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

APPENDIX 12-1

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:
Canadian Zinc Corporation
Vancouver, BC, V6B 4N9

February 2019
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Revision History

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<th>Revised By (Initials)</th>
<th>Revision Date</th>
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<td>Initial Version</td>
<td>Allnorth</td>
<td>2012-04-24</td>
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<td>B</td>
<td>Version 2</td>
<td>Tetra Tech</td>
<td>2018-11-30</td>
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Review and Approval

The following signatures indicate that the undersigned have read and agreed to the contents of this document, and that they approve and accept its distribution and use.

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<td>David Harpley</td>
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<tr>
<td>Approved by:</td>
<td>Full Name, Job Title</td>
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Distribution List

This Plan and the most recent revisions have been distributed to:

Copy #1 –
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PLAIN ENGLISH SUMMARY

The purpose of Canadian Zinc Corporation’s (CZN’s) Waste Management Plan (WMP) is to ensure that all wastes produced by activities associated with the construction and operation of the Prairie Creek Mine All-Season Road (ASR) are handled, transported, stored or disposed of in a safe and responsible manner and comply with all applicable legislation, regulations, authorizations, permits and licenses for the duration of the Project.

Road construction, operations and related infrastructure such as the camps and trucking operations are expected to produce small volumes of waste on a yearly basis. Road construction crews will likely use portable day trailers and accumulate modest volumes of domestic waste, sewage (black water) and grey water (wash water). The ASR maintenance camps will also generate domestic waste and sewage. The intent will be to temporarily store these wastes at the road camps. Domestic waste will be collected regularly and transported to the Prairie Creek Mine or a suitable off-site landfill. Sewage and grey water from the construction camps will either be treated on-site (larger camps) with disposal of effluent via septic fields or taken to the Mine for treatment. Sewage from maintenance camps will either be taken to the Mine or disposed of in pit latrines. Maintenance camp wash water will be handled as for construction camps.

The Plan identifies the types of wastes that will be produced by the project and the procedures to promote the reduction, reuse, and recycling of the waste materials. It also describes the practices and procedures for waste handling, collection, storage, transport, and disposal. Waste addressed are: domestic wastes (combustible and non-combustible - non-hazardous wastes); hazardous wastes; recyclable waste; domestic sewage and wash water; excavated material; and, waste explosives. Excavated material will consist of organic material and strippings that cannot be used in road construction. More detail is provided in the Road Construction Plan (RCP). Waste explosives are covered in more detail in the Explosives Management Plan (EMP).

The WMP is a living document that will be updated throughout the life of the Project to adapt to and incorporate any changes (in terms of both the Project or available technologies) that may arise. This will also include the results of ongoing engagement with the potentially-affected Indigenous groups, including Nahanni Butte Dene Band, Liddii Kué First Nation, and Dehcho First Nations, and applicable regulators and land managers.
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APPENDIX SECTION

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Appendix B  Limitations on the use of this Document
LIMITATIONS OF REPORT
This report and its contents are intended for the sole use of Canadian Zinc Corporation (CZN) and their agents, Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than CZN, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in the Appendix or Contractual Terms and Conditions executed by both parties.
# LIST OF ACRONYMS

<table>
<thead>
<tr>
<th>Acronyms/Abbreviations</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AANDC</td>
<td>Aboriginal Affairs and Northern Development Canada</td>
</tr>
<tr>
<td>CCME</td>
<td>Canadian Council of Ministers of the Environment</td>
</tr>
<tr>
<td>ASR</td>
<td>All Season Road</td>
</tr>
<tr>
<td>CZN</td>
<td>Canadian Zinc Corporation</td>
</tr>
<tr>
<td>DFO</td>
<td>Department of Fisheries and Oceans</td>
</tr>
<tr>
<td>EA</td>
<td>Environmental Assessment (Process)</td>
</tr>
<tr>
<td>GNWT</td>
<td>Government of the Northwest Territories</td>
</tr>
<tr>
<td>ha</td>
<td>Hectare</td>
</tr>
<tr>
<td>km</td>
<td>Kilometre</td>
</tr>
<tr>
<td>KP</td>
<td>Kilometre Post</td>
</tr>
<tr>
<td>m</td>
<td>Metre</td>
</tr>
<tr>
<td>m³</td>
<td>Cubic Metre</td>
</tr>
<tr>
<td>M</td>
<td>Million</td>
</tr>
<tr>
<td>Mine</td>
<td>Prairie Creek Mine</td>
</tr>
<tr>
<td>MVLWB</td>
<td>Mackenzie Valley Land and Water Board</td>
</tr>
<tr>
<td>MVRB</td>
<td>Mackenzie Valley Review Board</td>
</tr>
<tr>
<td>NNPR</td>
<td>Nahanni National Park Reserve</td>
</tr>
<tr>
<td>NWT</td>
<td>Northwest Territories</td>
</tr>
<tr>
<td>ROMP</td>
<td>Road Operations and Maintenance Plan</td>
</tr>
<tr>
<td>RWED</td>
<td>Renewable Resources, Wildlife, and Economic Development</td>
</tr>
<tr>
<td>TDG</td>
<td>Transportation of Dangerous Goods</td>
</tr>
<tr>
<td>WHMIS</td>
<td>Workplace Hazardous Materials Information System</td>
</tr>
<tr>
<td>WMP</td>
<td>Waste Management Plan</td>
</tr>
<tr>
<td>WSCC</td>
<td>Worker’s Safety &amp; Compensation Commission</td>
</tr>
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## GLOSSARY

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustible Non-Hazardous Waste</td>
<td>Waste that can be incinerated such as kitchen and food waste, cardboard, wood, paper, etc.</td>
</tr>
<tr>
<td>Domestic Waste</td>
<td>Domestic waste typically consists of packaging, tins, food scraps and drink containers.</td>
</tr>
<tr>
<td>Domestic Sewage</td>
<td>Black and grey waste water</td>
</tr>
<tr>
<td>Four Rs of Waste Management</td>
<td>Reduce, Reuse, Recycle, Recover</td>
</tr>
<tr>
<td>Non-Combustible Non-Hazardous Waste</td>
<td>Waste that cannot be burned such as scrap metal, Exposed solid rock or rock underlying loose deposits such as soil or alluvium.</td>
</tr>
<tr>
<td>Recyclable Waste</td>
<td>Waste that can be recycled such as beverage containers, batteries, electrical equipment, etc.</td>
</tr>
</tbody>
</table>
1.0 INTRODUCTION

This Waste Management Plan (WMP) was prepared for Canadian Zinc Corporation (CZN) by Tetra Tech Canada Inc. (Tetra Tech) in general accordance with the Mackenzie Valley Land and Water Board’s (MVLWB 2011) Guidelines for Developing a WMP.

The WMP builds on a previous draft plan developed by Allnorth Consultants Ltd. (2015) and addresses the waste management practices to be implemented for the construction and subsequent operations phases of the Prairie Creek All-Season Road (ASR) and associated infrastructure from the Mine to the Liard Highway.

Canadian Zinc and its contractors are committed to undertaking waste collection, storage, transportation and disposal for the access road in a safe, efficient and environmentally responsible manner, by actively encouraging and implementing the four R’s of waste management, namely: waste reduction, recovery, reuse and recycling, as generally summarized in Figure 1. The WMP is a living document and once implemented, will be regularly reviewed and updated as appropriate.

Figure 1: Basic Principles of Waste Management

<table>
<thead>
<tr>
<th>Reduce</th>
<th>Generating less waste through:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- more efficient operations;</td>
</tr>
<tr>
<td></td>
<td>- improving inventory control;</td>
</tr>
<tr>
<td></td>
<td>- modifying equipment and process; and</td>
</tr>
<tr>
<td></td>
<td>- changing purchasing criteria.</td>
</tr>
<tr>
<td></td>
<td>Example: Ordering chemicals or lube products in bulk/returnable drums.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reuse</th>
<th>Reusing materials in their original form.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Examples: Returning chemical containers to the supplier so that they can be refilled.</td>
</tr>
<tr>
<td></td>
<td>Reusing waste oils, glycols and solvents for secondary jobs. Salvaging scrap steel for various uses.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recycle</th>
<th>Converting waste back into a usable material.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Examples: Processing old metal or plastic into new metal or plastic products. Shredding paper for packaging material and office paper recycling.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recover</th>
<th>Extracting materials or energy from a waste for other uses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Example: Burning waste oils for energy recovery.</td>
</tr>
</tbody>
</table>

| After the Rs- Treatment and Disposal. Left with and unavoidable waste residue which may require treatment and a waste disposal method. | |

Figure 1: Basic Principles of Waste Management
1.1 Company Name, Location and Mailing Address

Head Office:
Suite 1710-650 West Georgia Street, Vancouver, BC, V6B 4N9
Phone: 604-688-2001
Fax: 604-688-2043
Email: David.Harpley@canadianzinc.com

Prairie Creek Mine:
Iridium 9555 Satellite Phone 1 (yellow) 011-8816-315-30998
Iridium 9505A Satellite Phone 2 (black) 011-8816-315-30997
Iridium 9505A Satellite Phone 3 (orange) 011-8816-315-30996
Ground-To-Air Radio Handheld FREQ 122.800

1.2 Purpose and Scope

The purpose and scope of CZN’s WMP is to ensure that all wastes produced by activities associated with the construction and operation of the Prairie Creek Mine ASR are handled, transported, stored or disposed of in a safe and responsible manner and comply with all applicable legislation, regulations, authorizations, permits and licenses for the duration of the Project.

To achieve this, the WMP:

- identifies waste types potentially generated by the project;
- identify procedures to promote reduction, reuse, and recycling of waste materials;
- identify practices and procedures for waste handling, collection, storage, transport, and disposal, and
- identify waste monitoring and mitigation procedures.

The WMP is a living document that will be updated throughout the life of the Project to adapt to and incorporate any changes (in terms of both the Project or available technologies) that may arise. This will also include the results of ongoing engagement with the potentially-affected Indigenous groups, including Nahanni Butte Dene Band, Liidlii Kué First Nation, and Dehcho First Nations, and applicable regulators and land managers.

The WMP is linked to a number of other CZN environmental management plans including:

- Road Construction Plan
- Road Operations and Maintenance Plan
- Specific Borrow Pit Development Plans
- Wildlife Management and Monitoring Plan
- Spill Contingency Plan
- Explosives Management Plan
- Health, Safety and Emergency Response Plan.
Details of the road, together with the schedule of road construction and operations, are provided in the CZN Road Construction Plan (RCP) and Road Operations and Maintenance Plan (ROMP). A map book of the road is provided in Appendix A.

1.3 CZN Environmental Policy

It is CZN's policy to achieve and maintain a high standard of environmental care in conducting its business as a resource company, and through its developments, contribute to sustaining society’s material needs. CZN's approach to environmental management seeks continuous improvement in performance by incorporating evolving scientific knowledge and community expectations into its operations.

Specifically, it is CZN's policy to:

- Comply with and adopt the spirit of all applicable laws, regulations and standards, and where laws do not adequately protect the environment, apply standards that minimize any adverse environmental impacts resulting from its operations, products and services.
- Communicate openly and in a timely manner with government on environmental issues, and contribute to the development of policies, legislation and regulations that may affect CZN and its operations.
- Recognize local communities as stakeholders and engage with them in a process of open consultation and timely communication regarding environmental management issues and impacts and seek to involve them in decision making and implementation.
- Ensure that employees and suppliers of goods and services are informed about this policy and that they are aware of their environmental responsibilities in relation to CZN's business.
- Develop and implement management systems to identify, control and monitor potential environmental risks arising from operations, and be prepared to respond to adversity.

1.4 Regulatory Requirements

Specific legislation, regulations and guidelines related to waste management in the Northwest Territories (NWT) include:

1.4.1 Federal Legislation

- Canadian *Environmental Protection Act* (1999)
- *Waters Act* S.N.W.T (2014)
- Canada –Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (CCME 2001)
- *Work Site Hazardous Materials Information System (WHMIS)* Safety Act
- *Territorial Lands Act* (1985)
- *Explosives Act* (1985)
1.4.2 Territorial

- Guidelines for Developing a Waste Management Plan (MVLWB 2011)
- Guideline for Waste Antifreeze (RWED 1998)
- Guideline for Waste Batteries (RWED 1998)
- Guideline for Waste Solvents (RWED 1998)
- MWLWB Land Use Permit (to be issued)
- MVLWB Water Licence (to be issued)
- NWT Environmental Protection Act (1988)
- NWT Public Health Act (1988)
- NWT Transportation of Dangerous Goods Act (1990)
- NWT Waters Act (last amended April 1, 2014)
- Used Oil and Waste Fuel Management Regulations (GNWT 2003).

2.0 PROJECT DESCRIPTION

Canadian Zinc is planning to operate the Prairie Creek Mine. The Mine is located at approximately 61° 33' north latitude and 124° 48' west longitude adjacent to Prairie Creek, a tributary of the South Nahanni River, southwest NWT (Figure 2).

A 170 km ASR connecting the Mine (at Km 0) to the Liard Highway via the Nahanni Butte access road (Figure 3) will generally follow the alignment of a previously permitted Winter Road, while reflecting the terrain, site characteristics, and road specifications suitable and preferred for the ASR. Approximately half of the proposed ASR (85 km between Km 17 to Km 102) is located within the Nahanni National Park Reserve (NNPR). The NNPR, a world heritage site, is known for its globally-significant karst terrain, as well as the South Nahanni River, a Canadian Heritage River. Approximately half of the ASR alignment will directly overlap with the alignment of the permitted Winter Road.

Construction of the ASR will take approximately three years to complete. Initial winter roads will be built to gain access to the Mine, allow further investigation of the ASR alignment to complete detailed design, and to provide access for ASR construction. CZN’s intent is to build the initial winter roads on the ASR alignment as much as possible to minimize the total extent of disturbance.

The ASR will cross approximately 18 major streams with clear span bridges or large diameter culverts, and 85 minor streams with culvert diameters ranging from 800 mm to 2000 mm based on the size of the stream. Construction of the ASR will be supported by temporary camps at Km 23 (Sundog), Km 39 (Cat Camp), Km 65, Km 87 (Tetcela...
Camp), Km 120 (Grainger Gap), Km 151 or Km 158, and Km 177.5. The camps at Km 39 (Cat), Km 87 (Tetcela) and Km 120 (Grainger) will likely be retained in a reduced form to support on-going road maintenance.

Borrow sources have been identified all along the road route to provide material for the road sub-grade (fill) and surfacing (gravel). Eighty-six borrow sources have been defined for use in road construction, with another 30 as back-up in the event any of the 86 are subsequently found to be unsuitable. Currently, approximately 44 of the 86 borrow sources are considered preferred locations and about 9 of these sources may require blasting and/or crushing activities. Blasting may also be required along the ASR alignment at a number of locations such as Km 5, Km 23, Km 25 to Km 29, Km 32, and Km 36 to Km 37. Some of the surfacing borrow sources will be retained to support road maintenance. The remainder will be closed and reclaimed immediately after road construction. Most borrow sources are proximal to, or within the road corridor. Some will require short access roads.

Water sources will be utilized in winter for winter road construction and during summer for dust control. Water sources have been defined at Km 0 (the Mine), Km 39 (Cat Camp), Km 60 (Mosquito Lake), Km 70, Km 100, Km 121 (Gap Lake), Km 139, Km 141 and the Liard River. Winter water extraction from lakes will be conducted in conformance with Department of Fisheries and Oceans' (DFO) water withdrawal protocol, limiting extraction to less than 10% of lake volume. Summer water extraction from lakes will similarly be limited to avoid significant water level drawdown and will be monitored using installed staff gauges.

2.1 Project Setting

The currently permitted Winter Road and approximate location of the proposed ASR, including major realignments, is shown in Figure 3. The access road will be located in the southwestern NWT. The road will begin at the Nahanni Butte access road and pass through the Mackenzie Mountains and the NNPR to the Prairie Creek Mine site. Approximately half of the 170 km access road will pass through NNPR (Figure 2). From the Nahanni Butte access road, the ASR crosses lowland terrain and the Liard River before passing through a gap in the Front Range (Grainger Gap), crossing the Silent Hills (Wolverine Pass), Fishtrap Creek and the Tetcela River before ascending and crossing the Ram Plateau. Thereafter, the road enters the Mackenzie Mountains and follows Sundog Creek, Funeral Creek and Prairie Creek to reach the Mine.

2.1.1 Terrain Physiography and Vegetation

The proposed route of the ASR passes through a variety of natural regions including valleys, Sub-Alpine Shrub and Alpine Tundra (max elevation of 1,530 m AMSL), Riparian Alluvial habitat, open-forest parkland, muskeg, and mixed forest. The road alignment crosses terrain that includes discontinuous permafrost and karst, with the potential occurrence of thermokarst, sinkholes, debris flows and thaw slumps, as well as rock fall, rock slides and snow avalanches in mountainous terrain. The route is underlain by sedimentary rock sequences generally consisting of combinations of limestone, dolostone, siltstone, shale and mudstone.

The road area is located primarily within the Taiga Cordillera and Taiga Plains Ecozones of the NWT and is characterized by several significant topographic features (e.g., Mackenzie Mountains, the Nahanni Range and the Liard floodplain). This has resulted in an array of growing conditions, and consequently, numerous vegetation species assemblages (Ecosystem Classification Group 2007). Wildfires occasionally occur in the region and have influenced forested ecosystems throughout much of the landscape.

2.1.2 Surface Waters

The main surface water basins crossed by the ASR alignment are, from west to east, Prairie Creek, Sundog Creek, Tetcela River, Fishtrap Creek, an unnamed creek, Grainger River, and the Liard River (Figure 2).
Seasonal hydrological characteristics of the various larger streams crossed by the ASR generally mirror the pattern of Prairie Creek, for which there is a good and lengthy record. Higher monthly flows occur in the spring and summer coincident with freshet and summer storms. The annual low flow month is typically March when flows are approximately 50 times less than in June. Peak flows observed in the area occur during intense summer rainfall events. Freeze-up usually begins in mid-October, and spring thaw in mid-April.

2.1.3 Fish and Wildlife

Both bull trout and mountain whitefish spawn in Prairie Creek upstream of the mine site, the former most likely in Funeral Creek. Arctic grayling is known to inhabit lower Prairie Creek and many other creeks and rivers in the area. Bull trout have not been found east of the Prairie basin. In total, there are 13 stream crossings along the ASR alignment where the presence of fish has been confirmed or is suspected.

Wildlife species at risk or maybe at risk that are potentially present along the ASR corridor include boreal woodland caribou, northern mountain woodland caribou, wood bison, grizzly bear and collared pika. In addition, five bird species at risk occur or may potentially occur in the area including Peregrine Falcon, Short-eared Owl, Common Nighthawk, Olive-sided Flycatcher, Bank Swallow, and Canada Warbler.

Additional wildlife species that have known distributions along or near the ASR include Dall's sheep, moose and furbearers (including grey wolf, beaver, marten and wolverine). A number of waterfowl species, including Trumpeter Swan, frequent the area of the ASR alignment; the Project area contains habitat for breeding and/or staging for short periods during annual migration. In addition to waterfowl, raptors are expected to occur and nest near the entire ASR alignment, and documented occurrences include Golden Eagle, Bald Eagle, Peregrine Falcon, American Kestrel, Red-tailed Hawk, Northern Harrier, and Gyrfalcon.
Figure 1

Prairie Creek Mine Overview

**Legend**

- Proposed Prairie Creek Access Road

**Base data source:** Imagery from ESRI; DigitalGlobe (2016).

**NOTES**

- Figures 1
- TETRA TECH
- Z

**Scale:** 1:15,000

**DATUM**

- NAD83

**CLIENT**

- CANADIAN ZINC CORPORATION

**FILE NO.**

- EARC03145-01_Figure1.mxd

**DATE**

- November 21, 2018

**PROJECT NO.**

- ENG.EARC03145-01

**PROJECTION**

- NWT Lambert
**NOTES**

Base data source:
- Road alignment provided by Allnorth (July 2018)
- Existing roads from CanVec (1:50,000)
- Watercourses from CanVec (1:250,000)

**SCALE:**
1:350,000

**STATUS:** ISSUED FOR REVIEW

**PRAIRIE CREEK ACCESS ROAD**

**Proposed Access Road Alignment**

**LEGEND**
- Access Road Kilometre Marker
- Proposed Prairie Creek Access Road
- Proposed Winter Road Alignment
- Existing Road
- Nahanni National Park Reserve Boundary
- Watercourse
- Waterbody
3.0 IDENTIFICATION AND MANAGEMENT OF WASTE TYPES

3.1 Waste Overview

A material is considered to be a waste when it can no longer be used for its original intended purpose. The types of waste anticipated to be generated during the construction and operation of the ASR can be classified into the following general categories:

- Domestic Wastes (Combustible and non-combustible – non-hazardous wastes)
- Hazardous Wastes
- Recyclable Waste
- Domestic Sewage
- Excavated Material
- Waste Explosives.

Road construction, operations and associated infrastructure activities are expected to produce small volumes of waste on an annual basis. Road construction crews will likely use portable day trailers and accumulate modest volumes of domestic waste and sewage. The ASR maintenance camps will also generate limited volumes of domestic waste and sewage. The intent will be to temporarily store these wastes at the road camps for regular collection and transportation to the Prairie Creek Mine or the Fort Nelson Municipal Landfill (BC) for treatment and/or disposal.

The same approach will be taken for any hazardous waste generated by the Project, such as lead acid batteries. Soils or granular materials contaminated with hydrocarbons are currently anticipated to be transported to the Mine for treatment in a bioremediation cell which is planned to be developed.

3.2 Domestic Waste

Domestic waste produced during road construction and operation (maintenance) and similar waste associated with the operation of the camps will consist of packaging, tins, food scraps and drink containers. Production sources will be from trucks and other mobile equipment moved along the road during the road construction and operations phases, and at the maintenance camps, where some truckers may also stop for a few hours or overnight.

Road construction crews of 10 to 50 personnel will work from each end of the road during the construction phase. Domestic waste is assumed to be produced at a rate of 2.64 kg/person/day (0.011 m³/day, 240 kg/m³). 60 personnel would produce an estimated 158.4 kg/day. Road maintenance crews will be smaller, and therefore less domestic waste will be produced.

Road maintenance camps may be used by two to three personnel per shift. Six to nine personnel are expected to produce waste ranging from 15.84 kg/day to 23.76 kg/day.

In addition, Mine and contractor trucks will be travelling daily on the access road. This activity is assumed to be roughly equivalent to 15 personnel being on the road 24 hours/day. Based on these assumptions, an additional 39.6 kg/day of domestic waste may be generated.
3.2.1 Combustible Non-Hazardous Waste

Typical combustible non-hazardous wastes include discarded materials in a solid, or semi-solid form that can be safely incinerated. Such wastes do not pose a risk to human or environmental health. The types of waste generated within this category include:

- Kitchen and food waste
- Corrugated cardboard
- Domestic refuse.

Table 1 identifies the typical combustible non-hazardous waste types, sources, potential effects, management hierarchy, and management strategies.
### Table 1: Combustible Non-Hazardous Waste

<table>
<thead>
<tr>
<th>Type</th>
<th>Source</th>
<th>Potential Environmental Effects</th>
<th>Waste Management Hierarchy</th>
<th>Waste Management Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitchen and Food Waste</td>
<td>Food scraps</td>
<td>Improper storage, handling and disposal can lead to the attraction and subsequent habituation of carnivores and scavengers</td>
<td>Train kitchen staff on waste reduction</td>
<td>Designated wildlife-proof food waste containers to be located at all camps</td>
</tr>
<tr>
<td></td>
<td>Kitchen grease</td>
<td></td>
<td>Use bulk food containers whenever possible</td>
<td>Collected daily</td>
</tr>
<tr>
<td></td>
<td>Wrappings contaminated with food</td>
<td></td>
<td></td>
<td>Stored in wildlife-proof containers prior to incineration / landfilling</td>
</tr>
<tr>
<td></td>
<td>Bagged lunches</td>
<td></td>
<td></td>
<td>Batch incineration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Potential for litter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrugated Cardboard</td>
<td>Packaging of supplies/ materials</td>
<td></td>
<td>Order products in bulk to minimize packaging</td>
<td>Stored under cover</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Monitor and reduce, where possible, the amount of packaging shipped to the sites</td>
<td>Regular collection and incineration or transfer to Fort Nelson or the Mine</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Reuse corrugated cardboard on-site to package materials being sent off-site</td>
<td></td>
</tr>
<tr>
<td>Domestic Refuse</td>
<td>Refuse from camps (e.g., paper, plastic wrapping, fabrics, etc.)</td>
<td>Improper storage, handling and disposal can lead to the attraction and subsequent habituation of carnivores and scavengers</td>
<td>Domestic waste will be reduced through employee/contractor education programs, including proper separation of waste</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Potential for litter</td>
<td></td>
<td>Educate employees about separating recycling and hazardous items from personal waste items</td>
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<td></td>
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<td></td>
<td>Use clear garbage bags so that cleaning staff can monitor waste sorting habits</td>
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<td></td>
<td></td>
<td>Periodically assess domestic refuse to ensure that waste streams are being separated</td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td>Regular collection and incineration or transfer to Fort Nelson or the Mine</td>
</tr>
</tbody>
</table>
3.2.2 Non-Combustible, Non-Hazardous Waste

Typical non-combustible non-hazardous waste includes discarded materials in a solid, liquid, or semi-solid form that cannot be burned or recycled. Such wastes do not pose a risk to human or environmental health. The type of waste generated within this category is primarily scrap metal. All scrap metal generated by the ASR and associated infrastructure will be consolidated and shipped off-site for recycling/disposal as appropriate as further discussed in Section 3.4.

3.3 Hazardous Waste

A hazardous waste is a contaminant which is a dangerous good that is no longer used for its original purpose and is intended for recycling, treatment, disposal or storage. A hazardous waste does not include a contaminant that is:

- household in origin;
- included in class 1, Explosives or class 7, Radioactive materials of the Transportation of Dangerous Goods Regulation (TDGR);
- exempted as a small quantity;
- an empty container; or
- intended for disposal in a sewage system or by landfilling that meets the applicable standards set out in schedules I, III or IV of the Guideline for Industrial Waste discharges in the NWT.

A small quantity is "hazardous waste that is generated in an amount that is less than 5 kilograms per month if a solid or 5 litres per month if a liquid; and where the total quantity accumulated at any one time does not exceed 5 kilograms or 5 litres. This does not apply to wastes that are mercury or in classes 2.3, 5.1 or 6.1 of TDGR. These wastes must be generated in an amount less than 1 kilogram per month if a solid or 1 litre per month if a liquid; and where the total quantity accumulated at any one time does not exceed 1 kilogram or 1 litre."

The typical types of waste generated within this category include:

- Used petroleum products (oils/greases)
- Contaminated snow/water/soil (oil/fuel)
- Oil and fuel filters
- Used sorbents and rags
- Hydraulic fluid
- Empty petroleum hydrocarbon containers and drums
- Glycol
- Solvents
- Fluorescent light tubes
- Electronics and electrical waste, and
- Waste equipment batteries.

Table 2 identifies the hazardous waste types, sources, potential effects, management hierarchy, and management.
<table>
<thead>
<tr>
<th>Type</th>
<th>Source</th>
<th>Potential Environmental Effects</th>
<th>Waste Management Hierarchy</th>
<th>Waste Management Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used Petroleum Products (oils / greases)</td>
<td>Vehicles and equipment including camp generators/ pumps</td>
<td>Petroleum products released to water bodies can impact aquatic life and waterfowl Petroleum products can be toxic if ingested by wildlife</td>
<td>When possible, waste oil will be incinerated at the road camps or Mine</td>
<td>Waste oil will be collected and stored in empty bulk lubricant cubes. Cubes will be stored in designated hazardous waste storage areas at each road camp When possible, waste oil will be incinerated at the road camps or mine Waste oil that is not appropriate for incineration may be shipped off-site to a registered hazardous waste receiver</td>
</tr>
<tr>
<td>Contaminated Snow/ Water/ Soil (oil/fuel)</td>
<td>Fuel or oil spills on snow or soil</td>
<td>Same as above</td>
<td>Spill prevention procedures to be employed</td>
<td>Spill Response Procedures to respond to the spill (safety procedures, initial assessment, spill report, containment, storage, and disposal) Contaminated snow/water will be stored in clearly-marked, sound, sealed containers at the road camps and then shipped off-site to an appropriate facility Bioremediation to be implemented for contaminated soil</td>
</tr>
<tr>
<td>Oil and Fuel Filters</td>
<td>Vehicles and equipment</td>
<td>Same as above</td>
<td></td>
<td>Waste oil and fuel filters will be drained in a heated and ventilated section of the road camp or Mine. Filters will then be crushed to minimize volume and release any additional oil The filters will be placed in sealed containers and labelled and stored prior to being shipped off-site to a registered hazardous waste receiver</td>
</tr>
<tr>
<td>Type</td>
<td>Source</td>
<td>Potential Environmental Effects</td>
<td>Waste Management Hierarchy</td>
<td>Waste Management Strategies</td>
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</tr>
<tr>
<td>Used Sorbents and Rags</td>
<td>Used in maintenance of vehicles and equipment</td>
<td>Same as above</td>
<td>When possible waste oil will be incinerated at the road camps or Mine</td>
<td>Where possible, used rags and sorbents will be incinerated</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>If incineration is not practical, used sorbents and rags will be stored in clearly-marked, sound, sealed containers in designated hazardous waste storage areas at each road camps prior to being shipped off-site to a registered hazardous waste receiver</td>
<td></td>
</tr>
<tr>
<td>Hydraulic Fluid</td>
<td>Used in vehicles and camp equipment</td>
<td>Hydraulic fluid may enter the environment from spills and leaks from equipment or from improper storage and harm fish or wildlife.</td>
<td>Biodegradable, low toxicity hydraulic fluids will be used where practical</td>
<td>Where possible, used hydraulic fluid will be incinerated</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Equipment will be regularly maintained to prevent spills from ruptured hydraulic fluid lines</td>
<td>Used hydraulic fluid that cannot be incinerated will be stored in clearly marked, sound, sealed containers prior to being shipped off-site to a registered hazardous waste receiver</td>
</tr>
<tr>
<td>Empty Petroleum Hydrocarbon Containers and Drums</td>
<td>Packaging for oils, solvents and penetrating oils</td>
<td>Same as for other petroleum products</td>
<td>CZN and its contractors will purchase these items in bulk to minimize the amount of packaging</td>
<td>Will be backhauled to a recycling facility</td>
</tr>
<tr>
<td>Glycol</td>
<td>Used as a coolant and antifreeze in equipment</td>
<td>Glycol’s odour is a known wildlife attractant</td>
<td>Equipment will be regularly maintained to prevent spills from ruptured glycol lines</td>
<td>Waste glycol will be stored at each road camp in clearly marked, sound, sealed containers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Glycol can have toxic effects on aquatic organisms and wildlife</td>
<td></td>
<td>These containers will be shipped off-site to a registered hazardous waste receiver</td>
</tr>
<tr>
<td>Solvents</td>
<td>Used to degrease machinery in the maintenance shop</td>
<td>Petroleum products released to water bodies can impact aquatic life and waterfowl</td>
<td>Low toxicity solvents and physical cleaning will be used where practical</td>
<td>Waste or excess solvents will be stored in the waste storage facility in clearly marked, sound, sealed containers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Petroleum products can be toxic if ingested by wildlife</td>
<td>Petroleum-based solvents will not be allowed into the environment and will be subject to the spill response plan</td>
<td>These containers will be shipped off-site to a registered hazardous waste receiver</td>
</tr>
<tr>
<td>Type</td>
<td>Source</td>
<td>Potential Environmental Effects</td>
<td>Waste Management Hierarchy</td>
<td>Waste Management Strategies</td>
</tr>
<tr>
<td>----------------------</td>
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</tr>
<tr>
<td><strong>Fluorescent Light Tubes</strong></td>
<td>Indoor lighting</td>
<td>Fluorescent tubes contain mercury phosphor powder and traces of lead and cadmium</td>
<td>Lights will be equipped with motion sensors to reduce usage where practical</td>
<td>Discarded fluorescent lights will be consolidated and stored at each road camp prior to being shipped off-site to a registered hazardous waste receiver</td>
</tr>
<tr>
<td><strong>Electronics and Electrical Materials</strong></td>
<td>Electrical devices that cannot be repaired and cannot be recycled</td>
<td>Electrical waste and devices may or may not contain polluting substances (such as mercury, lead, arsenic, cadmium, and polyvinyl chloride (PVC) that could enter the ecosystem</td>
<td></td>
<td>CZN’s environment staff will determine the risk of electronic devices and classify them as hazardous or non-hazardous waste and determine the appropriate method of recycling/disposal</td>
</tr>
<tr>
<td><strong>Equipment Batteries</strong></td>
<td>Equipment batteries</td>
<td>Lead batteries (i.e., vehicle batteries) contain sulphuric acid and lead</td>
<td>Protect and service batteries to prevent damage and loss of charge</td>
<td>Equipment batteries will be shipped off-site to a recycling facility or a registered hazardous waste receiver</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rechargeable batteries (i.e., industrial, radio and transmitter batteries) usually contain either potassium hydroxide or nickel cadmium</td>
<td>Test batteries prior to disposal to confirm the battery is spent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Replace non-rechargeable batteries with rechargeable batteries where possible</td>
<td></td>
</tr>
</tbody>
</table>
Hazardous materials will be stored and managed according to the Guideline for the General Management of Hazardous Waste in the NWT (ENR 1998). Where appropriate and in compliance with legislation, used oils will be incinerated. All other types of hazardous waste will be shipped to a registered hazardous waste receiver.

3.4 Recyclable Waste

Recyclable wastes comprise discarded items that can be made into new products. The typical types of waste generated within this category include:

- Scrap metal
- Beverage containers (plastic, aluminum, glass, tetra packs)
- Tires
- Electronics and electrical wastes
- Dry cell batteries for domestic use (e.g., AAA to D cells, 6- and 9-volt batteries).

Table 3 identifies the recyclable waste types, sources, potential effects, management hierarchy, and management strategies.

<table>
<thead>
<tr>
<th>Type</th>
<th>Source</th>
<th>Potential Environmental Effects</th>
<th>Waste Management Hierarchy</th>
<th>Waste Management Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrap Metal</td>
<td>Camps</td>
<td>Unsightly if left on site (visual impact)</td>
<td>To be consolidated and temporarily stored</td>
<td>Stored at each road camp prior to shipment off site for recycling</td>
</tr>
<tr>
<td>Beverage Containers</td>
<td>Camp and transport personnel drinking bottled beverages</td>
<td>Improper storage, handling and disposal can lead to the attraction and subsequent habituation of carnivores and scavengers Potential for litter</td>
<td>The road camps will limit the use of individually packaged beverages (e.g., cans of pop or juice, bottled water, etc.), and promote the use of bulk beverages available from a beverage dispenser</td>
<td>Basic waste management training, including recycling training, and waste reduction for all personnel on-site Designated recycling bins for beverage containers Used beverage containers will be stored in wildlife-proof containers Stored at each road camp prior to shipment off site for recycling</td>
</tr>
<tr>
<td>Tires</td>
<td>Tires from equipment that can no longer be repaired</td>
<td>Unsightly if left on site (visual impact)</td>
<td>Tires will be repaired and reused as much as possible</td>
<td>Spent tires will be consolidated and shipped off-site for recycling</td>
</tr>
</tbody>
</table>

Table 3: Recyclable Waste
Electronics and Electrical Materials

- Electrical devices that cannot be repaired and cannot be recycled
- May contain mercury, lead, arsenic, cadmium, brominated flame retardants (BFRs), and polyvinyl chloride (PVC) that could enter ecosystem
- Electrical devices will be repaired when possible
- CZN’s environment staff will determine the risk of electronic devices and classify them as recyclables, hazardous or non-hazardous waste and investigate the possibility of recycling the electronics and/or appropriate methods for waste disposal

Dry cell batteries (AAA to D cell, 6- and 9-volt, and watch batteries)

- Personal electronics (e.g., flashlights)
- New domestic dry cell batteries do not contain mercury. Older batteries may contain small amounts of lead, cadmium, and mercury. Other battery compounds like silver, zinc, and nickel may also be present.
- To be collected and temporarily stored in bins
- There will be designated collection bins for dry cell at each road camp
- Dry cell batteries will be shipped off-site for recycling/disposal as appropriate.

Recycling is preferred over disposal as it reduces the potential environmental effects associated with the Project. At the ASR maintenance camps recyclables will be stored in labelled, designated waste recycling containers and regularly trucked off-site to an approved recycler.

It should be noted that lead acid batteries greater than 1 kg and rechargeable batteries are considered a contaminant under the NWT Environmental Protection Act and are managed as a hazardous waste. There is limited infrastructure for recycling in the NWT but such facilities do exist in nearby British Columbia.

### 3.5 Domestic Sewage

Road construction, operations and related infrastructure such as the camps and trucking operations are expected to produce small volumes of domestic waste and sewage on a yearly basis. Road construction crews will likely use portable day trailers and accumulate modest volumes of domestic waste, sewage (black water) and grey water (wash water). The ASR maintenance camps will also generate domestic waste and sewage. The intent will be to temporarily store these wastes at the road camps.

Domestic waste will be collected regularly and transported to the Prairie Creek Mine or a suitable off-site landfill. Sewage and grey water from the construction camps will either be treated on-site (larger camps) with disposal of effluent via septic fields or taken to the Mine for treatment. Sewage from maintenance camps will either be taken to the Mine or disposed of in pit latrines. Maintenance camp wash water will be handled as for construction camps.

The ‘rule of thumb’ used to estimate sewage (black and grey water) production is 270 L/person/day. Using the personnel data above, sewage volumes are estimated as follows:

- Road construction and maintenance – 10 x 270 = 2,700 L/day
- Road maintenance camps – 3 x 270/camp = 810 L/day/camp
### 3.6 Excavated Material

Construction of the ASR will involve some ground levelling to make the road bed, and side-hill cuts. This will generate a limited quantity of excavated material, which is expected to be organic material and mineral (granular) soil. The organic material will be stockpiled local to the excavation source for use in progressive and future closure and reclamation of the ASR. Most of the mineral soil will likely be consumed in road bed preparation, particularly where permafrost may exist and require insulation. However, some may not be suitable for use. Mineral soil to be excavated or stripped will be characterized for acid rock drainage/metal leaching (ARD/ML) potential prior to disturbance. Borrows with ARD/ML potential will not be used. If the stripping of soil with ARD/ML potential cannot be avoided, a disposal plan will be developed which may include transfer to the Mine to be managed with other material in the Mine’s Waste Rock Pile (WRP).

The Polje Re-alignment is approximately 9 km in length and inside the NNPR. The underlying bedrock is either the Fort Simpson or Nahanni Formation, which are predominantly limestone and shale units respectively. Most of the expected side-hill cuts will be where the road overlies the Fort Simpson Formation. Therefore, the excavated material may be clay-rich and unsuitable as fill. If this is the case, the material will be taken stockpiled locally for later use in reclamation.

The road switch-backs on the west side of the Silent Hills (inside the NNPR) are to be revised. The underlying rock is the Upper Devonian unit, consisting of shales, mudstones or siltstones. However, very little excavation is expected to be required. The Wolverine Pass-Grainger Gap Re-alignment is approximately 16 km in length, and the underlying bedrock is either the Upper Devonian unit or Fort Simpson Formation. Again, very little excavation is expected to be required.

The Front Range Re-alignment is approximately 43 km in length, and the underlying bedrock is Mesozoic shales, mudstones or siltstones, although rock exposure is rare. Very little excavation is expected in predominantly soil/muskeg material.

It should be noted that the chances of encountering material with significant ARD/ML potential is considered to be low because no indications of mineralization have been noted in proximity to the ASR, and the excavations will be shallow and mostly in highly weathered soil deposits. It is considered more likely that clay-rich soil that is unsuitable as fill will need to be stockpiled.

### 3.7 Waste Explosives

Waste explosives and explosive materials left following completion of blasting activities at a particular site will be re-used at subsequent blasting locations. Such wastes can also be disposed of by burning, detonation, or by chemical destruction. The selected disposal method will depend on the type of explosive, quantity, condition, and the manufacturers specifications.

All destruction of explosives will be carried out by licensed blasting personnel. Destruction of large quantities of explosives will be carried out at a designated location at least 500 m from any infrastructure that could be damaged by the detonation. Personnel and other property damage will be avoided by sheltering the detonation area.

Blasting personnel will adhere to the following procedures:

- Only a licensed person, or a person under the supervision of a licensed person (Explosives Contractor) is allowed to dispose of or destroy explosives.
Use a method of disposal that provides the greatest degree of safety to personnel, protection of property and the environment; take adequate precautions to protect against injury or damage to property.

Ensure that the method of disposal is appropriate to the type and condition of explosives.

Follow recommended disposal method indicated by manufacturer or responsible authorities.

Unused explosives and explosive waste must be removed and disposed of under the supervision of or by the Explosives Contractor.

Further information on the management and use of explosives is provided in CZN’s Explosives Management Plan.

3.8 Training & Certification

As part of their orientation, all access road construction and operations phase employees and contractor personnel will receive basic environmental and waste management training, including:

- Reducing water use
- Managing food wastes to minimize animal attraction
- Reducing waste, and
- Separating waste (recyclables, dry-cell batteries, food waste, hazardous waste).

In addition, all personnel involved in the handling of hazardous wastes will receive Workplace Hazardous Materials Information System (WHMIS), ‘Personal Safety and Protection’ and Emergency Response training.

3.9 Environmental Mitigation

Canadian Zinc made a number of commitments during the Mackenzie Valley Review Board (MVRB) Environmental Assessment (EA) process pertaining to the implementation of environmental mitigation measures related to waste management associated with the access road and associated infrastructure. These include:

- All waste foods and human garbage will be stored in wildlife proof containers and incinerated consistent with current industry good management practices to minimize wildlife attraction and potential habituation to the local area.
- Littering will be prohibited.
- Feeding of wildlife will be prohibited.
- Adaptive management will be applied to waste management practices. If wildlife is found to be attracted to a particular site (i.e., problem wildlife) additional management practices as appropriate will be adopted.
- Employees and contractors will receive orientation on the contents of CZN’s WMP and best practices for waste management.

The diligent application of these and other mitigation measures and best practices outlined in the WMP will assist in minimizing potential effects of the waste management program associated with the construction and operation of the Prairie Creek Mine All-Season Road (ASR) on the environmental values of the Project area.
REFERENCES


APPENDIX A

ALL-SEASON ROAD MAP BOOK
APPENDIX B

LIMITATIONS ON THE USE OF THIS DOCUMENT
LIMITATIONS ON USE OF THIS DOCUMENT

GEOENVIRONMENTAL

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PRAIRIE CREEK ACCESS ROAD