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Report

Pre-Feasibility Study Mmakau Coal Pty Ltd

August 2017

Classification

Confidential

Executive Summary

Chapter 1 Geology

Chapter 2 Mining

Chapter 3 Coal Characterization

Chapter 4 Coal Handling Preparation Plant

Chapter 5 Geotechnical

Chapter 6 Stormwater Management Plan

Chapter 7 Infrastructure

Chapter 8 Discard Disposal

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8 Discard Dump

8.1 Introduction

A summary of the description of work carried out in the feasibility design, the hazard classification and the description of capital works for establishment for the discard disposal facility is presented in the chapter. This should be read in conjunction with applicable drawings and calculations contained in appendices.

8.2 Feasibility of design of discard disposal facility

8.2.1 Seepage and Slope Stability Analysis

Seepage and slope stability analyses of the proposed facility have not yet been carried out due to a lack of representative geotechnical information. Based on the available information and the proposed configuration of the discard disposal facility, it is not expected that any problems will be experienced with its structural integrity. The nature of the discards, which will to all intents and purposes be deposited dry, and the absence of any water inputs to the facility other than infiltration associated with rainfall, make it likely that conditions within the dump will remain unsaturated. This will retard the migration of infiltration through the dump and make it unlikely that a phreatic surface would develop within the discards. It is therefore also unlikely that there would be any seepage to the foundation materials underlying the discard dump.

8.2.2 Hydrology and Surface Water Management

The site stormwater management plan dictates that run-off from the discard disposal site will be collected in the cut of channel which surround the discard area. The channels drain to Pollution Control Dam A as per the requirements of the regulation 704 which states that polluted water is not allowed to be discharged into the environment for storms exceeding the 50 year recurrence interval.

The Schurvekop stormwater management plan is discussed in detail in Chapter 6. Calculation have been carried for the site to estimate run-off volumes and maximum likely discharge rates for a range of recurrence intervals and event durations.

The site is divided into two catchment areas with run-off of volumes of 32 Mℓ /annum and 54 Mℓ /annum respectively in a 1:50 year flood event. PCD A has been designed to contain 86.5 Mℓ /annum. The pollution control dam has sufficient storage capacity to accept and retain the expected volumes of surface water runoff from the discard disposal facility.

8.3 Hazard Classification of Disposal facility

8.3.1 Safety Classification

The safety classification of the facility has been carried out in accordance with the requirements of SABS 0286:1998: Code of Practice for Mine Residue. The safety classification system serves to provide a consistent means of differentiating between high, medium and low hazard deposits on the basis of their potential to cause harm to life or property. The classification system furthermore provides a basis for the implementation of safety management practices for specified stages of the life cycle of mine residue disposal facilities. The code prescribes the aims, principles and minimum requirements that apply to the classification procedure and the classification in turn gives rise to minimum requirements for investigation, design, construction, operation and decommissioning.

The approximate area that may be affected by a flow slide originating from a residue deposit is usually determined based on the guideline values from the Code of Practice and the topography of the area. Based on the nature of the discards however it is not expected that the facility would ever be subject to a flow slide and the associated release of discards. It is not expected therefore that the zone of influence would extend beyond the perimeter road of the facility. Based on the zone of influence as defined and the criteria specified in the code, the discard disposal facility has been classified as a low hazard facility.

Table 8-1: Schurvekop Discard Disposal Facility - Safety Classification

Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5
no. of residents in zone of influence	no. of worker in zone of influence	value of 3rd party property in zone of influence	depth to underground mine workings	classification
0	<10	0 – R 2m	> 200m	low hazard
1 – 10	11 - 100	r 2m – r 20m	50m – 200m	medium hazard
>10	>100	>r20 m	<50m	high hazard

8.3.2 Environmental Classification

The environmental impacts associated with the development, operation and closure of mine residue disposal facilities relates to:

- Their potential to contaminate surface water resources due to uncontrolled runoff of water from their side slopes or releases of water from their return water systems
- Their potential to contaminate groundwater due to seepage
- Their potential to cause contamination of soils
- The change in land use associated with the development of the facility
- Their potential to generate dust
- Their aesthetic impact on their surroundings

These risks are discussed below, with specific reference to the potential impacts associated with the development and operation of the Belfast Discard Disposal facility and the mitigation measures required to ameliorate those risks. The assessment for each environmental risk issue covers the life cycle of the facility as well as the construction and operational phases which are seen as being part of the preparation for the closure and aftercare phase.

8.3.2.1 Surface Water

Surface water runoff from the surface of the facility will be intercepted to prevent it reporting to the wetland to the north of the site. This is easily achieved by means of a channel which will enable the collection and is transported to PCD A. The impacts on the surface water environment are expected to be of moderate severity, limited to the wetland area immediately down slope of the facility and of long term short duration.

8.3.2.2 Ground Water

The infiltration of contaminated water to groundwater is expected to be limited by the compaction of discards as well as the dump footprint and the installation of and HDPE liner and subsoil drains to the footprint of the facility. The potential for the discard dump to impact on the local ground water environment is considered to be limited but is being assessed in detail as part of an ongoing hydrogeological investigation.

8.3.2.3 Land Use

The development of the discard dump will result in a change in the land use of the immediate area upon which it is established. It is possible, given the nature of the site, that post closure the facility could be rehabilitated in such a way as to derive economic benefit from the land without risk of damage to the chemical, social or ecological sustainability.

8.3.2.4 Aesthetic Impacts

The facility will have an impact on the aesthetics of the area for as long as it is in existence. the facility could be rehabilitated in such a way as to blend into the surrounding post closure landscape. This should limit the impact of the facility on the aesthetics of the surrounding area.

8.3.2.5 Atmospheric Pollution

The facility will, as with all discard disposal sites, have the potential to generate windblown dust. The compaction and ongoing rehabilitation of the facility is however likely to mitigate the effects of wind on the facility.

8.3.2.6 General

Based on the assessment as outlined above it is concluded that the facility will have the potential to impact on the surrounding environment and care has been taken to minimise those impacts, particularly on the surface and ground water environments.

8.4 Description of works for establishment of the Discard dump

The proposed layout of the discard dump facility is illustrated in Figure 8-1, the discard dump area is completely bunded with a cut-off channel conveying dirty water to the pollution control dam facility.

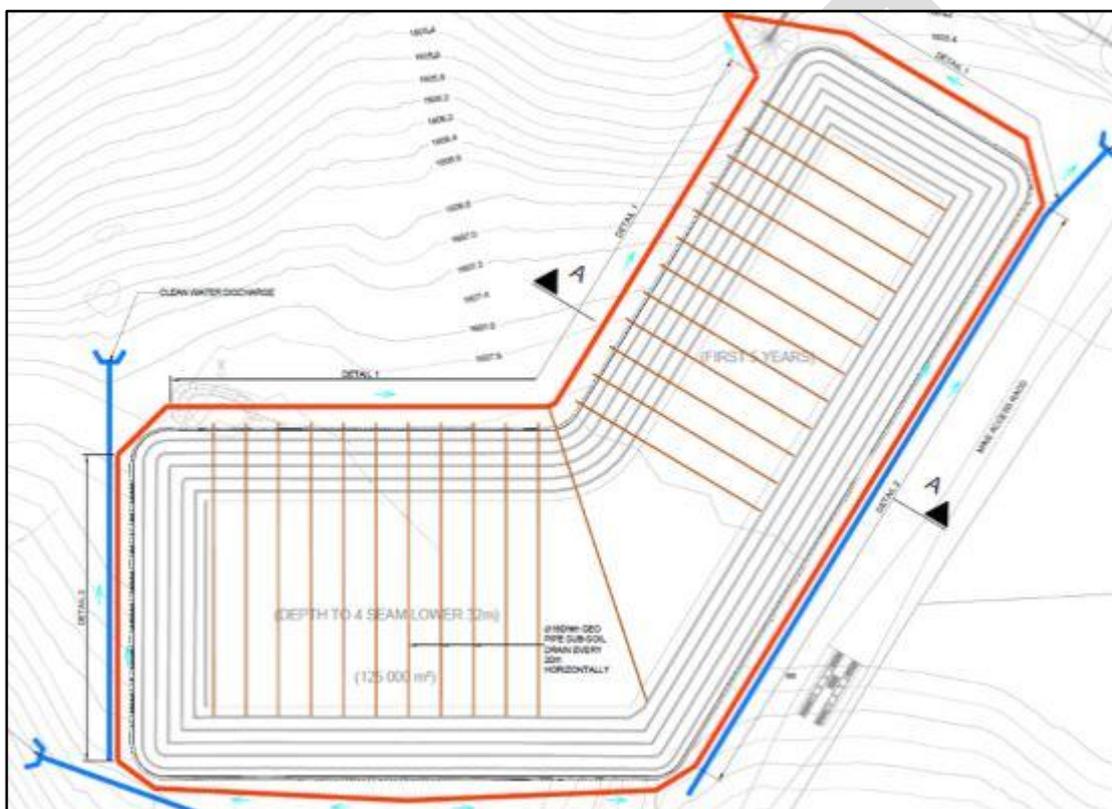


Figure 8-1: Discard dump layout

8.4.1 Site clearance and topsoil stripping

The site will be cleared of vegetation and topsoil will be stripped to an estimated average depth of 300mm and stockpiled within 500m of the site for use in rehabilitation. The site clearance and topsoil stripping is expected to take place in two phases as the footprint of the facility expands.

The total volume of topsoil to be stripped is 37 500m³ over a 125 000m² area. The area to be rehabilitated is a 125 000m² for the place of a 0.3m layer of topsoil to the side slopes, benches and crest of the discard dump. There is therefore no expected surplus of topsoil, however should there be any surplus topsoil available it can be utilized for placement of a slightly thicker layer to the discard dump or for use in other miscellaneous rehabilitation works on the site.

8.4.2 Preparation of the discard disposal facility footprint

The preparation of the discard disposal facility is expected to comprise the phased preparation of the footprint for the deposition of discards by ripping and re-compacting the in-situ soils remaining after stripping of the topsoil to a depth of at least 300mm. The preparation of the footprint will include also the construction of a nominal toe wall to the perimeter of the area on which discards are to be placed.

8.4.3 Liner and underdrainage system

A U24 bidim or approved equivalent will be installed to the footprint of the discard dump in phases as the development of the facility proceeds. The liner would be placed on top of a protective layer of geosynthetic clay liner placed onto a 50mm sand capping and 150mm thick prepared in-situ surface, compacted to 90% MOD AASHTO density. The liner would then be covered with 150mm thick G7 capping layer, compacted to 93% MOD AASHTO. This layer will be sealed with E-prime bitumen sealer applied at a rate of 0.7 l/m². Discards will be placed and compacted in 300mm layers from the edge of the lined area and working inwards so as to minimise the chances of damaging the liner. A series of under drains will be installed to the footprint of the discard disposal facility. These drains will comprise shallow trenches into which slotted drainage pipes and filter stone are placed to form the drains. The drains will be wrapped in geofabric and will discharge to the channels surrounding the facility. The drain outlets will be equipped with 45° bends to ensure that ingress of air into the pipe, and to the foundation of the discards, is prevented by the presence of drainage water. At closure the pipe outlets m sealed and fitted with end caps to prevent the ingress of oxygen to the drains.

8.4.4 Leakage detection system

A series of leakage detection drains has been allowed for to assist in monitoring the performance of the liner. The drains will be located so as to intercept potential seepage flows and will comprise slotted drainage pipes within a crushed drain stone and surrounding geofabric. The leakage detection pipes will discharge to the solution trench and will be clearly marked so as to distinguish them from the seepage underdrainage collection pipes.

8.4.5 Surface water containment system

The system proposed for the containment of surface water runoff from the discard disposal facility will comprise:

- A network of lined channels intended to collect surface runoff from the side slopes of the discard facility to the pollution control dam north east of the discard dump.
- A series of sub-surface drains is located every 20m horizontally throughout the discard dump and 4m vertically.
- A concrete lined drain into which seepage water from the sub-surface drainage collects. The channel will carry all such water to the pollution control dam located at to the north east of the discard disposal facility. The solution trench has been sized to facilitate access by small earthmoving equipment to facilitate cleaning of accumulated silt as required.

In addition to the collection of potentially contaminated water from the facility the system described above is intended to facilitate the control of material eroded from the dump and will also have the effect of retarding the flow of runoff from the facility, thereby reducing the peak flow and storm water containment requirements.

8.4.6 Silt trap and pollution control dam

Potentially contaminated surface water runoff and seepage flows will report, through the concrete lined solution channel, to a silt trap and pollution control dam. The facility is not intended to store all runoff from the discard disposal facility but is intended to allow for the settlement of solids remaining in the water flows and to attenuate the flow of runoff to discharge onto the natural ground.

8.4.7 Rehabilitation of disturbed areas

Areas surrounding the discard disposal facility disturbed during the construction process will be rehabilitated as part of the site dis-establishment by the earthworks and civils contractor. The faces of the toe walls and cross walls, surface water diversion trench and berm, and silt trap walls will be covered with a layer of topsoil and seeded with a mixture of indigenous grass seeds.

8.4.8 Construction and rehabilitation materials balance

The construction material of the discard dump will comprise material from the mine pit. The topsoil to be utilized for rehabilitation will be the total quantity stripped from and stockpiled from the site, it is not anticipated that any additional topsoil will be required. A complete balance calculation of the material can at this point not be determined yet.

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