Attachment 14.2

Mine Site Water Management Plan

(20 Pages)

Mine Surface Water Management Plan

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2018-09-14	0	Issued for Use	F Hugo	A Grobbelaar	M Haaksma	T Atiba
Date	**Rev.**	**Status**	**Prepared By**	**Checked By**	**Approved By**	**Approved By**
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1. Introduction

This document describes the various earthworks and infrastructure features that are planned to be constructed as part of the Expansion Project and how storm water is managed as a result of the new features. This document covers the design of all surface water infrastructure required to satisfy the approved Civil Design Philosophy for the Mary River Mine Site.

Storm water management and drainage systems were applied in various locations across the site to ensure that surface water runoff will have limited interference with infrastructure at the mine infrastructure site.

Care was taken to ensure that where possible, the existing watersheds and streams remained in their original state. This was done through the use of berms, ditches, swales and culverts.

For more detail refer to the Issued for Construction (IFC) drawings for the relevant areas. For a list of the related IFC drawings see Appendix A.

The overall layout for the Mine Site Storm Water Drainage Plan can be seen in Appendix B.

2. References

2.1 General

2.1.1 All applicable federal, territorial (Nunavut) and local laws and regulations apply, in particular the following apply:

- OHSA Occupational Health and Safety Act
- CSA Canadian Standards Association
- MHSA Mine Health and Safety Act (Nunavut – S.N.W.T. 1994)
- OHSR Occupational Health and Safety Regulations
- NBCC National Building Code of Canada (2010)
- ASTM American Society for Testing and Materials
- ASCE American Society of Civil Engineers
- NFPA National Fire Protection Association
- NRC Natural Resources Canada – Explosives Safety and Security Branch

2.2 Reference Documents

Reference is made to the contents of the following documents, articulated during the previous phases of the project and the current phase:

- H353004-00000-200-210-0001: Civil Design Philosophy
- H337697-0000-10-122-0001: Storm Water Management and Drainage System Design

- H337697-6170-10-122-0001: Milne Port Drainage System and Storm Water Management Ponds
- H337697-6170-10-122-0002: Mine Site Drainage System, Storm Water and Sediment Management
- Standard Specification H353004-00000-260-200-0001: Quarried Fill Materials
- Standard Specification H353004-00000-200-078-0008: Site Conditions
- NB 102-181/30-7: Baseline Hydrology Report, Knight Piésold, Jan 04, 2012
- Updated Design Peak Flow Assessment. Knight Piésold, 2016
- Final Environmental Impact Statement (FEIS), Mary River Project, February 2012
- H353004-00000-228-066-0001: Mary River – Snowmelt and Rainfall Frequency Analysis.
- H353004-40000-200-210-0001: 2018 Water Management Report.

3. Overview

This document is divided into different areas of interest. The areas are grouped as follows:

- 800 Person Camp – Storm water management in and around the new 800-person camp
- Haul Road & Stormwater Diversion Berms 1 and 2 – These diversion berms divert water away from the crusher pad and haul road
- Mine Crusher Pad – Runoff from the crusher pad into swales and culverts draining towards the new Mine settling pond
- Mine Settling Pond – A new settling pond designed for runoff from the new crusher pad
- New Mine workshop pad and access road – Storm water management for the workshop pad and access road to the pad
- New Mine Fuel Tank Farm – Storm water management in and around the new fuel tank terrace and berms created for containment of spillage
- Mine Culvert 3A, 3B and 4 – These culverts are designed to manage storm water runoff from an existing stream underneath the new Tote Road diversion and proposed rail alignment and associated service road
- Kohler Gen Sets – Storm water management at the pad where new generator sets will be located
- Tote Road Diversion – Storm water management along the Tote Road Diversion and new airport access required as a result of the rail construction
- Rail Service & Access road – Stormwater management for the service road along the rail line providing access to the 800 person camp and the treated effluent discharge point

The layout of the various drainage areas described above is depicted in Figure 3-1below.

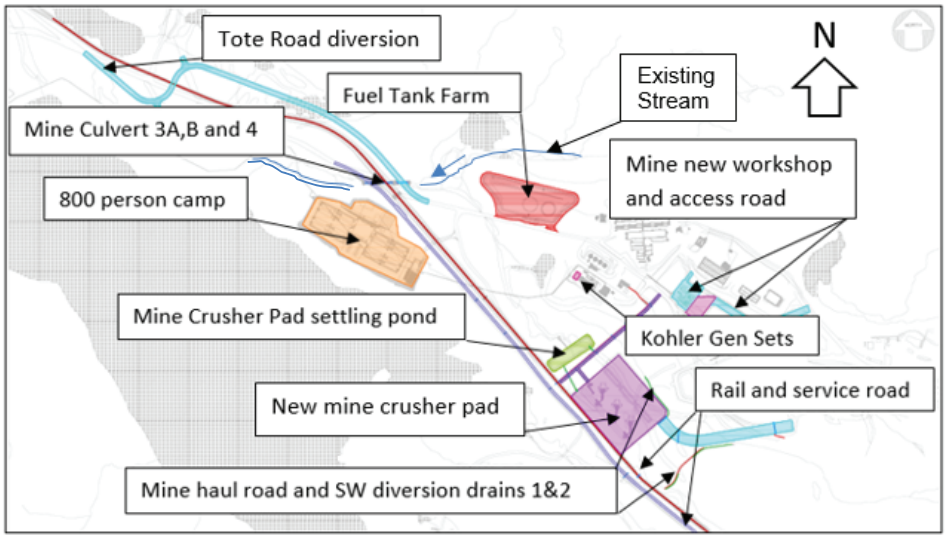

Figure 3-1: Mine Site Drainage Areas

4. 800-Person Camp Area Drainage

This section describes the drainage for the terrace created for the new 800 person camp.

The 800-person camp is constructed on top of a purpose-built pad. This camp pad includes a parking area for vehicles & personnel transport as well as a raised platform for delivery of food and other consumables to the kitchen area.

The camp pad is designed with a gradient to direct storm water from the perimeter areas of the pad to the sides of the pad. On top of the camp pad, additional level pads were constructed for the accommodation, kitchen and other facilities (wastewater treatment plant, waste disposal and electrical plant, etc.).

Storm water runoff from the level pads underlying these units (8 accommodation wings and common core with kitchen/dining area) is nominal and any run off is managed through troughs on the pad. Note that The accommodation wings are raised above the pad level and no water can enter the buildings.

Storm water runoff from the larger underlying camp pad is through overland sheet flow off the pad. No storm water is concentrated through swales, culverts or canals.

Figure 4-1 shows the 800-person camp site drainage.

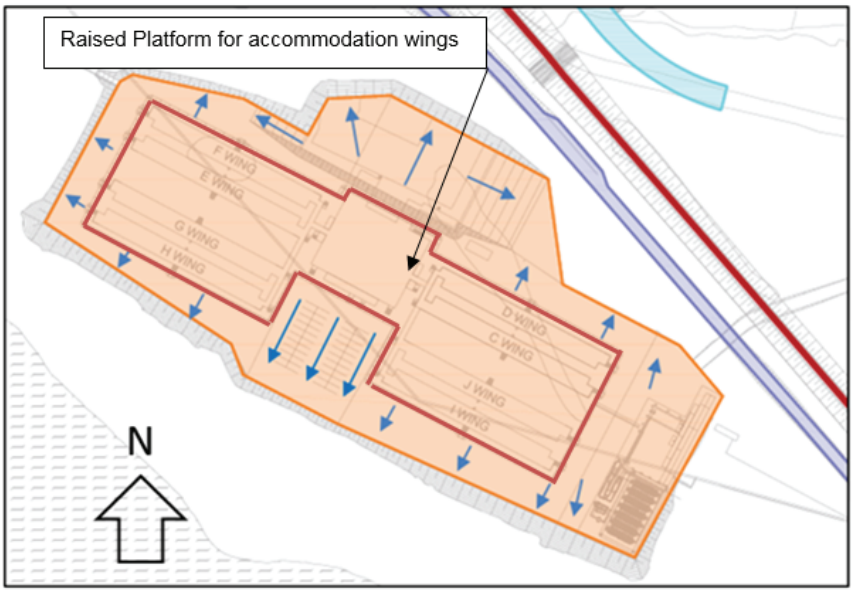

Figure 4-1: 800 Person Camp Site Drainage

5. Haul Road and Storm Water Diversion Berms 1 and 2

A new haul road is to be constructed to access the new crusher pad and on-loading platform for the rail wagons.

The haul road and storm water diversion berms 1 & 2 are indicated on Figure 5-1.

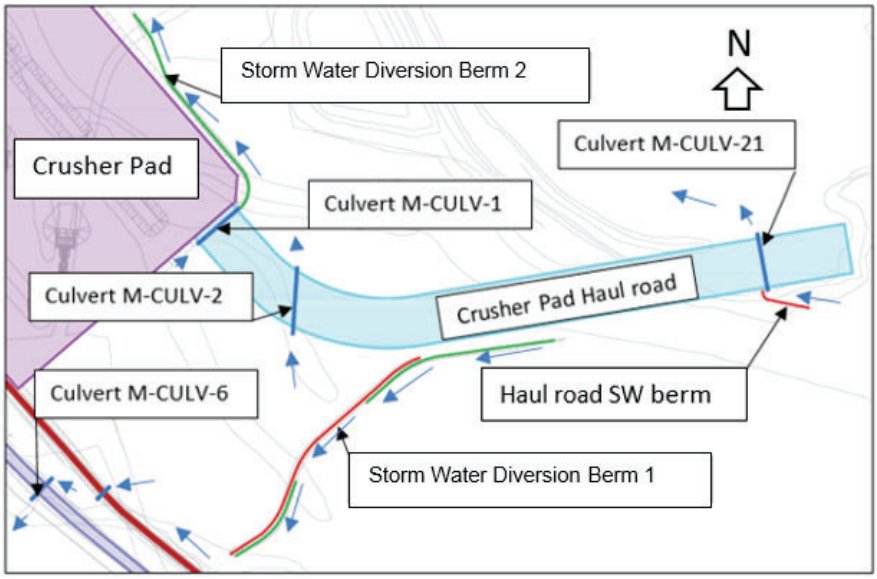

Figure 5-1: Mine Crusher Pad Haul Road And Diversion Berms 1 & 2

The haul road is graded in one direction ensuring sheet flow runoff from the road towards the downstream slope of the surrounding ground level. Openings in the safety berms adjacent to the road allows water to escape to the natural environment.

Two storm water diversions (SWD 1 & 2) and a haul road storm water berm are designed to divert storm water away from the crusher and on loading platform and direct it to natural drainage ditches / culverts in the vicinity (M-CULV-1, 2 and 21).

Storm Water Diversion 1 (SWD-1) – The diversion is located to the south of the haul road. Storm water accumulates against the toe of the haul road fill and runs towards the crusher pad. At a point close to the pad, a diversion ditch is created, directing the flow to the south to a low point where it joins a natural stream. This stream eventually crosses the rail and adjacent service road through a 1 200 mm diameter CSP culvert (M-CULV-6) where it subsequently drains into the surrounding environment. This SWD-1 diversion has the following dimensions:

- Minimum vertical depth of 800mm
- Side slopes at 1V:2H
- Bottom Width - 0.5m
- Flow (1:100) - 1.52 m^3/s
- Velocity - 1.35 m/s

Rip rap will be provided for the first section of the diversion since the hydraulic analysis showed that the velocity will be greater than 1.5 m/s when no rip rap is present.

Storm Water Diversion 2 (SWD-2) – This diversion caters for storm water accumulating at the low point where the haul roads enters the crusher pad. The accumulated water from a small catchment to the south of the haul road is conveyed underneath the haul road through a 600mm diameter CSP culvert (M-CULV-1). From the exit of the culvert the storm water is conveyed in a ditch and directed to an existing stream adjacent to the crusher pad.

The diversion has the following dimensions and detail:

- Side slopes at 1V:2H
- Bottom Width - 0.5m
- Flow (1:100) - 0.67 m^3/s
- Velocity - 1.08 m/s
- No rip rap will be required for this diversion.

6. Mine Crusher Pad Drainage

The crusher pad drainage area is depicted is Figure 6-1 below.

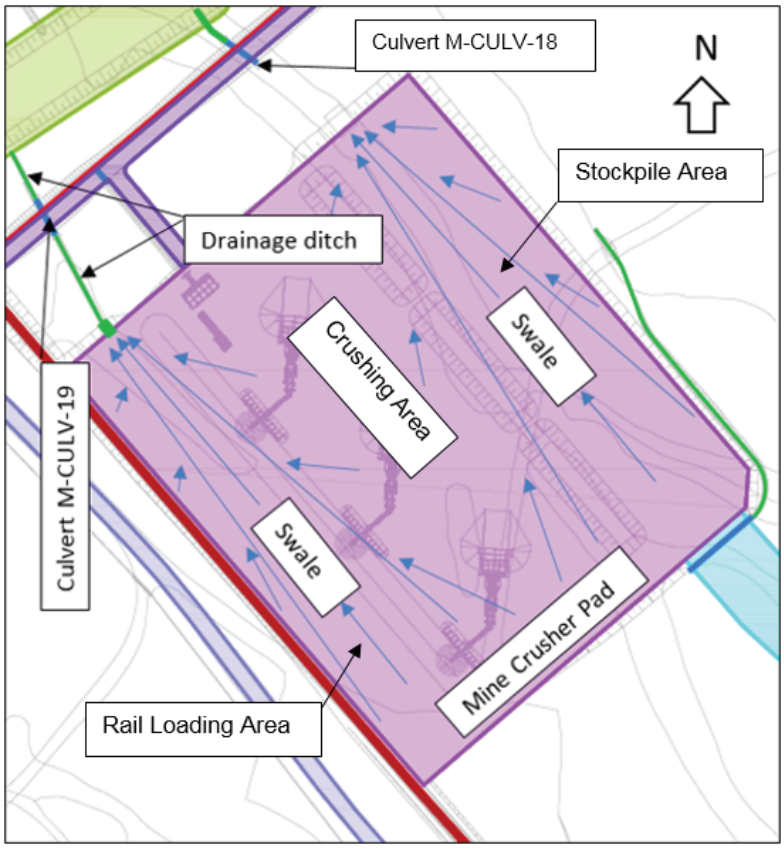

Figure 6-1: Mine Crusher Pad Drainage Area

The crusher pad consist of three distinct areas:

- Stockpiling area
- Crushing area
- Rail wagon on-loading area.

The crusher pad is elevated from the surrounding natural ground to prevent any storm water discharging onto the pad, either through sheet flow or concentrated flow. The runoff from the pad may be impacted by high levels of total suspended solids and therefore needs to be contained and tested before release.

Storm water runoff is directed towards a settling pond (See section 7) in two separate swales on top of the pad. The pad is graded to form the swales.

The swale on the north side of the pad discharges to the natural environment and ends up at a low point where it continues flowing to the settling pond via a culvert (M-CULV-18) and eventually into the setting pond via a channel (Eastern). At the discharge point from the pad, erosion protection is provided on the pad embankment in the form of rip-rap. The drainage channel (Eastern) has the following properties:

- Bottom Width - 0.1m
- Side Slopes - 1V:1.5H
- Flow - 0.10 m^3/s
- Velocity - 0.78 m/s

The pad swale to the south discharges in a similar manner as the one to the north except that it continues flow in a drainage ditch and then passes underneath the utility berm and road through a 600mm diameter CSP culvert (M-CULV- 19) before finally discharging into the settling pond. The drainage channel (Western) was designed with the following properties:

- Bottom Width - 0.1m
- Side Slopes - 1V:1.5H
- Flow - 0.10 m^3/s
- Velocity - 0.57 m/s

7. Mine Crusher Pad Settling Pond

An overall layout of the settling pond area can be seen in

Figure **7-1** below.

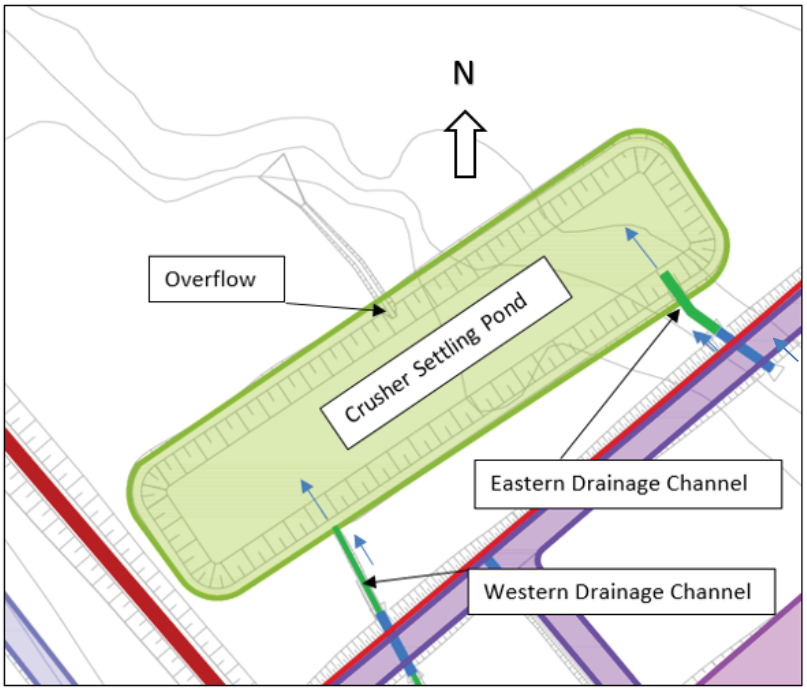

Figure 7-1: Crusher Pad Settling Pond

The inflow to the pond is from the Mine Crusher Pad Eastern and Western drainage channels which capture the runoff from the pad. The pond has an emergency overflow that flows into the natural environment and is designed in accordance with the Civil Design Philosophy. At the bottom of the overflow, rip rap is provided to dissipate the energy and prevent erosion.

The following values were applied in sizing the pond:

- Catchment area - 47 435 m2
- Runoff Coefficient - 0.9
- Rainfall (1:10 year 24 hour) - 40.8 mm

Based on these parameters it was determined that the required pond capacity is 1 742 m^3.

The overflow is designed to safely discharge the 1:200 year return period rainfall event. The result of the design and analysis are as follows:

- Bottom Width - 0.5 m
- Depth - 0.3 m
- Flow - 0.20 m3/s

8. New Mine Workshop Pad and Access Road

8.1 Truck Workshop Terrace

The truck workshop terrace layout is indicated below in Figure 8-1.

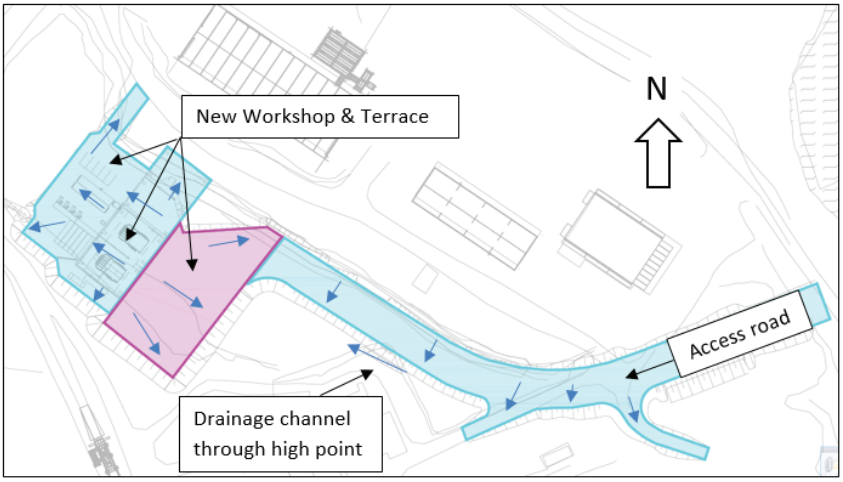

Figure 8-1: Mine New Workshop and Access Road Drainage

The new workshop terrace is graded to slope towards the outside of the terrace away from the footprint of the workshop building. The workshop footprint area is level to accommodate the floor and general structure. The parking area to the northwest is also graded from the centre of the terrace toward the outside to accommodate overland flow. Once storm water flows off the terrace, it follows the natural drainage path.

8.2 Workshop Access Road Drainage

The access road to the new workshops is singularly graded to one side to allow natural drainage off the road surface. Safety berms on the access road have openings every 25m to allow for storm water to exit the access road surface.

A high point at the toe end of the fill to the access road has been cut to allow flow to continue past this high point. This side drain has a bottom width of 0.6m and side slopes of 1V:2H.

9. Mine New Fuel Tank Farm

Figure 9-1 indicates the Mine new fuel tank farm drainage.

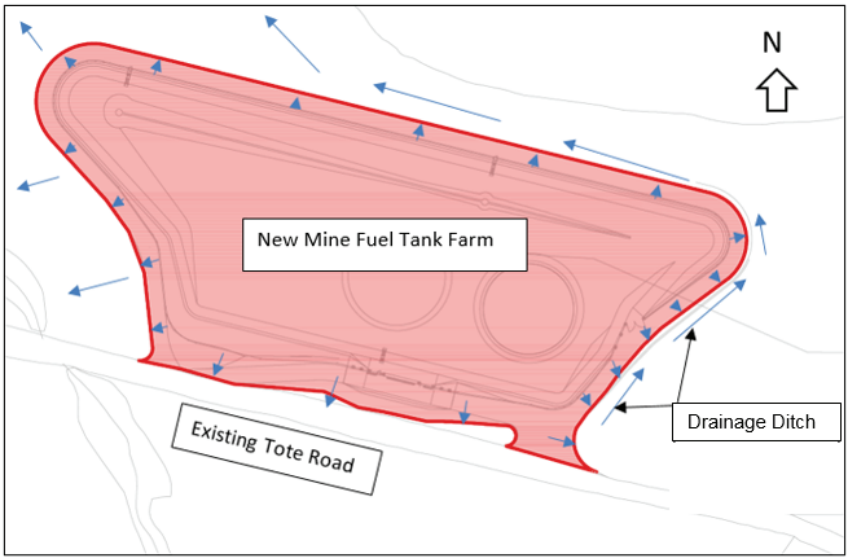

Figure 9-1: New Fuel Tank Farm Drainage

The tank farm consists of perimeter dykes and berms to ensure containment of any possible spillage. The containment dyke creates capacity for fuel spill storage of the largest tank volume plus 10% of the remaining tank/s volume. The design is in accordance with all relevant legislation and regulations governing the tank farm construction and design.

All precipitation collected inside the fuel tank farm is contained and tested before being discharged. If required, the water is treated to remove contaminants and then discharged. The road around the perimeter of the tank farm provides access for maintenance and emergency vehicles. Storm water drains to the outside of the road, off the terrace and into the natural environment.

On the south eastern side, a localised ditch is created to divert local rainfall towards the north (falling onto the access & service roads). This ditch is graded to convey the water to the north and into the existing natural drainage ditch.

10. Mine Culvert 3A, 3B and 4

The culvert M-CULV3-A, 3-B and 4 is to be constructed in phases. Culverts 3-A and -4 are to be constructed first as part of the Tote Road diversion (M-CULV-4) and the new airport access road and 800 personnel camp (M-CULV3-A). Culvert 3B will be constructed later, during construction of the rail embankment.

The culvert layout is depicted in Figure 10-1.

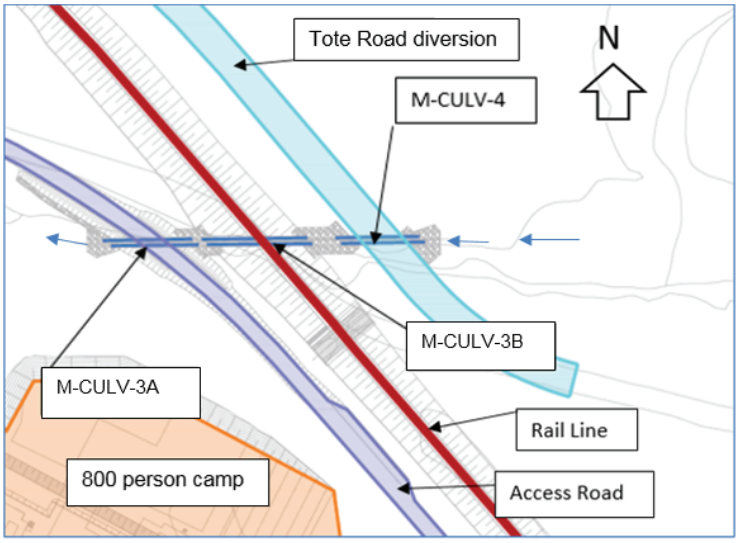

Figure 10-1: Mine Culvert 3A, 3B and 4

Each culvert has an inlet and outlet with rip rap to protect the embankment and its surrounds against scouring.

The culverts consists of 2 x 1.5 m diameter CSP barrels. Details of these culverts are shown on drawing No. H353004-10000-228-272-0004-0001.

The hydraulic calculations indicated the following:

- The upstream catchment area of the culvert is 3.7 ha
- Based on the 1:100 year return period flood, the computed headwater elevation at the culvert inlet is 180.139 m. This elevation is lower than the top of the tote road and the rail line, with an allowance of 300 mm freeboard.
- Calculated maximum velocity is equal to 1.83 m/s and as a result, rip rap will be placed at the inlet and outlet of the culverts to protect against erosion.

11. Kohler Gen Sets

Additional electrical generation sets are required for the mine expansion program. These Gen Sets are located on a existing terrace that will be expanded. The terrace is graded to

allow sheet flow off the terrace where it then flows into the natural environment, , as shown on Figure 11-1.

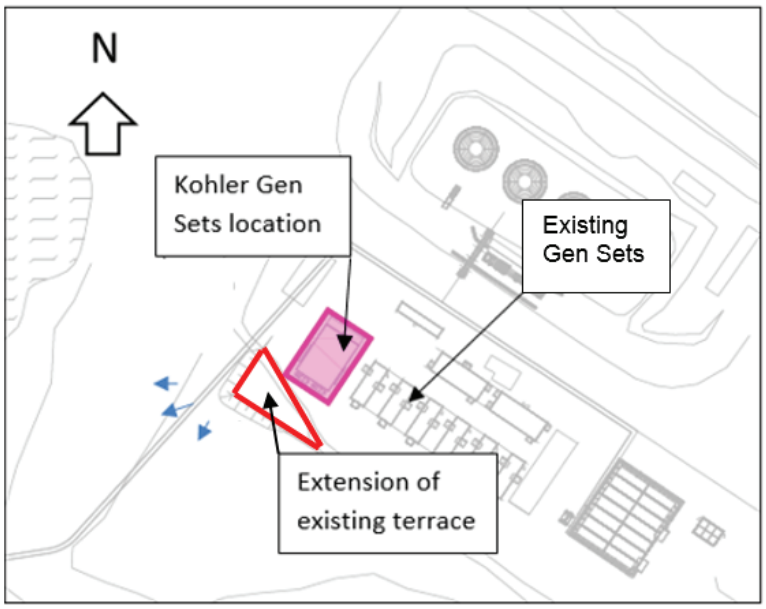

Figure 11-1: Kohler Gen Set Drainage

12. Tote Road Diversion

Drainage of the Tote Road diversion is based on surface runoff from the graded road. The drainage is from either side of the centre line to the sides of the road, and then onto the natural environment.

See Figure 12-1 below for the layout of the Tote Road diversion.

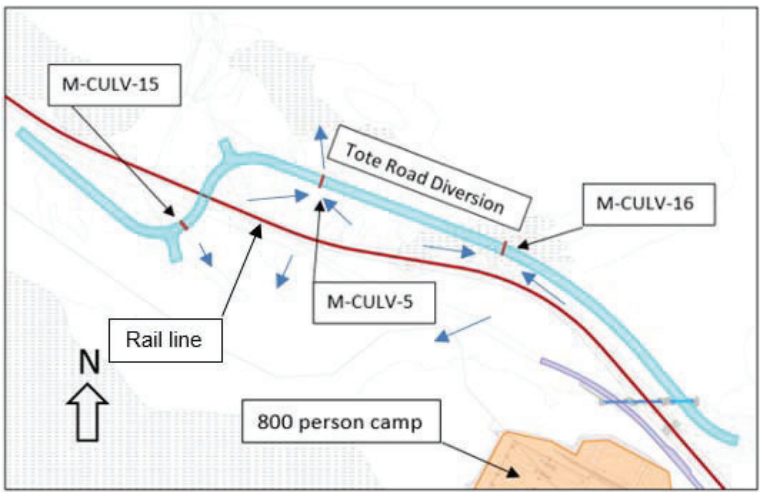

Figure 12-1: Tote Road Diversion Drainage

Apart from culverts M-CULV-3A, 3B & 4 described in Section 10, three additional culverts provide drainage at low points along the Tote Road diversion. These culverts are:

- M-CULV-5 - 1 x 600mm diameter CSP barrel
- M-CULV-15 - 1 x 600mm diameter CSP barrel
- M-CULV-16 - 1 x 600mm diameter CSP barrel.

None of the flow velocities through these culverts exceeds 1.5m/s and thus no erosion protection is required.

13. Rail Service and Access Road

The rail service and access road to the 800 personnel camp also serves as access to the treated effluent discharge point. The discharge point is located at the southern terminus of the road. This road follows the alignment of the rail embankment in a southeasterly direction. Storm water runoff from the catchment area between the rail line and the access road is directed to culverts at low points along the road. The location of these culverts are shown on Figure 13-1 and Figure 13-2.The design details for these culverts are:

- M-CULV-7 - 1 x 600mm diameter CSP barrel - no erosion protection required
- M-CULV-8 - 1 x 600mm diameter CSP barrel - no erosion protection required
- M-CULV-10 - 1 x 600mm diameter CSP barrel- no erosion protection required
- M-CULV-11 - 1 x 600mm diameter CSP barrel- no erosion protection required
- M-CULV-12 - 1 x 600mm diameter CSP barrel- requires erosion protection
- M-CULV-13 - 1 x 600mm diameter CSP barrel- requires erosion protection.

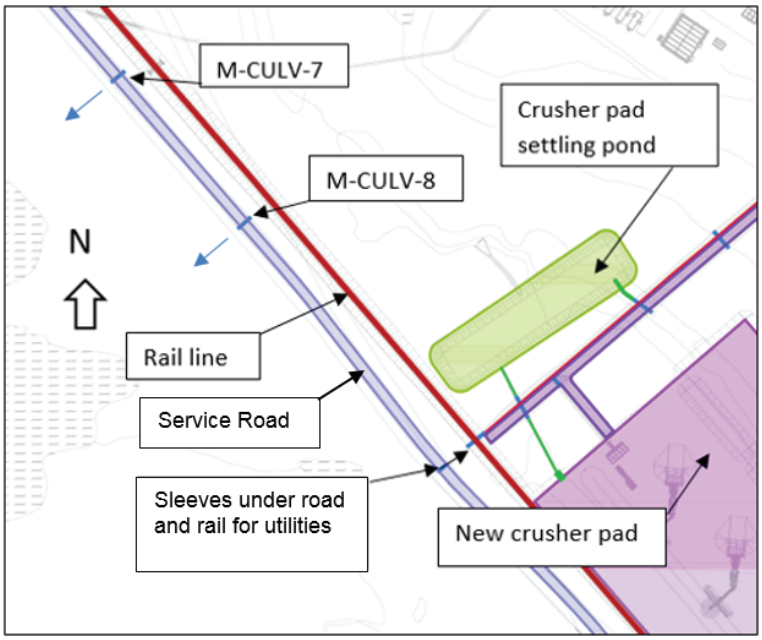

Figure 13-1: Rail Service & Access Road - Cross Drainage Culverts

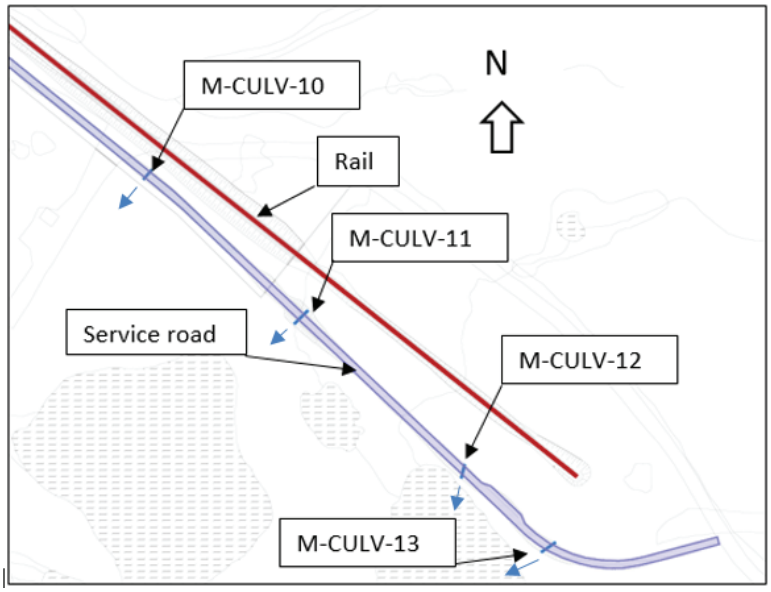

Figure 13-2: Rail Service & Access Road – Cross Drainage Culverts

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Appendix A
IFC Drainage Drawing List

Drainage Drawings	
H353004-10000-228-272-0001-0001	Mine Site - 800 Person Camp Pad - Drainage Plan
H353004-10000-228-272-0005-0001	Mary River Expansion Project - Mine Site - Crusher Pad - Drainage Plan
H353004-10000-228-273-0001-0001	Mary River Expansion Project - Mine Site - Rail Loadout Terrace- Polluted Water Dam - Cross Section & Details
H353004-10000-228-272-0006-0001	Mary River Expansion Project - Mine Site - Rail Loadout Terrace- Polluted Water Dam - Layout Drawing
H353004-10000-228-272-0004-0001	Mine Site - Service Road Culvert Detail
H353004-10000-221-273-0001-0001	Mine Site – Mine Truck Workshop pad – Earthworks cross sections
H353004-10000-221-271-0009-0001	Mine Site – Mine Truck Workshop pad – Access Road plan & profile

Other	
H353004-00000-200-210-0001	Civil Design Philosophy
H353004-10000-220-272-0008-0001	Mary River Project - Mine Site - 2018 Surface Water - Management Plan

Typical	
H353004-00000-221-294-0001-0001	Site Wide - Standard Drawing - Typical Culvert Details
H353004-00000-221-294-0002-0001	Site Wide - Standard Drawing - Earthworks & Drainage Details
H353004-00000-221-294-0003-0001	Site Wide - Standard Drawing - Earthworks & Drainage Details
H353004-00000-221-294-0004-0001	Site Wide - Standard Drawing - Earthworks & Drainage Details
H353004-00000-221-294-0005-0001	Site Wide - Standard Drawing - Earthworks & Drainage Details
H353004-00000-221-294-0006-0001	Site Wide - Standard Drawing - Earthworks & Drainage Details
H353004-00000-221-294-0007-0001	Site Wide - Standard Drawing - Road Signage Placement Details
H353004-00000-221-294-0008-0001	Site Wide - Standard Drawing - Typical Pad, Ditch & Berm Sections
H353004-00000-221-294-0009-0001	Site Wide - Standard Drawing - Typical Internal Road Sections
H353004-00000-221-294-0010-0001	Site Wide - Standard Drawing - Typical Internal Road Sections

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Appendix B
Drawing H353004-10000-220-272-0008-0001 – Surface Water Management Plan – Mine Site