Sites will be graded and re-contoured to blend with adjacent areas, as much as possible. The original drainage patterns will be re-established as much as possible, but additional water flow will not be directed into the borrow area. Water bars are to be installed as required to maintain natural drainage patterns.
- Borrow pit banks will be re-contoured to preferably no steeper than 3 horizontal to 1 vertical ratio (minimum 2:1, except rock quarry pits) to allow larger animals to safely enter and exit the pit, and to promote the establishment of emergent vegetation.
- Soils in areas that have been compacted by traffic from heavy equipment or other vehicles will be ripped or scarified to reduce surface compaction (especially on the borrow pit access roads).
- Re-vegetation will be accomplished through natural regeneration.

12 INSPECTION AND MONITORING

An inspection and monitoring program will be established starting when the first material is stripped from the site until the site has stabilized after reclamation. Disturbed areas utilized for borrow would be considered stable when, under normal conditions:

- re-vegetation is occurring, consistent with the local area.
- surface water is being contained and managed with no significant erosion or sedimentation.
- no slope or soil stability issues exist.

The time required for stability would vary on a site by site basis. During road construction, an Environmental Monitor would be onsite monitoring all activities, including borrow pit development



and operation. Periodic environmental monitoring of reclamation will also occur at a frequency dependent on reclamation progress.

On completion of access road construction, responsibility for the condition of the road and related facilities would shift from the construction foreman to the Road Operations Manager. He would be responsible to coordinate as required inspections of borrow sites not yet classified as stable.

13 REVISION HISTORY

Rev.#	Date of Issue	Reviewed By	Approved By	Description
1	2015 Aug 31	EK		Initial Guide