1. Introduction

1.1 Purpose

A waste rock disposal area designed for permanent storage of waste rock will be located north of the open pit. Based on the current mine plan, an estimated 640 Mt of waste rock will be generated from the mining of Deposit No. 1.

Open-pit mining will generate large quantities of waste rock that will be stored at dedicated locations and quantities of ore that will be stored temporarily in ore stockpiles while being crushed and transported to Milne and Steensby Ports. Waste rock and ore will require environmentally acceptable management and storage locations and practices. These materials have been characterized and grouped on the basis of geochemical static and kinetic test work. Environmental management plans are developed for each material group based on projected chemical reactivity and physical properties to ensure long-term environmentally acceptable storage. The Waste Rock Management Plan (WRMP) addresses the issues of sitting, deposition of the waste rock, inspection, potential release of contaminants to the receiving environment, geotechnical stability, as well as closure considerations. As additional geochemical, geotechnical, and geological data are collected, and detailed engineering is completed, the management plan will be further optimized using an approach that protects the environment while operating in a cost-effective manner.

Baffinland's Waste Rock Management Plan satisfies the requirements of the Mine Site Reclamation Policy for Nunavut (AANDC, 2002).

1.2 Regulatory Requirements

Regulatory provisions related to mine site reclamation are enforced by the following acts and regulations:

- Territorial Lands Act and regulations;
- Nunavut Land Claims Agreement;
- Fisheries Act and regulations;
- Canadian Environmental Protection Act; and
- Nunavut Waters and Nunavut Surface Rights Tribunal Act.

Runoff quality from the waste rock dumps must satisfy the requirements of the Metal Mining Effluent Regulations (MMER) SOR/2002-222.

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1.3 Baffinland's Commitments

Baffinland provides adequate resources to implement and maintain the Environmental, Health, and Safety (EHS) Management System, including the necessary human, material, and financial resources. For Baffinland's Sustainable Development Policy, see Figure 1-1.

Figure 1-1 - Baffinland Sustainable Development Policy

At Baffinland Iron Mines Corporation, we are committed to conducting all aspects of our business in accordance with the principles of sustainable corporate responsibility and always with the needs of future generations in mind. Everything we do is underpinned by our responsibility to protect the environment, to operate safely and fiscally responsibly and to create authentic relationships. We expect each and every employee, contractor, and visitor to demonstrate a personal commitment to this policy through their actions. We will communicate the Sustainable Corporate Policy to the public, all employees and contractors and it will be reviewed and revised as necessary on an annual basis.

These four pillars form the foundation of our corporate responsibility strategy:

- Health and Safety.
- Environment.
- Investing in our Communities and People.
- Transparent Governance.

1.0 HEALTH AND SAFETY

- We strive to achieve the safest workplace for our employees and contractors; free from occupational injury and illness from the very earliest of planning stages. Why? Because our people are our greatest asset. Nothing is as important as their health and safety.
- We report, manage and learn from injuries, illnesses and high potential incidents to foster a workplace culture focused on safety and the prevention of incidents.
- We foster and maintain a positive culture of shared responsibility based on participation, behaviour and awareness. We allow our workers and contractors the right to stop any work if and when they see something that is not safe.

2.0 ENVIRONMENT

- We employ a balance of the best scientific and traditional Inuit knowledge to safeguard the environment.
- We apply the principles of pollution prevention and continuous improvement to minimize ecosystem impacts, and facilitate biodiversity conservation.

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- We continuously seek to use energy, raw materials and natural resources more efficiently and effectively. We strive to develop pioneering new processes and more sustainable practices.

- We understand the importance of closure planning. We ensure that an effective closure strategy is in place at all stages of Project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts.

3.0 INVESTING IN OUR COMMUNITIES AND PEOPLE

- We respect human rights and the dignity of others. We honour and respect the unique culture, values and traditions of the Inuit people.
- We contribute to the social, cultural and economic development of sustainable communities adjacent to our operations.
- We honour our commitments by being sensitive to local needs and priorities through engagement with local communities, governments, employees and the public. We work in active partnership to create a shared understanding of relevant social, economic and environmental issues, and take their views into consideration when making decisions.

4.0 TRANSPARENT GOVERNANCE

- We will take steps to understand, evaluate and manage risks on a continuing basis, including those that impact the environment, employees, contractors, local communities, customers and shareholders.
- We ensure that adequate resources are available and that systems are in place to implement risk-based management systems, including defined standards and objectives for continuous improvement.
- We measure and review performance with respect to our environmental, safety, health, socio-economic commitments and set annual targets and objectives.
- We conduct all activities in compliance with the highest applicable legal requirements and internal standards.
- We strive to employ our shareholder’s capital effectively and efficiently. We demonstrate honesty and integrity by applying the highest standards of ethical conduct.

Tom Paddon
President and Chief Executive Officer
September 2011

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1.4 Update of This Management Plan

The Waste Rock Management Plan (WRMP) will be updated based on the basis of findings obtained from the on-going waste rock geological and geochemical characterization program that is focussed on current information gaps related to waste rock sampling, predictive geochemical sampling/testing programs, and better refining water quality modeling input parameters. Management reviews (see Section 8), incident investigations, regulatory changes, or other Project-related changes will also trigger updates of the WRMP.

1.5 Relationship to Other Documents & Management Plans

The following documents should be viewed in concert with the Waste Rock Management Plan and are included as annexes:

Annex 1: *"Stormwater Management and Drainage System Design"* Dated November 2011. Prepared by Hatch (H337697-0000-10-122-0001);

Annex 2: *"Development of Permafrost in Waste Rock Dumps-Preliminary Geotechnical Evaluation"* Dated November 2011. Prepared by Thurber

Annex 3: *"Waste Rock Geological and Geochemical Characterization Program, Mary River Project – Deposit No. ". Dated January 2012*. Prepared by Baffinland.

Annex 4: *"Interim Waste Rock Stockpile Seepage Quality Model Report, Mary River Project". Dated January 2012*. Prepared by AMEC.

Annex 5: *"Interim Open Pit Water Quality Model Technical Memorandum, Mary River Project". Dated January 2012*. Prepared by AMEC.

This WRMP should also be viewed in concert with the following additional plans prepared for the environmental impact statement (FEIS) or Type A Water Licence Application:

- Report inserted in Volume 6, Appendix 6B-1 – Geochemical Evaluation of Ore and Waste Rock; "Interim Mine Rock ML/ARD Report, Mary River Project, January 2012". Prepared by AMEC.
- Waste Rock Dump Design Criteria (H337697-1130-20-122-0001) presented in Appendix 3B; Attachment 4;
- Volume 10, Appendix 10B - Environmental Protection Plan presented in Appendix 3B, Attachment 5;
- Volume 10, Appendix 10D-2 - Surface Water and Aquatic Ecosystems Management Plan presented in Appendix 3B, Attachment 5;

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- Volume 10, Appendix 10G - Preliminary Mine Closure and Reclamation Plan presented in Appendix 3B, Attachment 10;
- Volume 10, Appendix 10D-11 - Terrestrial Environmental Effects Framework
- Volume 10, Appendix 10D-12 - Environmental Monitoring Plan presented in Appendix 3B, Attachment 5;

2. Targeted VECs

Targeted valued ecosystem components (VECs) for this management plan are surface water quality and terrestrial wildlife.

3. Mitigation Measures

3.1 Nature of the Waste Rock and Geochemical Testing

The detailed description of the regional and local ore deposit geology is provided in Volume 6 of the FEIS, particularly Section 2.1 and Appendix 6B-1. A description of the regional and local geology of Deposit No. 1, taken from Appendix 6B-1 of the FEIS, is provided below.

3.1.1 Regional Geology

The northern part of Baffin Island consists of the ca. 3.0-2.5 Ga Committee Fold belt which lies within the Rae domain of the western Churchill Province (Jackson and Berman, 2000). The Committee belt extends north-east for around 2000 km from south-west of Baker Lake, Nunavut Territory to north western Greenland. Four major assemblages of Precambrian rocks have been identified within the Committee Belt. The iron ore deposits occur as part of the supra-crustal rocks of the Neoarchean aged (2.76-2.71 Ga) Mary River Group in the region. The Central Borden Fault Zone passes within 1 km to the south-west of the site. This fault separates the highly deformed Precambrian rocks to the north-west from the early Paleozoic relatively flat lying sedimentary rocks to the southwest. The generalized stratigraphic sequence of the Mary River group from top to base according to Young et al. (2004) and Johns and Young (2006) is:

- interbedded ultramafic and intermediate volcanic rocks;
- quartzite;
- Algoma–type oxide– and silicate–facies iron formation;
- amphibolites; and
- psammite and sedimentary migmatite.

The thickness of individual units varies considerably across the area. Ultramafic and gabbroic intrusions in the form of small sills and dykes (<10 m in thickness) may occur within the sedimentary rocks, iron formation and amphibolite units (Johns and Young, 2006). Locally these

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intrusions have been observed to contain thin sulphide veinlets and disseminated sulphides. At the deposit scale, the overall sequence can be complicated by inferred early isoclinal folds and ramp and flat thrust faults (Young et al., 2004) which create complex and variable stratigraphic relationships. The contact between the Mary River group and gneiss basement rock are generally not directly exposed, being obscured by younger granitic intrusions.

Iron formation within the Mary River Group occurs as an oxide- and silicate- facies unit. Oxide facies iron formations vary from lean magnetite-chert to iron-ore quality deposits of magnetite and hematite (Johns and Young, 2006). Genesis of high grade iron ores is the result of the Hudsonian age deformation and metamorphism of enriched Archean Banded Iron Formation. The silicate–facies iron formation is generally thin and found in association with the oxide–facies, although it also occurs on its own. It commonly contains coarse garnet, anthophyllite, cummingtonite, and actinolite porphyroblasts.

3.1.2 Deposit Geology

Deposit No.1 occurs at the nose of a syncline plunging steeply to the north-east (Aker Kvaerner, 2008). The iron formation occupies the nose and two limbs of this feature with a ~1300 m long northern portion and a ~700 m long southern portion. The footwall to the iron formation mainly consists of gneiss with minor schist, psammitic gneiss (psammite) and amphibolite. The hanging wall is primarily composed of schist and volcanic tuff with lesser amphibolite and metasediment.

The hanging wall primarily encompasses chlorite–actinolite schist and garnetiferous amphibolites. Meta-volcanic tuff is also a significant lithology identified in the hanging wall. The footwall mainly consists of quartz-feldspar-mica gneiss with lesser meta-sediment (greywacke) and quartz-mica schist. Microcline and albite are the predominant feldspars within the gneiss and biotite is generally more abundant than muscovite.

The iron ore deposits at the Mary River project represent high-grade examples of Algoma-type iron formation and are composed of hematite, magnetite and mixed hematite-magnetite-specular hematite varieties of ore (Aker Kvaerner, 2008). The iron deposits consist of a number of lensoidal bodies that vary in their proportions of the main iron oxide minerals and impurity content of sulphur and silica in the ore. The massive hematite ore is the highest grade ore and also has the fewest impurities, which may indicate it was derived from relatively pure magnetite or that chert, quartzite and sulphides were leached and oxidized during alteration of the iron formation.

Intense deformation and lack of outcrop limit the ability to subdivide by lithology on the basis of future mined tonnages. Rather, the waste material has been subdivided on the basis of zonal relationships around the iron ore as described in Table 1.

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3.1.3 Summary of Geochemical Sampling and Test Work

An interim mine rock ML/ARD report ("Interim Mine Rock ML/ARD Report, Mary River Project, January 2012." Prepared by AMEC) is presented in Volume 6, Appendix 6B-1 and presents the geochemical data for the waste rock stockpile to the end of 2011. This report will be updated annually as additional field and laboratory data become available.

3.1.3.1 Sampling

Assessment of the potential for ML/ARD from mine rock has been undertaken primarily by sampling of the Project's archived exploration drill core. Sampling and analysis has been conducted in stages since 2006 (Knight Piésold 2008, Knight Piésold 2009, AMEC 2010a and AMEC 2012a). The highly deformed nature of the deposit and the relatively high metamorphic grade has largely restricted interpretation of waste material tonnages to a spatial (hanging wall and footwall) rather than a lithological basis. In addition to the archived drill core, three drillholes (318 m in total) were advanced in 2010 to specifically address a lack of representative waste material in the footwall of the deposit. Limited sampling of overburden material in the area has been completed.

Work in 2011 included collection of an additional 377 samples of waste rock material on the basis of a revised waste type model that subdivided the hangingwall (HW) and footwall (FW) zones to incorporate more schist dominated regions (HWS and FWS) occurring generally in close proximity to the iron ore. It has been observed that sulphide content in these regions while variable is typically higher than that in the more distal hanging wall and footwall material. The revised waste model also incorporated an internal waste (IW) subdivision (waste fingering within the ore zone) and a deleterious ore (DO) zone that has been identified as probable waste in the footwall.

3.1.3.2 Static Testing

Static testing has included modified Sobek acid base accounting (ABA) with sulphur speciation and carbon analysis, net acid generation (NAG) testing, total element analyses, and short term leach analyses. Materials tested have primarily included waste rock (613 samples) with some testing of ore (21 samples) and overburden (seven near-surfaces outside of pit area).

Waste rock is characterized by generally low modified Sobek neutralization potentials (NP) and low sulphide contents with resulting low acid potentials (AP) (Figure 4-1). Carbonate NP typically represents < 30% of the modified Sobek NP. Sulphide content in excess of 0.5% is generally predictive of an NPR (the ratio of NP/AP) less than 2 (Figure 4-2). A summary of static ABA waste rock results by waste type are provided in Table 4-1. Overall, assuming that a NPR ≤ 2 is representative of potentially acid generating (PAG) material and based on the current understanding of waste distributions in the pit, an estimated 15% of waste rock is expected to be PAG.

The static ABA sampling program completed in 2011 included a component of mineralogical work (see below) to improve the overall understanding of ML/ARD of the waste rock and particularly the

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source of non-carbonate acid neutralizing potential in the waste rock. This, along with kinetic testing, has been identified as a critically important consideration to support and better understand the adequacy of non-carbonate neutralization capacity in waste rock to limit acidic drainage.

Overburden from the pit volume has not been specifically tested. However, selected samplings of overburden from potential borrow areas around the site and along the proposed tote road to the north have been completed (Knight Piésold 2008, AMEC 2010b). Testing of these largely glacially derived surficial materials indicated they were generally low in sulphide content and in many cases contained abundant carbonate presumably derived from the local Paleozoic carbonate rocks that outcrop in the region.

3.1.3.3 Mineralogy

Selected samples have been characterized by qualitative and Rietveld XRD (R-XRD), optical microscopy and SEM to better understand the waste rock mineralogy in terms of ML/ARD. The work initiated in late 2011 is continuing and will be reported in 2012;

3.1.3.4 Kinetic Testing

Ten waste rock samples were run in humidity cells for 53 weeks in 2008 and 2009. A further 17 waste rock samples were initiated in humidity cell tests in May 2011. Nine of these samples were standard humidity cells and eight were NP depleted humidity cells designed to assess drainage quality in the absence of carbonate NP. Available humidity cell results have produced pH in the circum-neutral to weakly acidic (pH 5) range, but no strongly acidic drainage ($pH < 5$) has occurred. All 2011 humidity cell tests are continuing.

Humidity cell metal leaching results are generally consistent with the sulphide mineralogy identified, with measureable loadings of copper, nickel, zinc and cobalt present in some humidity cells. Based on limited kinetic data, total sulphide content of samples is weakly correlated with sulphate release rates; however, through the current periods of testing metal release rates and trends vary among the cells. Overall, metal release rates for the weak acid (pH 5 to 6.5) humidity cells are higher than those of neutral pH cells. The metals copper, nickel, zinc and cobalt discussed above were also consistently identified at elevated levels in NAG leachate analyses of the net-acidic samples tested.

Two field lysimeters are in operation at the Mary River site. The two lysimeters were constructed by placing lump and fine ore left over from the 2008 bulk sampling program on an impermeable membrane to allow collection of run-off water. Though minor gypsum has been locally identified with some ore, the presence of sulphate and some elevated dissolved metals (e.g. nickel) has been inferred to be related to sulphide oxidation in these materials. Long-term storage of ore during operations is not expected; however, continued monitoring of these ore lysimeters may provide field scale and climate driven data pertinent to low NP sulphide oxidizing material.

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Shallow hydrogeological investigations of the active zone in overburden adjacent to existing ore stockpiles were initiated during 2011 with the installation of four shallow monitoring wells. These wells will be monitored and sampled during the 2012 field season.

3.2 Planned Additional Waste Characterisation Work

The planned work to address the data gaps is described in detail in Annex 3: *"Waste Rock Geological and Geochemical Characterization Program, Mary River Project – Deposit No. ". Dated January 2012*. Prepared by Baffinland. An outline is provided below.

Sampling

- The large extent of presently unsampled footwall material and smaller gaps in hanging wall material within the pit volume and adjacent to the ultimate pit on the HW side is to be drilled and sampled in 2012.
- Overburden material within the pit volume is presently unsampled. Sampling of this material will be included to the extent possible in the additional planned drilling program or coordinated with other site work.

Static Testing

- In addition to the geological characterization of the above currently unsampled waste rock materials, static testing of these footwall, and hanging wall materials will be conducted as part of the planned drilling and sampling program in 2012. Sampling and analytical methods will be consistent with previous Project work.
- Static testing of representative overburden material samples within the pit volume is also planned.

Mineralogy

- Mineralogical characterization of drill core to better understand the effective neutralization potential of waste rock for the range of lithologies and waste types will continue in 2012.
- Detailed mineralogical characterization by R-XRD, optical microscopy and SEM is also planned for selected humidity cell samples that will include an attempt to identify and assess accumulated alteration products to support the understanding of metal attenuation during oxidative weathering of waste rock.

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PAG Segregation

- The following work will continue or be initiated to identify the importance and ability to segregate PAG materials.
  - The overall percentage and distribution of PAG will be updated on the basis of the expanded footwall and hanging wall sampling program planned for 2012.
  - Continuous sampling at 1m spacing over several targeted long sections of core will be completed in 2012 to better assess continuity of PAG materials at the bench scale.
  - Mineralogical and kinetic testing work will continue to be integrated with static testing results to improve the understanding of potential simplified surrogate relationships that can be used to assist in PAG segregation during operations should this be required.

Kinetic Testing

- A continued expansion of the laboratory kinetic testing program consistent with previous Project work is planned to include:
  - Humidity cell testing of deleterious footwall ore not presently represented in kinetic testing data base;
  - Humidity cell testing (as required) of presently unsampled lithostratigraphic units to be drilled in 2012;
  - Column or humidity cell testing of a range of non-PAG materials of various sulphide contents to better understand metal leaching from this material, and
  - Comparative kinetic testing of cold and room temperature leaching of selected PAG materials.
- On-going sampling of drainage from the existing lysimeters, other ore and waste stockpiles and rock-face seepage in the vicinity of the pit will continue for at least 2012 through 2014.
- Where possible, upgrades to existing lysimeters and adjacent active zone monitoring will be made to better quantify and constrain metal loadings released from these facilities.
- If suitable material is identified, field test piles will be setup and instrumented for both thermal monitoring and drainage quality.
- Where field test piles are established, laboratory testing representative of the test pile material will also be completed to provide direct comparison and insight into the scaling factors from lab to field.

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3.3 Construction of the Waste Rock Stockpile

3.3.1 Deposition Strategy

The low quantities of PAG material identified in hanging wall and footwall rocks, and the apparently slow sulphide reactivity, supports the planned management of PAG materials by encapsulation in a permafrost core of the constructed stockpile and the outer 50m of the dump being constructed of non-PAG material.

Because of the northern location, it is likely that the majority of waste rock area material will be permanently frozen, and that only the upper surficial material will be subject to seasonal freezing and thawing. The frozen material is expected to form an effective barrier for acid-forming reactions since liquid water is largely unavailable and this will limit the potential for sulphide oxidation. Additional geochemical studies including further kinetic testing are continuing to evaluate and refine results of this option (refer to Annex 3).

Waste rock will be deposited in lifts, using deposition methods that would enhance permafrost aggradations into the Waste Rock Stockpile using the guidelines presented in Section 3.2.1. The majority of the waste rock will be placed while the ground is frozen allowing the level of permafrost to rise in elevation by conduction. It expected that a permanently frozen impermeable core will form in the waste rock storage area within the first few years after placement. The technical memorandum on the development of permafrost in waste rock stockpiles is included in Annex 2. Modeling of the waste rock regime including climate change is included as part of the future characterization program described in Annex 3.

Studies of waste rock in permafrost demonstrate that these frozen layers form an effective barrier to water and oxygen, thereby preventing significant oxidation of sulphidic waste rock located below the surficial active zone. The surficial "active" layer, which will be subject to seasonal freeze-thaw, will be constructed of non acid generating rock as the waste rock stockpile develops.

Therefore, over the long term, runoff water quality which is influenced by contact water that flows through the active layer in the waste rock stockpile will not be affected.

3.3.2 Guidelines Used to Develop the Waste Rock Stockpile

The design of the waste rock storage area is based on the conservative assumption that up to 20% of the waste rock could be potentially acid-generating. The design guidelines which follow will develop over time as the results of the various studies during the 2012-2014 become available:

- A 2- to 3-m thermal barrier of waste rock will be placed during the winter months to protect the permafrost layer during the summer months and allow development of the permafrost through conduction;
- PAG waste rock should be segregated from non-PAG rock and encapsulated within the pile

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- At closure, the active layer of the waste dumps should consist of non-PAG rock;
- Final toe 100 m from the final pit crest, to be reviewed after further geotechnical drilling and stability analysis;
- 2:1 (H:V) overall slopes;
- 1.5:1 (H:V) individual lift slopes;
- 10-m lifts, triple-benching (30 m benches);
- 15-m berms between benches;
- 150-m segments (5 benches);
- Upper segment (above 680 m elev.) toe moved back 120 m from crest of bottom segment (below 680 m elev.);
- No overburden or PAG rock in the upper segment;
- No overburden or PAG rock in the in-pit dump;
- Overburden or PAG rock contained within a cell of non PAG;
- Overburden located in southeast corner (with short haul in case needed for reclamation); and
- PAG rock all in same watershed in the waste rock stockpile.
- Haul ramps for the waste stockpile are similar in design to those within the pit at 33 m wide with 10% grade. Final access ramps are from the east and west sides of the pit, tying into the pit design.
- Overburden is surrounded with non-PAG waste rock to steepen the slopes. A separate overburden structure would require shallower slopes of 2.5:1 (H:V) and would result in a larger footprint. Enclosing the overburden slopes within the non PAG rock was chosen as a preferred option.

For the conceptual arrangement and relationship in the waste rock storage area between the potentially acid-generating (PAG) rock and overburden cores (OB), and non-PAG waste rock cover, see Figure 3-1.

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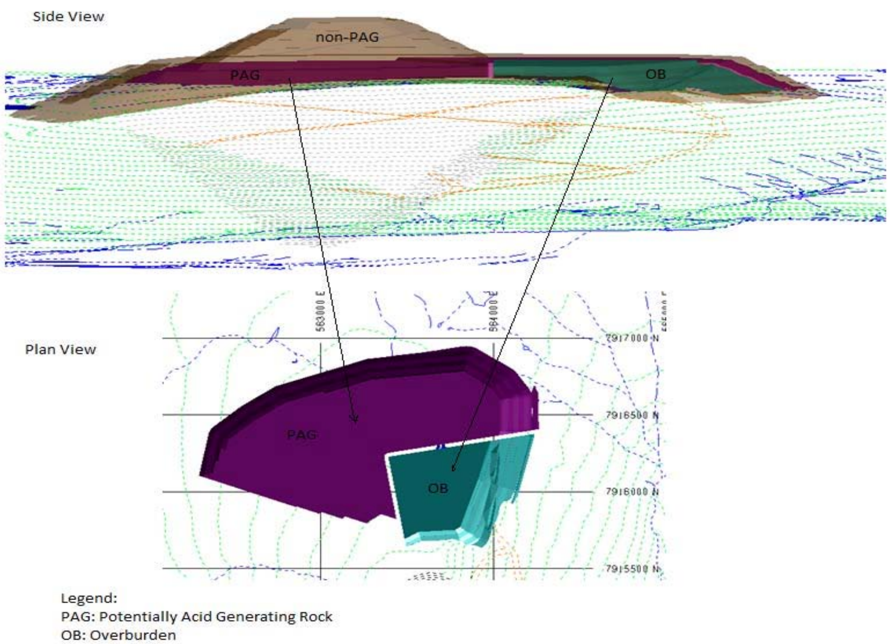

Figure 3-1 - Placement of Waste Rock

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3.4 Quantities of Waste Rock Generated Over Mine Life

For the expected quantities of waste rock and overburden materials to be generated over the life of the mine, see Table 3-1.The waste rock materials are further subdivided as non-PAG and PAG.

Table 3-1 - Preliminary Schedule of Waste Rock Production

Year	Non-PAG Waste Rock (Mt)	Overburden (Mt)	PAG Waste Rock (Mt)	Waste Rock Total (Mt)
PPM	0.4	-	0.1	0.5
1	7.9	-	3.0	10.9
2	6.7	0.5	2.5	9.7
3	18.1	0.3	5.2	23.6
4	17.4	1.8	6.1	25.3
5	24.0	1.3	7.2	32.5
6	21.4	2.1	6.3	29.8
7	26.0	2.8	7.8	36.6
8	31.4	2.5	9.6	43.5
9	25.8	4.7	7.6	38.1
10	27.9	2.6	8.2	38.7
0	132.0	13.2	41.3	186.5
16-21	126.8	0.7	39.8	167.3
Total	**465.80**	**32.50**	**144.70**	**643.00**

LEGEND:
PPM: Pre-production material
OB: Overburden
PAG: Potentially acid-generating rock

3.5 Evolution of Waste Rock Storage Area over Time

For a conceptual schematic of the expected development of the waste rock stockpile footprint over the life of the mine, see Figure 3.2. As additional geochemical, geotechnical, and geological data are collected, and the detailed engineering is completed, the waste rock plan will be optimized based on the application of best management practices and efficiencies.

In the detailed design phase, a geotechnical investigation will be carried out in areas where there are potential instabilities. These results will be incorporated into the detailed design. Specifically a stability analysis of the waste rock stockpile and the open pit will be carried out to show that the combined structures are stable (refer to "Slope Stability Analysis for the Waste Rock Dump" presented in Volume 3, Appendix 3B, Attachment 4).

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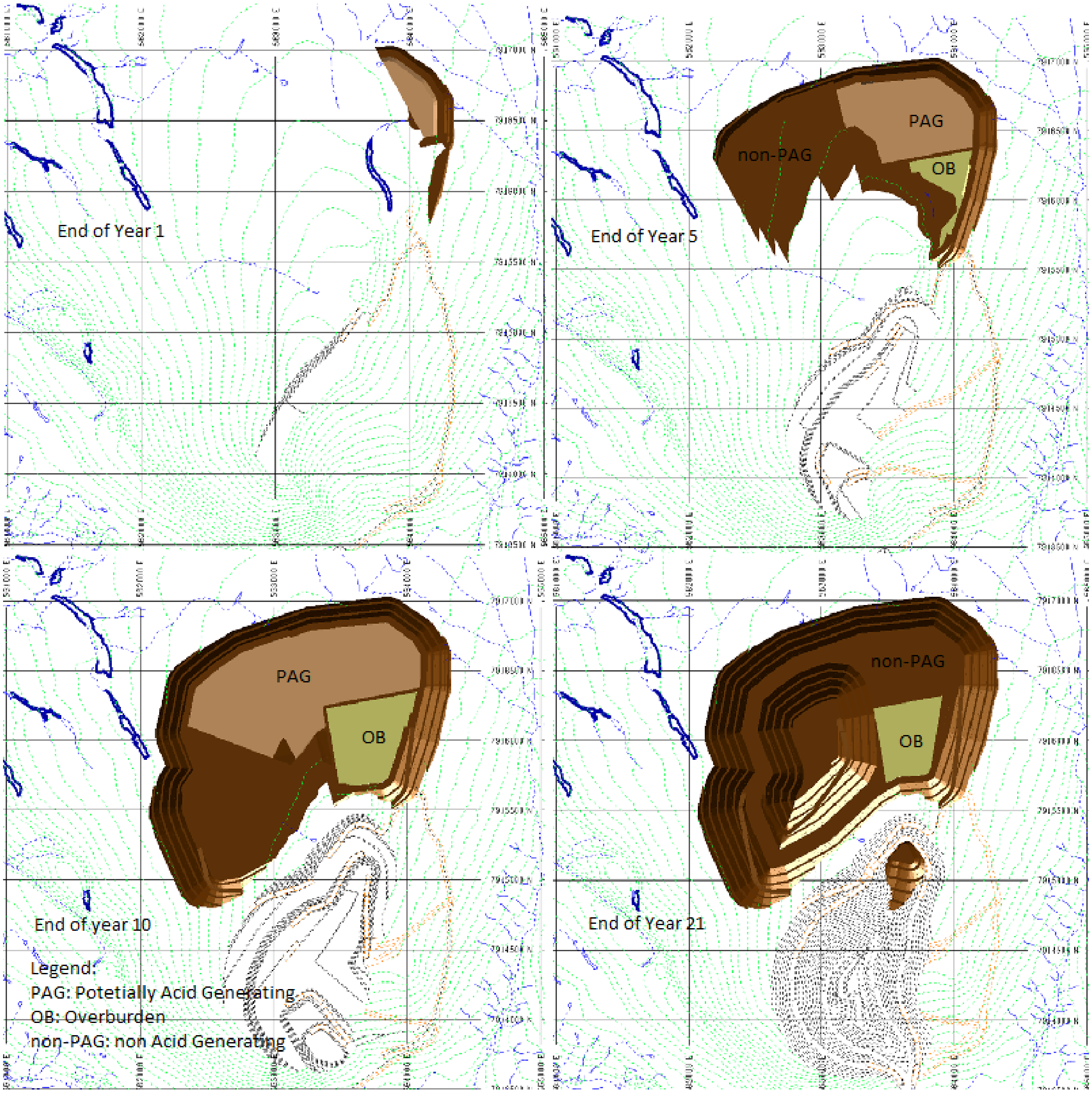

Figure 3-2 - Evolution of the Waste Rock Dump over the Life of Mine

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3.6 Ore Storage

Ore mined in the pit will be dumped on a small run-of-mine (ROM) stockpile located near the primary crusher located on the South side of the pit. The capacity of the ROM stockpile is expected to be in the order of 400,000 t.

Following primary and secondary crushing, the ore is carried on conveyors to the ore storage area where stacker-reclaimers load the ore on 2 linear stockpiles and reclaim the material for conveyor transport to the rail car loader where two rail cars are loaded simultaneously. The temporary ore stockpiles for the railway operation have an expected combined total capacity on the order of 1.4 Mt. Since ore will be stored in these locations only temporarily and the drainage during operations is controlled, there is little concern about long-term potential effects of PAG material stored at these locations.

3.7 Runoff Management and Monitoring

The stormwater management system with the associated dam safety assessment and dam design is included in "Stormwater Management and drainage system design" (H337697-0000-10-122-0001) in Annex 1

3.7.1 Waste Rock Stockpile Area

The runoff management system for the waste rock stockpile area will consist of channels formed by berms around the stockpile perimeter and two appropriately sized surface water management (SWM) ponds. The system is designed to operate on the following basis:

- Clean or "non-contact" water will be diverted away from the waste rock stockpile to minimize the volume of water that comes into contact with the waste rock (contact water). The non-contact waters will be discharged (drain) into their respective watersheds.
- During freshet, runoff will be contained in two SWM ponds indicated in Figure 3-3 where suspended solids will settle out. Both SWM ponds are sized to contain the 2 year return event for sedimentation purposes.
- The larger "west" SWM pond, of 700,000 m^3 capacity and located west of the open pit and southwest of the waste rock stockpile, and will decant water to an existing drainage that leads to a tributary of Camp Lake with final discharge intro Camp Lake.
- The smaller "east" SWM pond, of 400,000 m^3 capacity and will discharge to an existing drainage that reports to a tributary of the Mary River.

The volume of sediment to be collected in the SWM ponds will vary from year to year. Ponds will be inspected after freshet and the sediment removed when required. The sediment is non-toxic and will be hauled to the waste rock stockpile for disposal.

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Collection berms will be designed during the detailed design phase when the final configuration of the stockpile has been determined.

The SWM pond collection system will be monitored for runoff quality and compared with MMER criteria. Berms rather than ditches will be used to provide drainage diversions in consideration of the challenges in the arctic, e.g., ice-rich soils and lenses. Berm construction is designed to maintain the frozen layer and prevent any subsurface flow or flows that would undermine the berms. For water management structures for the waste rock storage, refer to Annex 1.

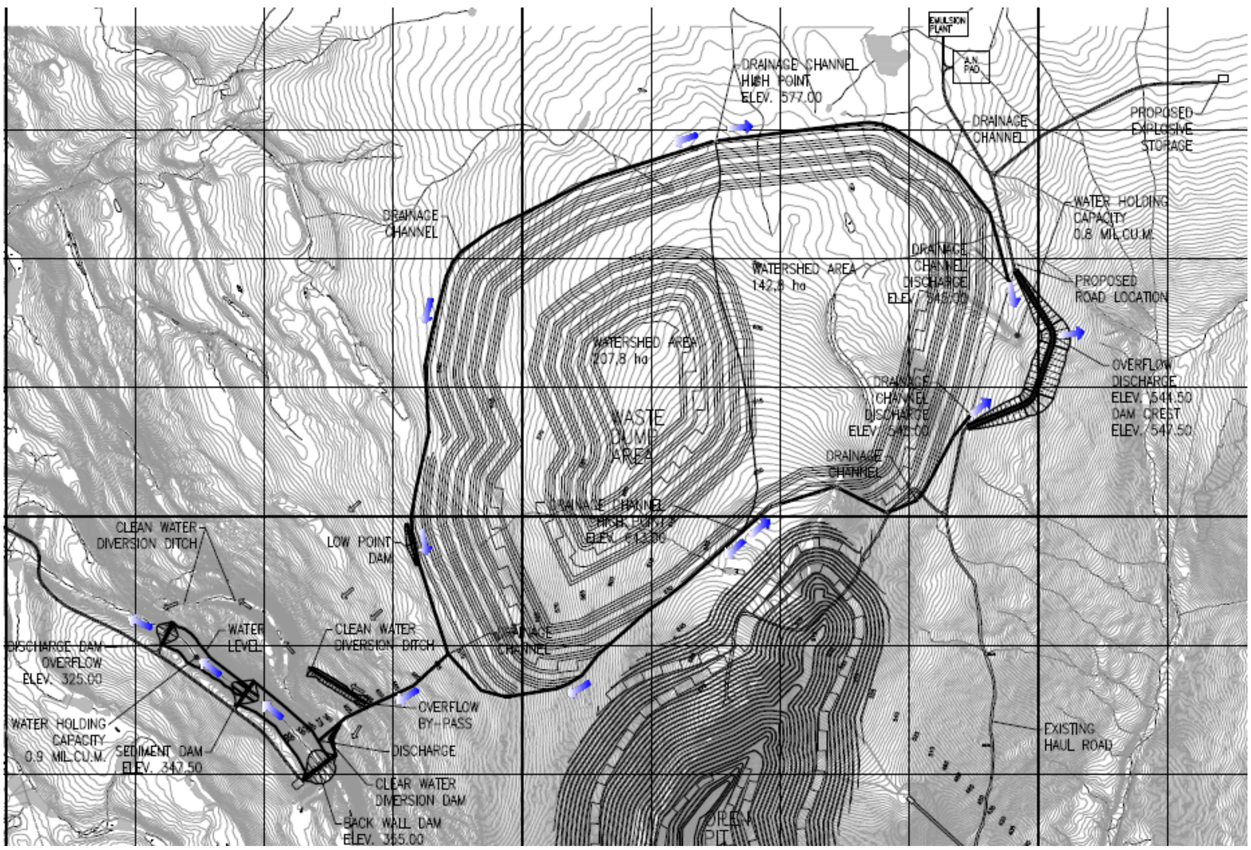

Figure 3-3 - Water Management Structures for the Waste Rock Storage Area

3.7.2 Ore Stockpiles

Each stockpile will be constructed of a 1.5-m thick granular pad base with a lined perimeter ditch to direct runoff to a stormwater pond. Because of the rapid turnover of both the ore stockpiles no oxidation of the ore will take place. Sedimentation will be required to reduce suspended solids below the MMER maximum concentration criteria of 30 mg/L.

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Run-off from the small Run of Mine (ROM) ore stockpile near the primary crusher will be collected in a storm water management pond to allow sedimentation of suspended solids. The overflow is an MMER discharge and will be released to an existing drainage that reports to a tributary of the Mary River.

The 1.4-Mt crushed ore stockpile is maintained by large stacker-reclaimer machines. The stacker conveyor is supplied by conveyor from the secondary crushers and the bucket wheel reclaimer supplies the railway load-out operation. The turnover of this stockpile of about 50,000 tpd means that no oxidation of the ore will take place. Run-off is collected in a SWP. The overflow is an MMER discharge and will be released to an existing drainage that reports to the Mary River. Conceptual engineering drawings of the SWPs are included in the Stormwater Management and drainage system design document. (H337697-0000-10-122-0001) to be found in Annex 1

3.7.3 Mining area run-off

Runoff from the mining area/open pit will require sedimentation to meet TSS requirement before discharge. This will be sent to the East SWP for sedimentation before discharge.

3.7.4 Run-off Water Quality

Snow will accumulate in the waste rock stockpile during the winter and during the summer the melted snow along with any rainfall will seep through the active zone runoff the sides of the dump or drain from the foot of the perimeter of the dump. The latest estimate of waste rock stockpile run-off water quality is presented in Annex 4, "Interim Waste Rock Stockpile Seepage Quality Model Report, Mary River Project". Dated January 2012. Prepared by AMEC. This shows that, following sedimentation, runoff from seepage of water through the waste rock meets all the MMER discharge requirements.

Run-off from the open pit area has also been modelled and the results presented in Annex 5, "Interim Open Pit Water Quality Model Technical Memorandum, Mary River Project". January 2012. Prepared by AMEC. This shows that, following sedimentation, open pit area runoff meets the MMER discharge requirements.

This modelling does not take into account the potential for explosive residue material remaining on the waste rock after blasting to be dissolved by seepage water as ammonium or nitrate ions and carried downstream. This can lead to nitrate and/or ammonia levels in receiving water bodies exceeding acute toxicity limits. No Commitment to Nitrate modelling?

With the use of modern emulsified explosives the potential to dissolve in water is very low and with the use of best management practices in explosives handling and blasting the risk is considered to be very low. As such no treatment of mine effluent for ammonia or nitrate is anticipated to be required.

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Experience acquired at the Diavik mine indicates that the use of good SOP and best management practice for handling and loading of explosives in blastholes can reduces losses of explosives.

3.7.5 *Runoff Water Treatment Alternatives*

Latest modelling by AMEC indicates that the waste rock pile and open pit area runoff water will not contain concentrations of metals in excess of discharge requirements based upon the Metal Mining Effluent Regulations. In addition, ammonia and nitrate in runoff are not expected to cause receiving water impacts or regulatory exceedences.

However, In the event that ongoing WQ modelling or field monitoring shows a trend toward exceedance of discharge requirements, then water treatment facilities will be constructed.

Additional characterisation of the waste rock will be undertaken as part of the waste characterization program in 2012-2014 (Annex 3). The need for treatment of the runoff will then be reassessed in light of the results obtained from this on-going waste rock characterisation program and runoff WQ modelling. A review of the treatment schemes that were considered for both metal and ammonia/nitrate removal follows:

3.7.5.1 *Potential Runoff Water Treatment Alternatives for Metal Removal*

Resins

The ion exchange resins are insoluble matrices usually in the form of small diameter balls. This material is structured to present a multitude of pores on the surface to trap metal ions in the case of contaminated mine drainage. A variety of this material is available on the market, each resin should be chosen based on the elements to be captured. This technology has been set aside until more detailed waste characteristics are available to establish the operating costs for such a system. In addition, the operation of ion exchange equipment is quite complex and this is a key concern for this site.

Polymer Addition

Certain polymers are able to effectively precipitate the Nickel. However the chemical costs for these proprietary chemicals is not considered cost-effective. This will be reviewed when more detailed waste characteristics are available.

Sodium Hydrosulfite Treatment

Sodium hydrosulfite is added to cause metals to precipitate as sulphides which can then be sold for further processing to recover the metals. The precipitated metals and water are pumped into a

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clarifier where the treated water is discharged into the environment and solids are removed to be managed. This process has been set aside until more detailed waste characteristics are available to establish economic feasibility of such a system.

Ozonation

The ozonation process is mainly used for the treatment of drinking water. Ozone is generated from oxygen in the air. Subsequently, ozone is bubbled into the water to be treated. Ozone oxidizes the transition metals to their higher oxidation states in which they usually form less soluble oxides and are easy to remove by filtration. Metals that can be removed in this way include Fe, Cd, Cr, Co, Cu, Pb, Mn, Ni and Zn. This method produces very little sludge however the purchase of an ozone generator capable of treating a continuous flow of water is very expensive. In addition, costs in energy consumption could be high. As such this treatment method has been discounted.

Biofilters-Sulphide Precipitation

The principle of biofiltration is used for many applications in the treatment of water for many years. It consists of passing water to be treated through a granular bed where a biofilm will be developed by microorganisms. In the case of water contaminated with metals, the sulphate-reducing bacteria will result in the precipitation of metal sulphides and thus removing metals from the effluent. The bacteria moderated process requires constant operating conditions which are difficult to maintain in site conditions for a plant at Mary River and this technique is not considered appropriate.

Activated Carbon

Activated carbon has a microporous structure which gives the material a high adsorption capacity. As water passes through a carbon filled filter vessel metals are adsorbed and the water treated is discharged. After saturation, the carbon is "stripped" of the contaminants and regenerated. The costs and complexity associated with this option mean that it will not be considered further.

Lime Precipitation

By far, the most commonly used commercial process for treating metal contaminated mine drainage is lime precipitation where an aqueous solution of $CaCO3$ precipitates metals as solid hydroxides which are then removed as a sludge. Although several other processes are also possible for metal removal, in this situation the simplicity of the system operation is a key requirement and as such lime treatment is the preferred technique as this is the simplest most reliable operation.

Contaminated waste rock run-off water will be directed through the sedimentation pond where suspended solids will settle out. The run-off water will then be pumped into the lime treatment plant.

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The first step is one where the drainage is neutralized in a mix tank with controlled addition of lime to attain a desired pH set-point (see figure 3-4).

The slurry is then contacted to a flocculants and fed to a clarifier for solid/liquid separation. Some sludge is recycled from the bottom of the clarifier to the neutralization tank. The clarifier overflow may be released directly or a sand filtration system or polishing pond may be used to further reduce residual suspended solids. It should be noted that several heavy metals will be precipitated during this process (Al, Co, Cu, Fe, Pb, Zn…).

The effluent leaves the system to be discharged to the environment (after controlling for pH) and the sludge is collected and dewatered before disposal. Carbon dioxide will be used for pH control. It reduces high pH levels quickly. It is not stored as an acid solution so it is considered safer than sulphuric acid and it is non-corrosive to pipes and equipment and requires less equipment and monitoring costs.

Note that the effectiveness of a treatment with NaOH (caustic) is similar to that obtained with lime. However, this product is more difficult to handle and more expensive.

Figure 3-4 below shows an example of the lime treatment system.

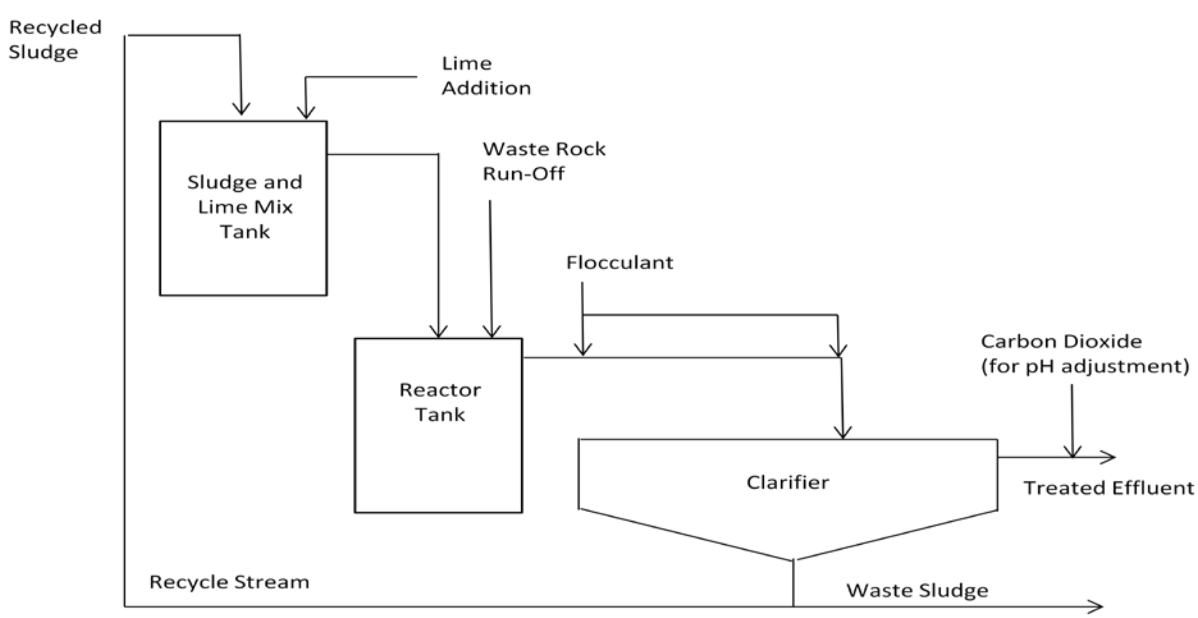

Figure 3-4 - Lime Treatment System

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If required, the batch run-off treatment system will be located in the main infrastructure area to the South of the West SWP. The treatment system will discharge by pipeline directly to Mary River during the summer months. Run-off requiring treatment would be trucked to this facility from the other ore and waste rock run-off ponds at the mine site.

The final location and configuration of the outfall from the facility will be determined during final design. The sludge generated in the treatment facility will be tested before disposal for leachate toxicity characteristics. If suitable it will be disposed of in the landfill or in a designated location within the waste rock stockpile. If it fails the test and is designated as hazardous then it will be dried and shipped off-site for disposal.

3.7.5.2 Potential Runoff Water Treatment Alternatives for Ammonia/Nitrate Removal

The main risk of explosive residues in water is acute toxicity of effluent discharge. MMER discharges cannot be acutely toxic to the receiving environment.

Given the oxidising conditions of the system it is expected that nitrate will be more likely than ammonia to be present in run-off.

Nitrate and ammonia removal technologies can be divided into three categories. These categories are ion exchange, electrochemical ion exchange and biological de-nitrification.

Biological De-nitrification (for removal of both ammonia and nitrate)

Ammonia is typically removed from wastewater via biological nitrification according to the following two-step reaction; the first step is moderated by Nitrosomonas bacteria, the second by Nitrobacter bacteria. The nitrification process results in the end formation of the nitrate ion and the nitrates then converted to nitrogen gas in a process known as biological denitrification.

The bacteria moderated process requires constant operating conditions which are difficult to maintain in site conditions for a plant at Mary River and this technique is not considered appropriate.

Ion Exchange

Nitrate: Nitrates are soluble and cannot be treated via neutralization or precipitation, but they can be removed via ion exchange. A strong-base anion resin is typically used; however, it will attract sulfates even more readily than nitrates. This can be a capacity problem for nitrate removal if sulphate levels are high, so more selective nitrate resins should be used when this is the case. Both resins are regenerated with sodium or calcium salts. This process produces a brine waste that must be handled.

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Ammonia: Ion exchange systems treat ammonia effectively. The choice of resin depends on the other cations and anions in the wastewater that may interfere. The process produces a brine waste that must be handled.

Electro-Chemical Ion Exchange

Electrochemical ion exchange is relatively untested but does not generate a waste stream.

In this two-stage system ion-exchange (IX) is the first stage in which the ammonia is removed from the wastewater. Once the IX media is loaded with ammonium, the media is regenerated by circulating a brine solution through the column. The ammonium ion is transferred into the regenerant solution and is subsequently oxidized to N_2 gas using an electrochemical reactor. Thus, the regenerant solution can be continuously reused.

In the case of nitrate removal the nitrate is removed by a selective ion exchange resin first. Once the IX media is loaded with nitrate, the media is regenerated by circulating a brine solution through the column. The nitrate ion is transferred into the regenerant solution and is subsequently reduced to N_2 gas using an electrochemical reactor. Thus, the regenerant solution can be continuously reused.

Breakpoint Chlorination of Ammonia

In the breakpoint chlorination process, chlorine is added to wastewater to chemically oxidize ammonium ions to various products (primarily nitrogen gas); under proper operating conditions, 95 to 99% of the ammonia-nitrogen in wastewater can be converted to nitrogen gas. The system is simple and cost-effective.

Preferred Potential Treatment method for Nitrate/Ammonia removal

Based upon the descriptions of the various process options above if a nitrate removal system is deemed necessary it would be electro-chemical ion exchange. Although this system has a relatively high capital cost the operating costs are low, there is no waste stream to handle and it does not have the difficulties with varying feed concentrations that biological treatment systems have.

Ammonia would be removed through breakpoint chlorination method.

A schematic of the proposed electro-chemical ion exchange process is given below:

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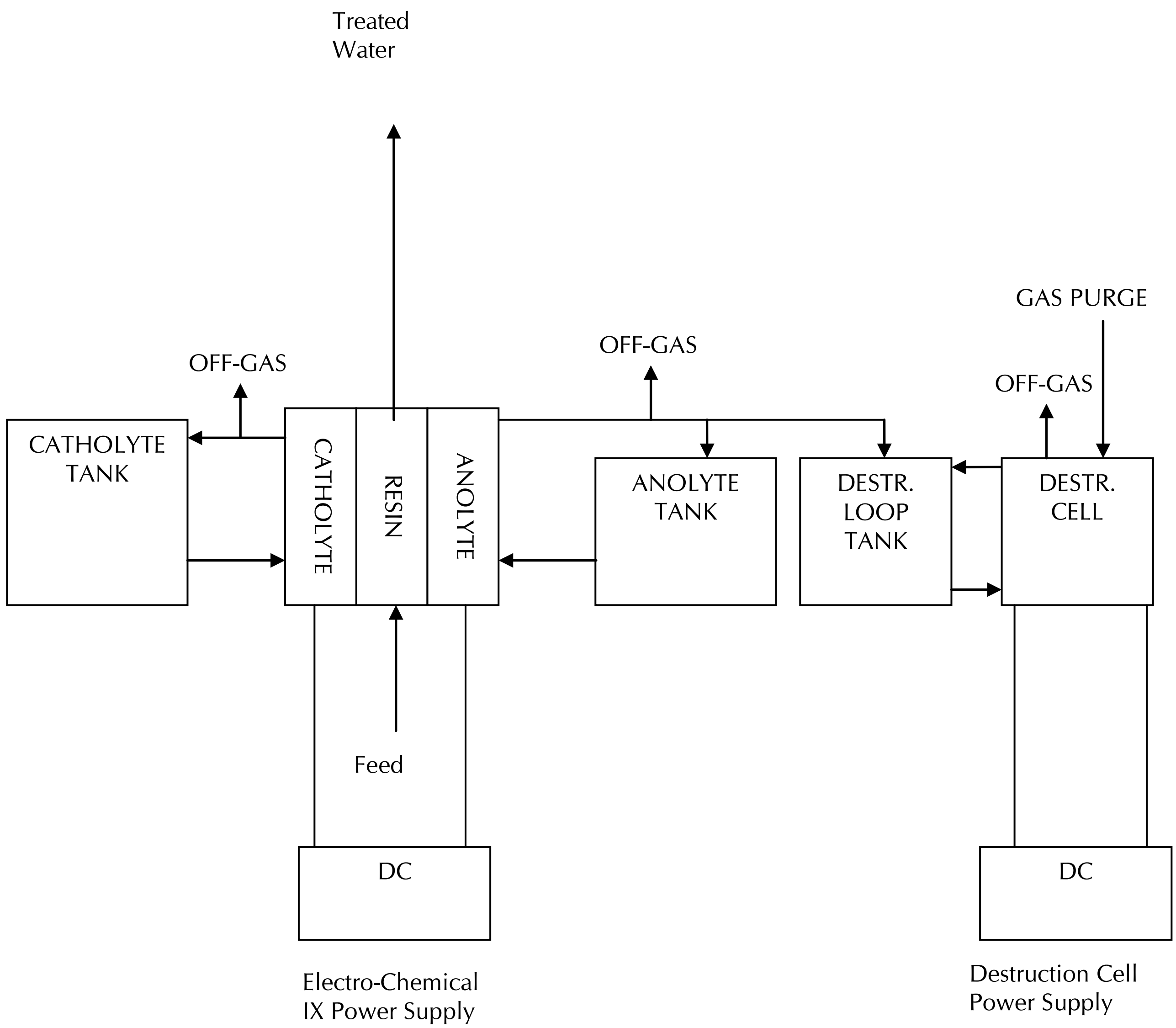
Electro-Chemical Ion Exchange



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4. Closure

Full details of project closure are included in the Preliminary Mine Closure & Reclamation Plan (H339697-0000-07-126 0014) to be found in FEIS Appendix 10G. At closure the principal objectives are the safety of the public and maintaining the physical and chemical stability of the permanent structure to ensure that there is no long-term environmental impact.

Mine planning will ensure that at closure the exterior of the dump consists of a layer of non-PAG material up to 50 m thick. To minimize active layer thickness a stockpile of overburden will be retained to spread a layer of less permeable material over the top of the dump.

4.1 Climate Change considerations

Studies of waste rock in permafrost demonstrate that permafrost forms an effective long-term barrier to water and oxygen, thereby preventing significant oxidation of sulphidic waste rock located below the surficial active zone. The surficial "active" zone, which will be subject to seasonal freeze-thaw, will not reach the 50m thickness of non-PAG material in the long-term (within 200 years) under the influence of climate change (Intergovernmental Panel on Climate Change, 2007).

Therefore, over the long term, runoff water quality which is influenced by contact water that flows through the active layer in the waste rock stockpile will not be affected.

5. Roles and Responsibilities

For roles and responsibilities for implementation of the Waste Rock Management Plan, see Table 5-1.

Table 5-1 - Roles and Responsibilities

Position	Responsibility
VP Sustainability	• Accountable for environmental performance of the mining operation. • Establishes goals and targets for environmental performance.
EHS Superintendent	• Responsible for implementing Baffinland Environmental Management Plans. • Provides direction on environmental issues to the Site Management Team. • Responsible for staffing Environmental Department. • Supervises/conducts site inspection and audits. • Initiates and manages environmental studies as required. • Manages external environmental consultants/specialists. • Responsible for environmental reporting as required by permits and authorizations.

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Position	Responsibility
	• Responsible for liaison with regulatory agencies on all environmentally related issues.
Environmental Consultants	• Provide specialist advice and input on environmental matters. • Conduct environmental studies and monitoring programs. • Conduct audits of operations, as requested. • Prepare environmental reports.
Contractors/Subcontractors	• Contractors/subcontractors are considered equivalent to Baffinland staff in all aspects of environmental management and control and their responsibilities in this respect mirror those of Baffinland personnel. Contractor personnel will be included in the onsite induction process. • Contractors/subcontractors are responsible for complying with the requirements of the EPP. • Responsibilities of the contractors/subcontractors supervisors include the following: ◆ Conducting regular site checks/inspections to ensure that regular maintenance is undertaken to minimize environmental impacts; and ◆ Providing personnel with appropriate environmental toolbox/tailgate meetings and training.

6. Performance Indicators and Thresholds

Runoff quality from the waste rock and ore storage runoff management ponds is the most relevant performance indicator. Discharge from these ponds must meet the water quality guidelines established by the MMER and site-specific indicators shown in Table 6-1.

Table 6-1 - Discharge Performance Indicators

Indicator	Threshold
	Maximum Concentration in a Grab Sample
pH	$6.0 < pH < 9.0$
Ammonia	Non-acutely toxic
Nitrate	Non-acutely toxic
Sulphate	To be established
Deleterious Substances - mg/L	
Arsenic	1.00
Copper	0.60
Lead	0.40

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Indicator	Threshold
Nickel	1.00
Zinc	1.00
TSS	30.00
Acute toxicity	
Fish species	No mortality

pH, conductance and sulphate will be used as early-warning indicators to identify potential acid generation in the waste rock storage area. Ammonia and Nitrate will be monitored in run-off to ensure that no explosive material remaining on the blasted waste rock has been dissolved by water infiltrating the active layer.

Contaminants of potential concern identified from kinetic testing will be measured to provide temporal data on effluent quality that could potentially affect the receiving water quality.

The Aqueous Environment Monitoring Plan (AEMP) will be implemented to monitor environmental effects of effluent discharge from the SWM ponds at Mary River. Results of the AEMP can trigger additional adaptive management actions such as further treatment of pond effluent, if required. The Aquatic Effects Monitoring Plan is presented in Volume 10, Appendix 10D-4.

7. Monitoring and Reporting Requirements

7.1 Effluent Quality Monitoring

Effluent quality monitoring consists of acute toxicity test work and effluent quality monitoring. All water quality monitoring locations are shown in the Environmental Monitoring Plan.

7.1.1 Acute Toxicity Testing

For the requirements of the acute toxicity test work, see MMER Schedule 5 and AEMP-Volume 10, Appendix 10D-14.

7.1.2 Water Quality Monitoring

Monthly water quality monitoring (starting after freshet until end of September) will include the following information and analyses:

- Sampling location;
- Temperature of the water;
- Specific conductance; TSS.
- pH, alkalinity, acidity;

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- Concentrations of ammonia, sulphate and nitrate;
- Concentrations of arsenic, copper, lead, nickel, zinc

Annual water quality monitoring will include the monthly analyses, plus mercury, aluminum, cadmium, chromium, iron, and molybdenum.

7.1.3 Ground Temperature Monitoring

Following consultation with experts from NRCan, the appropriate instrumentation will be installed in the waste rock stockpile to monitor ground temperatures and confirm the aggradations of permafrost within the waste rock dump and the thickness of the active layer.

Data from temperature sensors installed to monitor the ground temperatures will be collected on a regular basis and used to ensure that frozen conditions are maintained below the waste rock stockpile. In addition, the data will be used to calibrate the waste rock stockpile thermal model.

Baffinland will carry out thermal modeling of the waste rock stockpile when suitable data is available to demonstrate the robustness of the proposed waste rock stockpile deposition design and confirm that frozen conditions are maintained in the waste rock stockpile. This will take long-term climate change into account (200 years).

In the detailed design phase, a geotechnical investigation will be carried out in areas where there are potential instabilities. These results will be incorporated into the detailed design. Specifically a stability analysis of the waste rock stockpile and the open pit will be carried out to show that the combined structures are stable (refer to "Slope Stability Analysis for the Waste Rock Dump" presented in Volume 3, Appendix 3B, Attachment 4).

7.1.4 QA/QC

The QA/QC best practices that are outlined are designed to provide guidance to field staff and analytical laboratories to maintain a high level of confidence in the water quality data generated from the Project. The plan addresses best practice methods for water samples collected from lakes, streams, and rivers, treated wastewater effluent, drinking water, and site drainage.

7.2 Data Management

The EHS Superintendent is responsible for data management and reporting related to waste management. The data management system includes conducting routine inspections and monitoring, and providing these results to appropriate parties as required.

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7.3 Reporting

An annual monitoring report will be submitted to the NIRB, NWB, QIA and other interested parties. The report will indicate:

- Dates on which each sample was collected for effluent characterization, sub-lethal toxicity testing, and water quality monitoring;
- Location of the final discharge points from which samples were collected for effluent characterization;
- Location of the final discharge point from which samples were collected for sublethal toxicity testing and the data on which selection of the final discharge point was based, in compliance with the MMER;
- Latitude and longitude coordinates of sampling areas for water quality monitoring;
- Results of effluent characterization, sublethal toxicity testing, and water quality monitoring;
- Methodologies used to conduct effluent characterization and water quality monitoring, and related method detection limits;
- Charts showing trends in ground surface temperatures below and within the waste rock stockpile; and
- Description of quality assurance and quality control measures implemented and data related to implementation of those measures.

8. Adaptive Strategies

Baffinland is committed to continuous improvement in its work activities to reduce risks to the environment and improve operational effectiveness. The strategy employed at Baffinland is regular monitoring supported by operational change and adoption of other mitigation measures if warranted.

For the waste rock stockpile, information obtained over the life of the Project from the on-going characterisation of the waste rock will provide the basis for most modification or changes introduced in deposition strategy, runoff management and eventual closure.

As per the requirements of Baffinland's Environmental, Health, and Safety (HSE) Management Framework to be found in FEIS Volume 10 - Appendix 10A, Baffinland will conduct and document regular management reviews of its Waste Rock Management Plan. Such reviews will ensure monitoring results for the waste management plan are integrated with other aspects of the Project and that necessary adjustments are implemented as required. These reviews also provide a formal mechanism to assess the effectiveness of management in achieving company objectives and maintaining ongoing compliance with Project permits and authorizations.

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9. References

Aker Kaeverner. 2008. Definitive Feasibility Study Report Mary River Iron Ore Project Northern Baffin Island, Nunavut.

AMEC. 2010. Waste Stockpile Schedule by Period Map, Baffinland – Mary River DEIS. Project File No TDM-159952-0000-170-0001. Memo. July 16, 2010.

MMER. 2002. Metal Mine Effluent Regulations SOR/2002-222. Intergovernmental Panel on Climate Change. 2007.

INAC. 1992. Mine Reclamation in Northwest Territories and Yukon, prepared by Steffen Robertson and Kirsten (B.C.) Inc. for Indian and Northern Affairs Canada.

Canada Council of Ministers of the Environment. 2007, Canada Council of Ministers of the Environment. 2007, Canadian Water Quality Guidelines for the Protection of Aquatic Life.

Jackson, G.D. and R.G. Berman. 2000. Precambrian Metamorphic and Tectonic Evolution of Northern Baffin Island, Nunavut. Canada. The Canadian Mineralogist 38: 399-421.

Johns, S.M. and M.D. Young. 2006. Bedrock Geology and Economic Potential of the Archean Mary River Group, Northern Baffin Island, Nunavut. Geology Survey of Canada. Current Research 2006-C5.

2002. Metal Mine Effluent Regulations (MMER) SOR/2002-222. Schedule 5, Part I.

Young, M.D., H. Sandeman, F. Berniolles and P.M. Gertzbein, 2004. A Preliminary Stratigraphic and Structural Geology Framework for the Archean Mary River Group, Northern Baffin Island, Nunavut. Geology Survey of Canada. Current Research 2004-C1.

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Annex 1
Stormwater Management and Drainage System Design

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Stormwater Management and Drainage System Design

REGISTERED PROFESSIONAL ENGINEERS
J. CASSON
LICENSEE
Nov 7/11
NT/NU

2011-11-09	B	Approved for Use – Environmental Permit	R. Zhou	D. Sanchez	J. Binns	
2011-10-06	A	Internal Review	R. Zhou	D. Sanchez		
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Attachments

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1. Introduction

The Mary River Project is a proposed iron ore mine and associated facilities located in northern Baffin Island, in the Qikiqtani Region of Nunavut. The Project involves the construction, operation, closure, and reclamation of a 18 million tonne-per-annum open pit mine that will operate for 21 years. The high-grade iron ore to be mined is suitable for international shipment after only crushing and screening with no chemical processing facilities. A railway system will transport ore from the mine area to an all-season deep-water port and ship loading facility at Steensby Port where to ore will be loaded into ore carriers for overseas shipment through Foxe Basin.

The project consists of the construction, operation, closure, and reclamation of an open pit mine and associated infrastructures for extraction, transportation and shipment of iron ore from two newly constructed ports at Milne inlet and Steensby inlet. After crushing and screening, iron ore will be transported from the Mine Site to the Ports for shipment.

The development requires managing stormwater runoff and flow by a well designed stormwater management system to reduce impacts of the development on the environment.

This design memo describes the stormwater water management and drainage system for the Mine Site, the Milne Port and the Steensby inlet.

2. Design Criteria and General Design Considerations

2.1 Objectives

The objectives of the design for the stormwater management and drainage are to provide: i) a safe and efficient stormwater drainage scheme that will minimize disruptions to the mine and operations (including construction) during wet weather periods, while minimizing the potential for negative impacts to the environment in the event of an uncontrolled release of stormwater runoff, ii) intercept and divert clean stormwater from undisturbed areas, and iii) provide peak flow reduction to mitigate flooding of the downstream areas.

2.2 Design Criteria

2.2.1 Surface Drainage

The general criteria for the stormwater management system is described below. Where applicable the criteria described correspond to that described in the Civil Design Criteria.

- All interior site grading and roads will be designed to provide continuous overland flow without erosion to a drainage ditch system.
- Provision must be made to ensure that there is a safe flow path for events up to the 1 in 10-year event, such that the runoff will not flood key mining areas, cause significant erosion, pick up excessive contaminants or cause other significant problems.

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2.2.2 External Surface Drainage

Additional criteria for drainage of the external area are as follows:

- Run-off from undisturbed areas surrounding the mine site should be collected in clean-water perimeter ditches and diverted around and / or through the site perimeter.
- To the extent possible, these perimeter ditches will be designed to discharge at locations that best retain the characteristics of the existing (i.e., pre-development) natural drainage patterns.
- Clean water diversion ditches shall be designed to convey the 100-year flood event.

2.2.3 Stormwater and Sediment Ponds

Stormwater management ponds are designed to:

- Safely pass the Inflow design flood that meet CDA dam safety guidelines
- Reduce flooding in the downstream area
- Remove sediment concentration to meet the 15 mg/L discharge standard
- Be stable under design earthquake conditions
- Be stable under worst load conditions as required by CDA dam safety guidelines.

2.3 Dam Safety Assessment

The stormwater and sediment management ponds need embankment structures to create the required storages. These embankment structures meet the definition of dams (2 meters of height and retains more than 30,000 m^3 of water) and hence must follow the dam safety guidelines of the Canada Dam Association (2007). A dam classification is needed to determine many of the design parameters (such as the inflow design flood (IDF), and the design earthquake (DE)). The detailed dam safety assessment will be discussed in Appendix A.

3. Stormwater / Sediment Management and Drainage Systems

3.1 Mine Site

The general layout of the mine site development is presented in drawing no. H337696-4210-10-014-0001. The mine site stormwater management system includes dirty flow collecting ditches, clean water diversion ditches, and stormwater / sediment ponds. There are two main areas where stormwater management systems are required. One area is the treatment of stormwater and sediments surrounding the waste rock stockpile north of the main pit, and the other area is the treatment of stormwater and sediments surrounding the ore stockpile platform. The following sections discuss the two area's specific features.

3.1.1 Waste Dump Stockpile Area

Figure 3-1 shows the ditches and stormwater ponds for the treatment of the storm water runoff from the waste dump stockpile area. From Figure 3-1, the waste dump stockpile is surrounded by runoff collecting ditches. The ditches have four segments.

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- Segment 1 (northeast portion) collects runoff from the waste dump stockpile and carries flow to the east then to the south down to Stormwater Pond 2.
- Segment 2 (Southeast portion) receives runoff from the waste dump stockpile and flows mainly to the east and discharges into Pond 2.
- Segment 3 (Northwest portion) collects stormwater and flows to the west then to the south and releases the water into Pond 1.
- Segment 4 (South West portion) collects flows from the waste dump area and flows mainly to the west then discharges flow into Pond 1.
- Between Pond 1 and the waste dump stockpile area, there is a large area where no development is planned and there will be no disturbance to the runoff generated from the area. The water is therefore clean. The flow from this area will, however, flow down in the south direction and will be discharged into Pond 1. This will lead to unnecessary treatment of clean water by Pond 1 reducing the sediment removal efficiency or increasing the pond storage requirement. In order to avoid to treat the clean water generated by the undisturbed watershed, a clean water diversion ditch is proposed to collect the clean water generated from the natural area and divert the flow to downstream of Pond 1. The location of the clean water diversion ditch is shown in Figure 3-1.

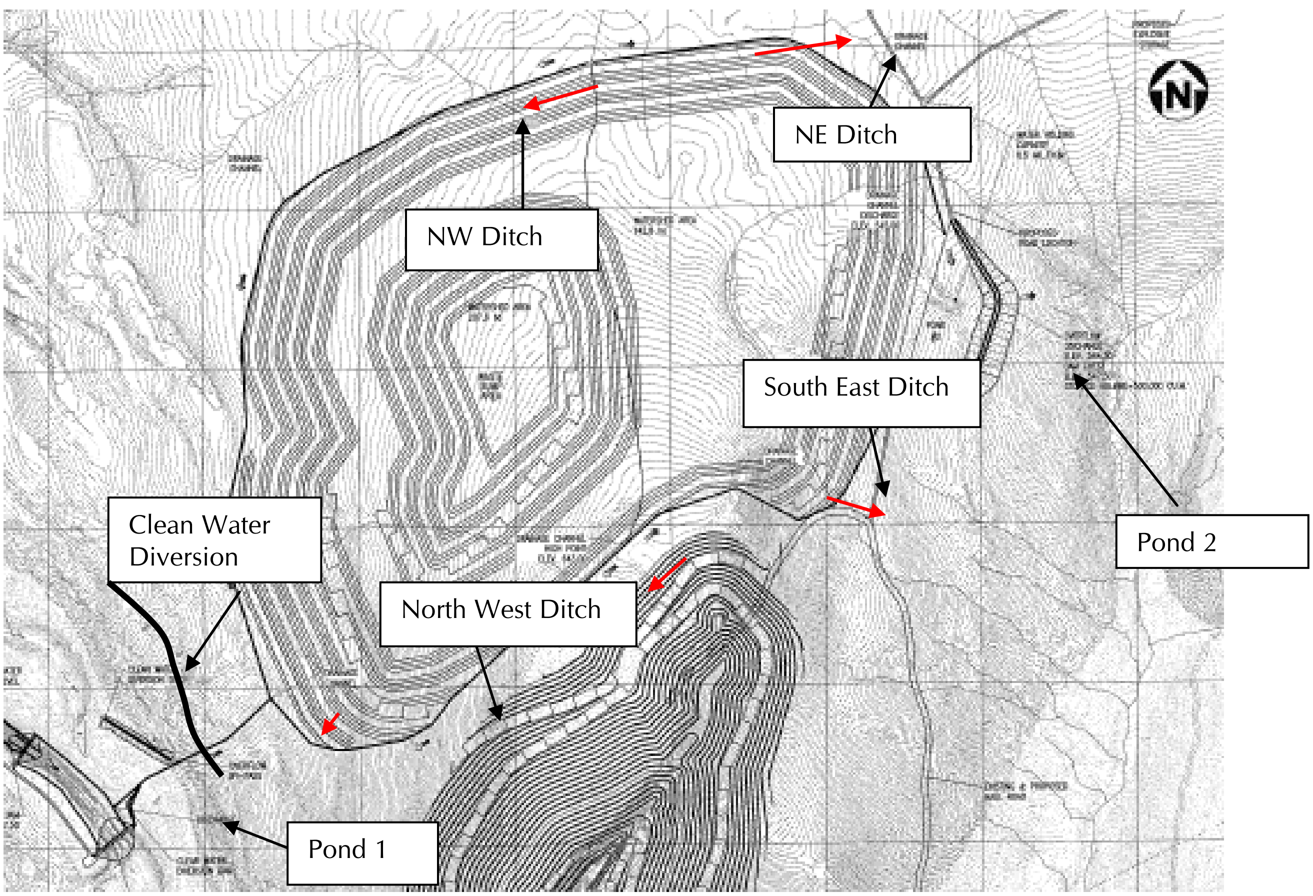

Figure 3-1: Stormwater Management System Layout - Waste Dump Stockpile Area

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Two stormwater ponds are proposed to treat the stormwater for sediment removal.

- Pond 1 is located on the south west area downstream of the waste dump stockpile. This pond has two cells. Three dams will be required to form the pond cells. The pond releases flow into an existing downstream stream.
- Pond 2 is located to the East of the waste dump stockpile. The pond treats stormwater for sediment removal and then discharges to an existing downstream stream near the dam.

It shall be noted that the construction of the ditch and stormwater pond system for the waste rock stockpile area can be undertaken in phases corresponding to the waste rock dump development plan. Pond 1 and the runoff ditches to this pond shall be constructed before the waste rock dumping start. However, Pond 2 may not be needed until year 15 according to the current waste rock stockpile development plan. The basic criteria to determine if the construction shall be carried out is that the stormwater treatment system shall be in place once waste rock dumping begins in the affected drainage area.

The sizing of the required components (ditches and ponds will be discussed in the following sections.

3.1.2 Ore Stockpile Platform Area

3.1.2.1 Clean Water Diversion Ditch

The ore stockpile area is presented in H337697-4210-10-042-0003. The infrastructures in this area are still in the process of modifications. However, the general layout of the drainage system shall not change much from what is described in the following sections. Some changes are expected in the final design.

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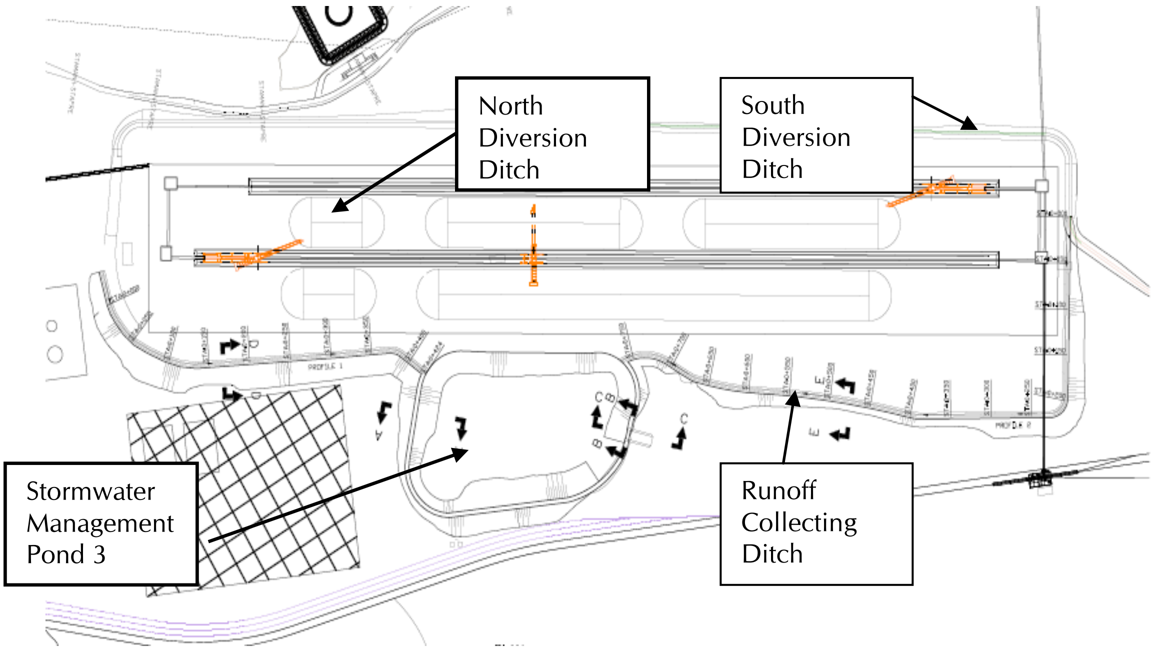

Figure 3-2: The Ore Stockpile Area (note: infrastructures in this area is still in the process of modifications and hence the ditch system may need minor modifications. But the general layout would remain unchanged)

In this region, the area north of the ore stockpile platform will be undisturbed and hence the runoff generated from that area will be clean water. The ground elevation of the north area is higher than the ore stockpile platform. The natural flow would flow into the ore stockpile working area and causes disturbance. The extra water will eventually enter the stormwater management pond for treatment leading to larger than needed SWM storage hence increase the cost. For the purpose of avoiding problems, a clean water diversion ditch was designed to divert the flow. This ditch has two segments as shown in Drawing Number H337697-4210-10-042-0003. The North West portion flows in a northwest direction and the North East portion flows in a southeast direction and both will be discharged into nearby existing streams.

3.1.2.2 Drainage Ditch

The runoff collection ditch is designed to collect runoff from the ore stockpile platform and carry flow into SWM Pond 3 for treatment.

3.1.2.3 SWM Pond 3

Pond 3 is designed to collect dirty water generated from the ore stockpile area for treatment. After treatment the flow will be discharged into an existing stream downstream.

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