CLERMONT OPEN CUT

GLENCORE

Mineral Waste Management

Plan

Number:	CLEOC-520960306-514	**Status:**	Approved	**Effective:**	05/12/2022
Owner:	Coordinator-Environment and Community	**Version:**	11.0	**Review:**	05/12/2027

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1. Purpose

Adequate identification, prediction and management of Acid Rock Drainage risks are extremely important to assist with mitigation of long-term environmental impacts and prevention of significant mine closure costs. This plan identifies management strategies and practices implemented at Glencore's Clermont Coal Operations (CCO) with respect to mineral wastes and their potential to cause Acid Rock Drainage (ARD) and spontaneous combustion. Acid mine drainage/acid rock drainage is referred to as ARD in this document to be consistent with CCO terminology. Broader mineral waste issues include neutral drainage, increased salinity, geotechnical issues and dust, but are not the primary focus of the management plan outlined in this document.

This document meets the requirements of the ***Environmental Authority (EA) EPML00634113*** issued under the *Environmental Protection Act 1994.* Where appropriate, the plan refers to other existing CCO documents, plans and procedures pertinent to mineral waste management. This document focuses on the management of ARD and spontaneous combustion from mineral waste (which includes overburden, inter-burden, waste rock, tailings[1] and rejects), as these have been identified as potential risks for CCO, and as such have been included specifically the mine's environmental approval (EA EPML00634113).

2. Scope

This document applies to CCO and details the requirements for:

- Legislative and regulatory compliance;
- Responsibilities and training;
- Mineral waste characterisation;
- Monitoring; and
- Reactive waste management

This document is not intended for geotechnical risk management, which is documented within the ***PHMP – Strata Failure***.

3. Statutory Approvals

Mineral Waste Management at CCO will be conducted in accordance with prescribed environmental approvals under Queensland (QLD) Legislation. Refer to GCAA Protocols ***11.20 Statutory Approvals Management*** and ***11.20 Statutory Approvals - QLD*** which outline the required approvals for the development of coal mining projects (including expansions) and the most efficient pathway to achieve those approvals.

[1] *The term tailings is used in this report to refer to any waste produced by coal washing of processing. These materials are regarded as PAF.*

This plan is intended to meet the requirements for:

- Acid rock and saline drainage management; and
- A Mineral Waste Management Plan as detailed in the EA.

3.1 Environmental Approval

EA EPML00634113 includes a requirement for a Mineral Waste Management Plan (see Table 3-1). This document meets the requirements of conditions C5-C6 and F28-F29, and is supported by the ***Rehabilitation Management Plan***.

Schedule C - Waste management	
Condition number	**Condition**
C5	**Mineral Waste Management Plan** A Mineral Waste Management Plan must be: a) developed by an appropriately qualified person; b) implemented for the duration of the mining activities; and c) reviewed at intervals no greater than **twenty-four (24) months**.
C6	The Mineral Waste Management Plan required by condition **C5** must include: a) a map showing the locations for waste rock and spoil placement; b) effective characterisation of the waste rock and spoil to predict under the proposed placement and disposal strategy the quality of runoff and seepage generated concerning potentially environmentally significant effects including salinity, acidity, alkalinity and dissolved metals, metalloids and non-metallic inorganic substances; c) a program of progressive sampling and characterisation to identify dispersive and non-dispersive spoil and the salinity, acid and alkali producing potential and metal concentrations of waste rock; d) a materials balance and disposal plan demonstrating how potentially acid forming and acid forming waste rock will be selectively placed and/or encapsulated to minimise the potential generation of acid mine drainage; e) where relevant, a sampling program to verify encapsulation and/or placement of potentially acid-forming and acid-forming waste rock; f) a description of the methods of tailings containment within decant cells, in-pit and within the Mega Cell; g) details as to how seepage and leachates from tailings containment will be managed both during operation and the foreseeable future; h) details as to controls in place to prevent fugitive emissions from tailings to air; i) a program of progressive sampling and characterisation to identify acid producing potential and metal concentrations of tailings; and j) a maintained record of the relative locations of any other waste stored in-pit.

Schedule F - Water	
Condition number	**Condition**
F28	**Saline drainage** The environmental authority holder must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of saline drainage.
F29	**Acid rock drainage** The environmental authority holder must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of acid rock drainage.

Table 3-1 – Environmental Authority Requirements

3.2 Relevant International Policies, Guidelines and Standards

The regulatory framework for geochemical characterisation of sulphidic geologic materials to assess their ARD potential is diverse in Australia, but is generally based on the following sources:

- AMIRA (2002) ARD Test Handbook - Prediction and Kinetic Control of Acid Mine Drainage; AMIRA International. Project P387A Prediction & Kinetic Control of Acid Mine Drainage, Ian Wark Research Institute and Environmental Geochemistry International Pty Ltd;
- List of Potential Information Requirements in Metal Leaching/Acid Rock Drainage Assessment and Mitigation, MEND Report 5.10E, January 2005;
- Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials, MEND Report 1.20.1, December 2009; and
- The Global Acid Rock Drainage Guide, http://www.gardguide.com/index.php/Main_Page, International Network for Acid Prevention INAP, 2014.

The geochemical characterisation and management program at CCO has been developed and refined to be consistent with these guidance documents and sources.

This document has also been written to comply with GCAA Protocol ***11.08 Waste Management***, ***11.26 Managing Geochemical Risks*** and ***Clermont Open Cut Conceptual Mine Closure Plan***.

4. Background

Clermont Coal Operations (CCO) is an open cut coal mine with a truck/shovel operation. Typical depth to the top of the coal seam is approximately 150m with the shallowest depth to coal being 80m. The maximum depth of the pit will be approximately 290m.

Mining commenced with the box-cut (initial excavation) in the north of the resource and will progress from north to south. Material from the box-cut has been transported out of the pit and placed in the North West waste dump by truck/shovel additional ex-pit dumps have also been constructed to the east and south-west. In-pit dumping is occurring in areas where this does not impact on the operations. A combination of in-pit and ex-pit dumping will continue with the North West waste dump eventually encroaching over the northern end of the in-pit dump. The South West dump will be developed by truck/shovel as the pit progresses to the south with direct haul to the west of the mining areas from the upper benches of the pit and placed ex-pit.

All the coal mined at CCO will be crushed ex-pit. However, run of mine (ROM) coal with inherent ash levels too high to blend to the required product ash level will also be washed in the Coal Handling Processing Plant (CHPP) prior to being blended with the crushed coal to produce a single product.

Coarse and fine coal rejects are currently a by-product of the washing process and are expected to be produced through life-of-mine. This waste is currently disposed of in specific cells on site.

Product coal is transported by overland conveyor to the Blair Athol Train Load Out (TLO) utilising the existing product stockyards, stacker/reclaimers and train loading facilities.

CCO has experienced incidents of spontaneous combustion in the coal and associated mineral waste. The site uses several methods of identifying spontaneous combustion. These include geological modelling, mine planning, visual inspections, and temperature and gas monitoring (refer to ***CCP Coal Stockpile and Reject Management procedure*** for further detail).

Since spontaneous combustion provides a more immediate risk, CCO has developed rigorous methods to identify and manage material which poses a risk of spontaneous combustion. Since the methods used to place mineral waste at risk of spontaneous combustion are similar to those for limiting the incidence of acid drainage, a common approach is outlined in this document, using CCO's nomenclature for spontaneous combustion.

4.1 Planning

The strategy for mineral waste management at Clermont CCO is reviewed on an "as needed" basis, as well as part of the annual planning process and to inform documents provided to the regulators. All mineral waste material will be assessed for ARD risk and managed appropriately. To ensure that controls are appropriate mineral waste will be managed in the following way:

1. Regular monitoring will be conducted to classify any new material or identify material that has been incorrectly classified;
2. Samples will be tested using both on site and laboratory techniques as appropriate;
3. Results will classify materials on site depending on risk and any results which would require a change to planning and placement will be communicated to the appropriate people;
4. Mine planning and operations will place potentially acid forming (PAF) material in locations where the risk of acid seepage is minimized; and
5. Reviews will be completed as required to identify any improvement opportunities.

Closure planning for Clermont CCO will occur as the operation continues, in accordance with the requirements of Glencore's corporate responsibilities. Project feasibility studies will be supplemented with further information collected as the operation continues to understand the risk and management control measures required for mineral waste

4.2 Geological Context

There are five distinct coal seams mined at CCO – the Gowrie, Prospect, Wolfang Upper, Wolfang and Wolfang Lower seams. The Wolfang seam is the largest with the other seams being relatively small in thickness. The stratigraphic sequence of the mine is illustrated in Figure 4-1. The Gowrie coal seam is overlain by Quaternary clay and weathered basalt, Tertiary basalt and Tertiary and Permian sediments. Permian sediments occur as interlayers between the five coal seams. The Wolfang Lower seam is underlain by Permian conglomerate and a metamorphic sequence of Cambrian-Ordovician age.

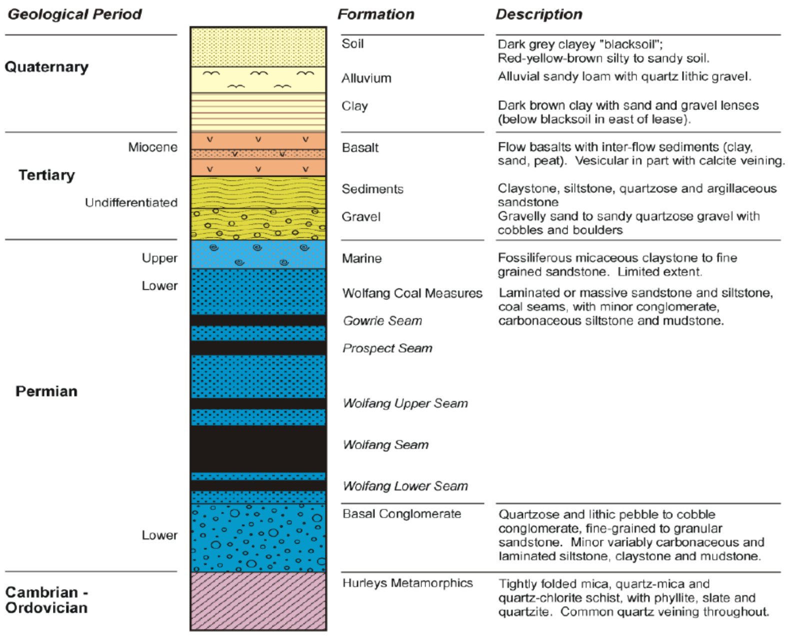


Figure 4-1 – Typical Stratigraphic sequence at CCO

4.3 Geotechnical Hazards

Geotechnical stability has been identified as a principle hazard (i.e. a hazard at a coal mine with the potential to cause multiple fatalities) at CCO and a Principle Hazard Management Plan (PHMP) for identifying and managing site principle geotechnical hazards has been prepared accordingly. Hazards that have been identified and are addressed in the PHMP include:

- Highwall failure
- Out of pit dump failure
- Truck dump point failure
- Pressurisation of groundwater
- Personnel working outside of equipment
- Drill and blast (blowholes)

The majority of these hazards are caused by inadequate design due to poor understanding of geological structure, material properties and/or water management, and poor design implementation, such as inappropriate or excessive blasting and over-zealous/off-design excavation.

Control methods to be considered in the ***Strata Failure PHMP*** to manage hazards include prevention, monitoring and contingency.

4.4 Geochemical Hazards

Satisfactorily closing a mine without having long-term water quality impacts and related management are one of the most significant and costly environmental challenges for the coal mining industry. The most significant challenges are related to water quality impacts and long term effects from coal geochemistry. Coal geochemistry refers to the chemical and geological properties of the coal and coal wastes (overburden and inter-burden, rejects and tailings).

Interaction between mineral wastes and groundwater can be detrimental to the environment and must therefore be carefully managed. Three types of chemical interaction are especially relevant at CCO:

- acidification of groundwater (also due to sulphide oxidation).
- spontaneous combustion of organic material (due to sulphide oxidation)
- leaching of soluble salts into the ground

4.4.1 Saline Drainage

Leaching of soluble salts is not considered a major hazard at CCO, since measurements of sodicity in waste materials indicate a low potential for release of Na. No special measures are therefore required for the handling of this material. The only requirement is that clay not be used for near-surface remediation activities, as its elevated sodicity has the potential to inhibit plant growth.

4.4.2 Spontaneous Combustion

The presence of carbonaceous material in overburden, rejects or stockpiles may lead to spontaneous combustion and spoil fires. Spontaneous Combustion is caused by the oxidation of coal and related carbonaceous materials, causing self-heating. A principal source of heat for this is provided by sulphide oxidation, which is a strongly exothermic process. In the presence of rapidly oxidising pyrite, temperatures can exceed 200°C, and spontaneous combustion can occur without an external ignition source.

Spontaneous combustion is a risk to people, facilities and the environment. Burning coal can release smoke and carbon monoxide, and fires in coal stockpiles and coal seams can be difficult to extinguish. The likelihood of spontaneous combustion varies with coal type, whether it is raw or washed, as well as time and depth of storage.

4.4.3 Acid Rock Drainage

Sulphides found in and along coal-bearing strata oxidizes to form sulphuric acid, and depending on the ability of the chemical compounds in associated materials to neutralize or buffer the acidity, result in Acid Rock Drainage (ARD). Groundwater acidification (commonly termed Acid Rock Drainage, or ARD) presents a significant hazard at CCO, due to the presence of sulphides in the coal and waste materials. Oxidation of sulphide minerals (pyrite in particular) can lower the pH of groundwater, increasing the solubility – and therefore the mobility – of potentially toxic metals through local aquifers. ARD is a risk to people, facilities and the environment, and consequently requires rigorous management. As the precursor mechanism for Spontaneous Combustion (and in addition to its own environmental impacts), ARD mitigation forms the main focus of this waste management plan; however, to make the implementation of mineral waste management consistent across the site, the colloquial terminology used by planning and operators has been incorporated into this document.

A detailed treatment of ARD, including the specific chemical pathways and conditions for their onset, can be found in the references provided in section **Error! Reference source not found.**. The potential for generating acid is greater for waste containing higher concentrations of sulphur (S), but neutralization can occur in the presence of sufficient quantities of alkaline species, and such materials are described as Net Acid Consuming. Both ARD-producing and Net Acid Consuming materials are present at CCO, and the mitigation strategy adopted here largely relies on minimising the bulk storage of potentially acid forming (PAF) materials, encapsulating materials that may be more reactive, or co-disposal of PAF with an excess of Net Acid Consuming material.

Criteria for assessing ARD-potential at CCO are defined in section **Error! Reference source not found.**. Further information can be found in Glencore's ***Protocol 11.26 Managing Geochemical Risks***.

4.5 Interpretation Criteria for ARD

CCO will classify waste material according to its propensity to generate acid, and allow for the operation to refine how it manages this risk. Specifically, geochemical analysis of waste material will be used to calculate its Net Acid Generation (NAG) and Net Acid Producing Potential (MAPP), and the material will then be classified according to whether these parameters exceed particular thresholds (NAG and NAPP are both defined in Glencore's ***Protocol 11.26 Managing Geochemical Risks***, and explained in detail in the GARD Guide. The following three categories of ARD-potential are recognized, and defined by the following criteria:

1. Non-Acid-Forming (NAF)
   - Total S ≤ 0.05%; or
   - 0.05% < Total S ≤ 0.5% and NAG pH ≥ 4.5
2. Potentially Acid Forming (PAF)[2]
   - Total S > 0.5%, NAPP > 10 kg/t H_2SO_4
3. Potentially Acid Forming-Low Capacity (PAF-LC)
   - Total S > 0.05%, 0 < NAPP < 10 kg/t H_2SO_4 and NAG pH < 4.5

In general, 0.5% S is defined as a cut-off limit, above which material should be segregated and encapsulated or effectively blended to have an overall ANC:MPA ratio of more than 3.

Materials that contain an excess of acid-consuming minerals (i.e. a NAPP > 0) are net-acid-consuming. At Clermont, these include basalt and quaternary sediment (see section **Error! Reference source not found.** for further details). Clermont's mineral waste management plan (see section **Error! Reference source not found.**) does not rely on the availability of excess acid consuming materials and instead is focussed on early identification, appropriate segregation and placement of potentially acid-forming waste.

4.6 Geochemical Characterisation Programs

Different approaches to quantify geochemical risk and monitoring the adequacy of management of these risks are recommended for existing mining operations. Extensive geochemical characterisation of waste material from CCO has been undertaken between 1997 (RTTS 1997) and 2011 (EGi 2004, 2008, 2011). In 2012, 2014 and 2017-2021 further sampling and geochemical characterisation was completed (KCB 2015, KCB 2017, KCB 2020, KCB 2021), with sampling and testing now incorporated into site operations as an ongoing task. The earlier results were included in the Clermont Coal Mine Project Environmental Impact Statement (EIS) (RTCA 2004a, 2004b) and included characterisation of a large number of samples of all lithologies, as well as coal rejects. Each subsequent characterisation

[2] All Tertiary and Permian sediments with total sulphur contents greater than 0.5% will be managed as potentially acid forming mineral waste, unless there is direct evidence that the material has more ANC than 30 kg/t H_2SO_4.

program has involved analysis of additional samples from the expected disturbance area using drill holes undertaken for both exploration and resource development. It is recommended that geochemical test work and results are analysed under supervision or by a geochemist.

4.7 Previous Findings

4.7.1 Potential for ARD

The prevalence of ARD potential, classed into NAF, PAF-LC and PAF materials for the various rock types at CCO, are summarized in **Error! Reference source not found.**. Previous geochemical characterisation programs have indicated that the bulk of the overburden material is non-acid forming (NAF). However, potentially acid forming (PAF) and PAF low capacity (PAF-LC) horizons have been identified within Tertiary and Permian sediments. Coal materials tested are dominantly PAF, although some are classified as PAF-LC. In addition, the coal stockpiles, processing wastes, coal wash wastes and coal reject wastes are potential sources of ARD. Coal reject wastes are also susceptible to spontaneous combustion, in addition to being PAF [3].

		NAF	PAF-LC	PAF
Quaternary Sediments		100%	0%	0%
Tertiary Overburden	**Basalts**	80%	16%	4%
	Sedimentary	61%	27%	12%
	Combined	70%	22%	8%
Permian Overburden		65%	18%	17%
Permian Coal		15%	27%	58%

Table 4-1 – Relative proportions of different ARD classes by rock type at CCO (KCB 2018)

From the site characterisation, the following units are most susceptible to being PAF:

- carbonaceous/coaly Tertiary sediment material within 5m of the lower basalt boundary;
- overburden within 5m of the Wolfang Upper (WU) seam roof;
- interburden between Wolfang and Wolfang Lower seams;
- Wolfang Lower seam splits;
- Wolfang Lower seam floor; and
- possibly Gowrie seam floor and roof.

Based on testing, units from the roof and floor within 2m of coal seams, and interburden and partings between seam splits should be treated as PAF unless confidently characterised as NAF. All of the Permian Coal samples tested to date are PAF, but most had only a low acid potential (PAF-LC). The ARD potential of interburden and overburden material is higher immediately above and below the coal seams (particularly the Gowrie and Prospect seams).

[3] Currently available data indicates that sulphide reactions rates in the MegaCell are suppressed sufficiently such that buffering is occurring in situ as water quality in MegaCell is pH neutral.

Of particular importance to the management of mineral waste at CCO is that the PAF materials have very short lag times to acidity (i.e. rapidly acidify). This has been confirmed by testing completed by CCO in 2014. The 2014 testing indicated a large proportion of the samples show potential for acidification if allowed to oxidize. Ex-pit material (i.e. above RL of 222m) was confirmed as generally NAF or low reactivity.

Error! Reference source not found. (below) shows the current distribution of geochemical acid forming propensities with respect to major lithological units.

Lithological Unit	Distribution of geochemical acid forming abilities (%)			Volume of each lithological unit (Mbcm)	Volume of geochemical acid forming abilities (Mbcm)		
	NAF	PAF-LC	PAF		NAF	PAF-LC	PAF
Quaternary clay / weathered basalt	100%	0%	0%	123 (17%)	123	0	0
Tertiary basalt	80%	16%	4%	189 (27%)	151	30	8
Tertiary sediments	61%	27%	12%	62 (9%)	38	17	7
Permian sediments	65%	18%	17%	334 (47%)	217	60	57

Table 4-2 – Current distribution of geochemical acid forming propensities with respect to major lithological units

All basalt samples were found to be NAF, with a relatively high propensity to consume acid. A large proportion of the Tertiary and Permian sediments are also NAF. CCO's soil and clay is non-acid forming.

4.7.2 Potential for Spontaneous Combustion

For CCO, the primary lithologies of concern for spontaneous combustion are the coal seams themselves, especially the Wolfang and Gowrie Seams. These two seams represent different risks for spontaneous combustion, since the underlying mechanisms leading to combustion differ. The reactivity of the Gowrie Seam is an inherent characteristic of the rock; a result of the fine-grained pyritic materials present in the lens. In contrast, the Wolfang Seam is reactive largely due to interactions with external factors, such as moisture and weather conditions.

Characterisation of mineral waste at CCO to understand the potential for spontaneous combustion is ongoing. The results of these programs will be used to continually reassess the risk of spontaneous combustion at CCO and the efficiency of control measures.

Experience at CCO has shown that coal and units that contain coal are most susceptible to spontaneous combustion. Geochemical testing has also shown that the coal seams, followed by Permian shale are the most likely to be PAF (see Table 4-4). Operationally the immediate need to identify and manage material that may have the potential to allow spontaneous combustion to arise drives the in-pit waste identification and waste management. Provided the material identified to be low risk to spontaneous combustion has a low risk of generating acidic drainage, the objectives of both Mineral Waste Management and spontaneous combustion are aligned.

Clermont has several methods of identifying spontaneous combustion. These include geological modelling, mine planning and visual inspections and temperature and gas monitoring.

The geological model for the site identifies areas which will require selective management, and therefore planning personnel highlight when handling and placement controls are required by the operational teams. The primary lithology's of concern for spontaneous combustion are the coal seams themselves, and specifically the Wolfang and Gowrie Seams. It is expected that the surrounding lithologies will also require management as potentially combustible mineral waste.

Operationally Clermont personnel uses the terms "reactive" and "clean" to differentiate between materials at risk of spontaneous combustion; only material with no spontaneous combustion risk is regarded as "clean" and suitable for ex-pit disposal.

Results from recent geochemical sampling (340 additional samples) and characterisation of the placed waste at Clermont (KCB 2020) has indicated that Clermont Open Cut's identification and placement of waste using the "reactive" and "clean" classification showed that the "reactive" and "clean" classes are reasonably analogous to PAF / PAF-LC and NAF.

5. Assessment of Risk

Management strategies, protocols and procedures implemented for mineral wastes will occur on the basis of risk, and normal risk assessment processes will be applied. ARD properties will be assessed on a regular basis. This will include:

- Assessment of ARD properties from material collected as part of the geology drilling programs;
- Regular field testing for ARD properties using in field testing methods (for in pit, ex-pit (refer to ***Mineral Waste Sampling and Analysis procedure***) and processed/washery waste (refer to ***Sampling Course Rejects and Sampling Fine Rejects WIs***);
- Review of mining and placement methods of PAF / reactive materials by short, medium and or long term planners;
- Review of sulphur in coal data (from coal quality analysis) to contribute to ARD assessment;
- Comparison of "reactive" and "clean" mineral waste with PAF and NAF classifications for the site, and,
- Water sampling as part of the regular surface and groundwater monitoring program (refer to ***Surface Water Monitoring and Groundwater Monitoring WI's***).

Continued review of information and direct data collection will be used along with risk assessment as a methodology for continual improvement. Such assessments will identify whether existing practices are either overly or under protective.

5.1 Sample Collection

Ongoing ARD monitoring programs will leverage off routine monitoring of spoil from rehabilitation areas, all routine drilling programs or other identified opportunities and campaigns to ensure continued samples are taken and analysed for those lithological regions where high sulphur levels have been identified. The collection of these samples will be aligned to other sampling of mineral waste material and coal sampling by other departments as far as practically possible.

5.2 Sample Selection and Analysis

In a previous geochemical assessment, Klohn Crippen Berger (2015) estimated that approximately 500 samples are necessary to characterize the volume of material at CCO. As of June 2018 this total had been achieved, and the subsequent geochemical ARD characterisations build on a substantial dataset of more than 850 samples (KCB, 2017). Ongoing and future ARD monitoring programs will focus on the performance of waste placement practices and the continued verification of the nature of the different lithological units.

Previous geochemical characterisations have indicated an uneven distribution of sulphide (and consequently ARD potential) among the various geologic units. For example, the coal seams and Tertiary and Permian sediments (particularly those in close proximity to the coal seams) pose the greatest ARD risk, while the Quaternary clay/Weathered basalt lithologies are strongly net acid consuming. Sampling density should therefore be weighted such that the highest-risk materials are more extensively studied.

Once collected, samples will be stored in a covered location until analysis can be conducted. This is particularly important in light of the tendency of reactive waste at Clermont to acidify rapidly (ref 2014 study and KCB 2020). A program of field sampling will also be conducted to verify the findings of the laboratory sampling program, and to identify areas which need further testing.

A detailed methodology for collection and analysis of the samples is outlined in the ***Mineral Waste Sampling and Analysis procedure***. All test results will be stored in Glencore's Environmental Monitoring Database (EMD).

5.3 Classifying Samples from Testing Results

To ensure standardised data interpretation at CCO, a standard acid-base accounting interpretation tool developed specifically for site will be used. The Clermont ABACUS Interpretation Tool (as per Appendix C) provides a means of consistent classification of materials.

This tool is based on the criteria outlined previously in section **Error! Reference source not found.** ("criteria for ARD"). The CCO AMD rules have been incorporated into a MS-Excel based tool previously developed (Usher, 1999) to provide consistent classification of materials, graphical presentation, automated classification of samples and, where appropriate, facility or mine-scale integration of Acid Base Accounting results (KCB, 2015). This tool is available from the CCO Environment Team, and the front-end interface has been provided as Appendix C.

All material which has not been classified as "clean" will be considered to be reactive until further analysis has been completed and shown it to be otherwise.

5.4 Application of Sampling Results

With regards to the distribution of waste, this management plan has three ultimate objectives:

1. To place waste in such a way that "hotspots" of reactive material are not created.
2. To place waste in a manner that restricts the oxidation of reactive materials and prevents acidification wherever possible.
3. To ensure that records are maintained of the average "clean"/"reactive" ratios of every mineral waste dump.

To achieve these, it is proposed that CCO meet the following obligations:

The outcomes of waste characterisation and classification should be incorporated into CCO's block model as maintained by the geology department (to verify the classification against historical modelling and to improve forward modelling of the location of specific waste classes and volumes of each class of material).

Reference to this block model should be routinely made by short and medium-term planning personnel when selecting placement locations for waste.

Records should be maintained of the origin (and ARD-characteristics) of waste after it has been deposited in its final resting place to permit future sampling and monitoring efforts.

6. Waste Placement and Handling

6.1 General Rules

The placement and handling of mineral waste at CCO is the responsibility of the short term planning superintendent. The block model, maintained for the site by the geology department, should adequately describe each block to identify areas which require selective management, and therefore short and medium-term planning personnel must clearly indicate when handling and placement controls are required by the operational teams.

6.2 Waste Classification

Waste at Clermont is classified as either "clean" or "reactive" according to its ARD-risk. Refer to ***Appendix D*** for the materials balance of clean and reactive wastes at CCO since 2015. The responsibility for classifying waste as "reactive" or "clean" lies with the block modellers within the geology department. Individual batches of mineral waste are classified by Geology and incorporated into Long-Term and Short-Planning according to their stratigraphic position (as indicated by the block model). This classification is supported by in-field observations made by Geology. The terms "reactive" and "clean" are synonymous with the terms "NAF" and "PAF" described in section **Error! Reference source not found.**. To facilitate communication between the various operations at Clermont it is recommended that all personnel now adopt this "clean vs reactive" terminology. PAF-LC waste is to be classified as "reactive".

Batches of waste that have not been classified by Geology must be classified as "reactive". This classification procedure, and some of the associated handling/placement requirements, are summarized in the flowchart in **Error! Reference source not found.**:

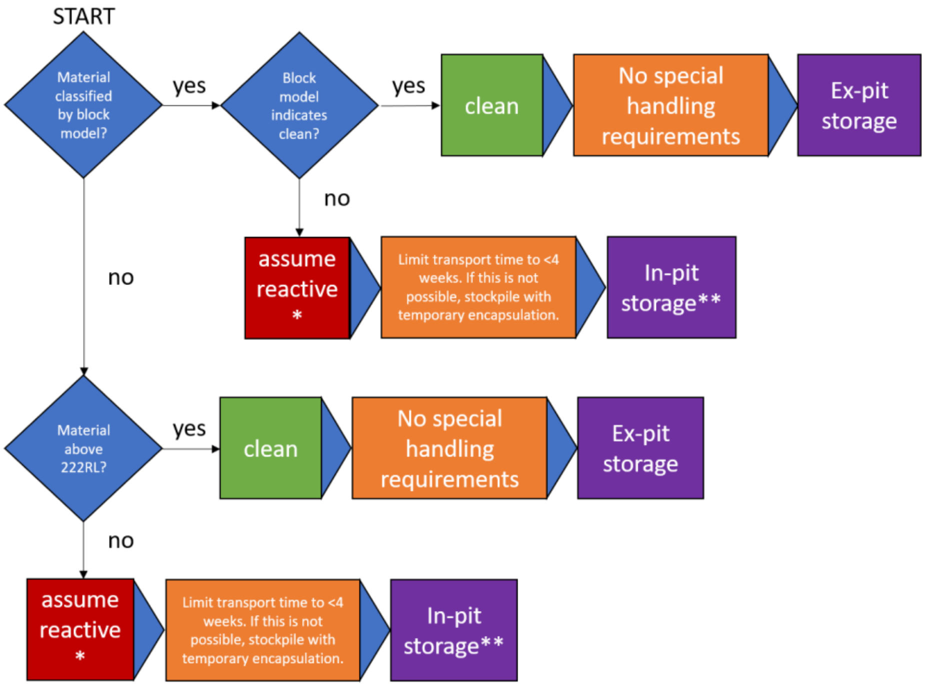


Figure 6-1 – Flowchart for classifying mineral waste a CCO. Handling requirement and placement locations are included in the orange and purple boxes respectively.

Material assumed to be PAF may be re-categorised if adequate testing confirms they meet the NAF criteria defined in section 4.5.

*****If in-pit storage is not possible, encapsulate as described in section 6.5.2.***

6.3 Waste Handling

There are no special control measures required for handling NAF / “clean” materials.

All PAF / PAF-LC / “reactive” material is to be transported quickly to its final destination; within 4 weeks wherever possible. Should this not be possible, operations should place the material in temporary stockpiles with temporary encapsulation by “clean” material. The reason for this is that the geochemical character of some reactive materials indicates that their acid-forming reactions will proceed very rapidly after their excavation (EGi, 2011 suggests that lag times for acidification are in the order of a few weeks).

When handling reactive coarse rejects and/or tailings, monitoring and data investigation must be in place to provide an early warning system, and to further the understanding of its ARD and spontaneous combustion risks. Any additional information sourced from monitoring must be used to update existing control measures.

Fugitive emissions to air are not of concern as the wastes are transported with a high moisture content and subsequently form a solid crust when stored or disposed of in-pit.

6.3.1 Tailings Decant Ponds

CCO plans to utilise tailings decant ponds to dispose of rejects and dried tailings in-pit. The ponds are filled with a tailings slurry from the Coal Preparation Plant’s thickener, and temporarily left to dewater in the ponds. During the drying time, the slurry dries due to water filtering through a semi-permeable wall that allows for water drainage but prevents tailings from passing through. The filtered water is pumped back to the industrial area dam, and eventually transfers to the process water dam for re-use. After sufficient drainage has occurred, the dried tailings (approximately 25 - 35 % total moisture content) will be excavated and transported to an in-pit dump for eventual co-disposal alongside coarse rejects.

6.4 Waste Placement

Different placement procedures have been developed for NAF / “clean” and PAF / PAF-LC / “reactive” waste. These procedures specify the placement location and the dump construction (specifically, how reactive waste is to be encapsulated). The procedures for “clean” and “reactive” waste are outlined in the succeeding sections. Refer to ***Appendix E*** for a map of the waste disposal plan.

6.4.1 Placement of “clean” waste

Clean mineral waste may be placed anywhere onsite. Although there are no restrictions on its placement, clean waste may be required for blending/capping of reactive material. For example, basaltic waste will be used to form basal layers beneath dumps of reactive material, and Tertiary and Permian sediments will be used to encapsulate these dumps (see section 6.4.2. below). The responsibility for designating batches of clean waste as blending/capping material lies with the Short-term planning operations team.

6.4.2 Placement of “reactive” waste

Reactive waste should only be placed in dumps located inside the pit, below an elevation of 90 RL mAHD. The intent of this control is to place reactive waste below the post-mining water table, where it will become permanently submerged (and its oxidation thereby inhibited). The specified elevation (90 RL) must be adjusted if revised post-closure pit modelling indicates that the post-mining water table will be above or below this level.

If reactive material cannot be placed below 90 RL mAHD, the final void closure plan should take the presence of this waste (and the deterioration in water quality) into consideration.

All reactive waste must be placed in adequately-constructed mineral waste dumps. These must aim not to contain more than 10% of reactive material.

Should the mining sequence result in a dump that contains more than 10% of reactive material, the dump must be encapsulated as per Figure 6-2. Encapsulation measures must be applied whether the dump in question is located inside or outside the pit.

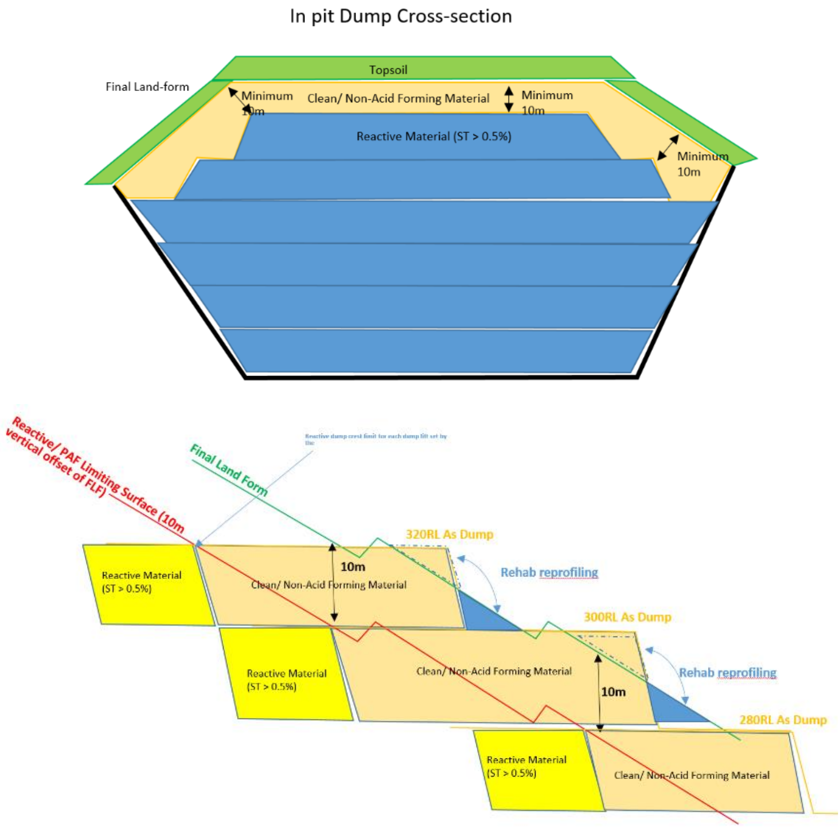


Figure 6-2 – Schematic section through an in-pit dump containing reactive materials.

If reactive material cannot be placed in-pit, it must be encapsulated by net-acid-consuming material as shown in **Error! Reference source not found.**3. In addition, the procedures outlined in the Acid Rock Drainage TARP should be followed. All reactive waste placed external to the pit must be encapsulated (this is consistent with the requirements of the ***Spontaneous Combustion Management SOP***).

The following criteria must be applied to ex-pit dumps encapsulating reactive materials:

- If available, a 2 metre thick basal layer of basalt (or some other net-acid-consuming material) must be placed on the original land surface. Note that clean waste is not automatically net-acid-consuming. See Section **Error! Reference source not found.** for details of these terms. If available, Quaternary clay should be incorporated into the basal layer to reduce infiltration by water.
- Net-acid-consuming material must be free dumped such that no reactive material is located within 10 metres of the final dump surface after the slope has been re-contoured at closure.
- Lifts of reactive or unclassified material should not exceed 5m in thickness as far as practically possible.
- Ex-pit dumps should preferably contain only clean waste. Where reactive material must be placed ex-pit for operational or Health and Safety reasons, these facilities should be constructed in a manner consistent with Figure 6-3 and ex-pit waste dump should contain less than 5% reactive material.

- To assist in this differential treatment, mineral waste dumps have been classified as either in pit or ex pit. Ex pit dumps are those where the footprint is outside of the current or final pit shell. This includes the North-waste dump, the south west dump and the south east dump.
- If there is potential for spontaneous combustion, inert or net-neutralising material is required between lifts. Clean waste or basalt should be mixed into reactive waste if convenient to do so.
- The final lift of the reactive mineral waste dump must be a layer of clean material, no less than 10m in thickness.
- The upper surface of the dump must be designed so that it only receives rainfall from the dump catchment itself, with no run-on from adjacent areas.
- The dump must be constructed such that during rehabilitation the encapsulated (reactive) material is not exposed.
- Records must be maintained of the placement of reactive material in ex-pit dumps. These should indicate the masses of reactive material placed in each dump.

It is recommended that the above controls be printed on a checklist so that they can be individually checked off during the process of designing any ex-pit dumps.

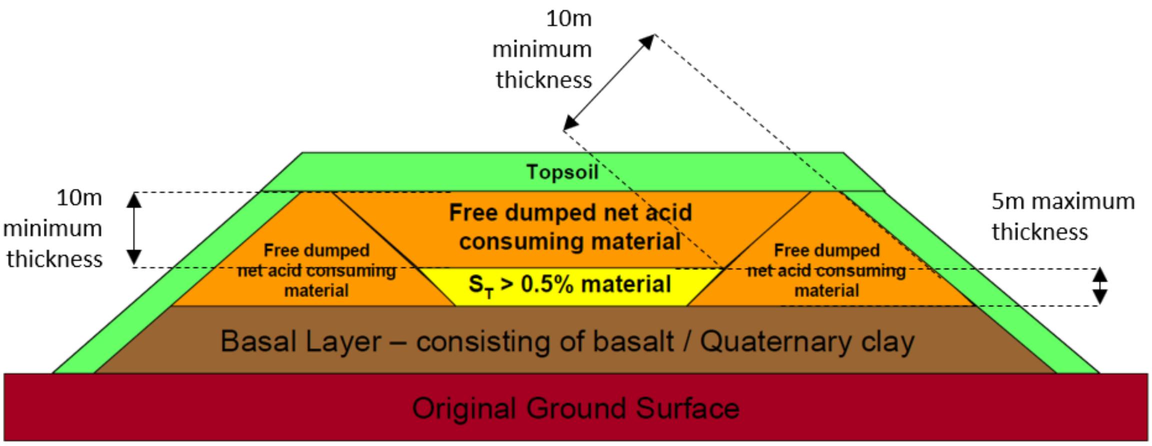


Figure 6-3 – Schematic section through an ex-pit dump containing reactive materials. The different waste types are coded by colour.

6.4.3 Placement of Potentially Spontaneous Combustion Materials

All carbonaceous materials with total sulphur content greater than 0.5% must be managed as reactive, and classified as potentially spontaneously combustible. Previous geochemical sampling (e.g. KCB 2015) indicates that this includes the coal seams themselves (the Wolfgang and Gowrie seams in particular) and the lithologies adjacent to them. The geological model for the site should incorporate a tag on each block to identify areas which will require selective management.

Management controls must focus on minimising the time period during which these rock types are allowed to oxidize. Investigations into the self-heating behaviour of coal at Clermont indicate that the time window for ignition of these materials is between 2 and 7 days as a conservative worse-case scenario (for the Gowrie Seam). The methodology for managing potentially spontaneously combusting mineral waste is illustrated in **Error! Reference source not found.**4.

Controls in place for managing acid drainage risk can be adapted to minimise the risk of spontaneous combustion. Alternatively, controls may be applied to address the risk to human health, and the risk to the environment where exposure time cannot be minimised. In the event that spontaneous combustion does occur, refer to the CCO Spontaneous Combustion SOP for details about the appropriate response.

Day to day management of spontaneous combustion in the stockpiles and pit is captured in various documents including CCO ***Stockyard Spontaneous Combustion Management Procedure, Spontaneous Combustion Management Standard Operating Procedure and the Spontaneous Combustion TARP.***

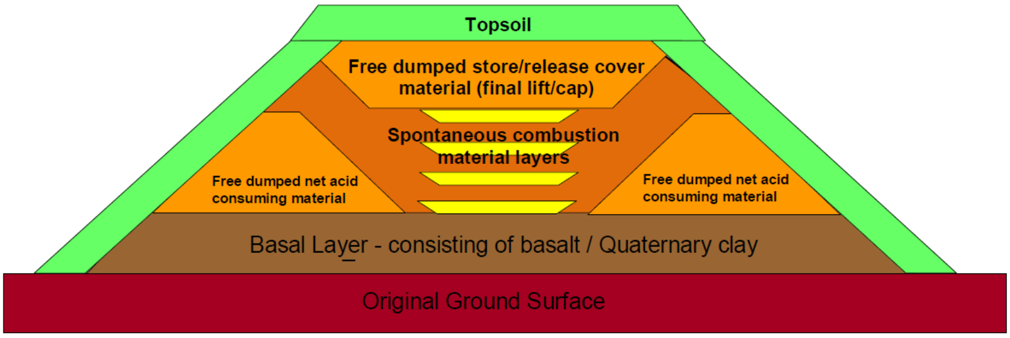


Figure 6-4 – Encapsulation schematic for Wolfang and Gowrie Seams for spontaneous combustion

6.4.4 Placement of Coarse Rejects and Tailings/ Processing Waste

A co-disposal system of coarse rejects and tailings is used at CCO, whereby rejects and tailings are to be disposed of in-pit and will be progressively encapsulated as the mine progresses. Over the life of the operation, rejects and tailings have been disposed of in Mega Cell 1 and Mega Cell 2 which are located in-pit. Mega Cell 1 ceased operation in 2012 and has since been backfilled and encapsulated. Mega Cell 2 is inactive but has not been decommissioned/ rehabilitated. CCO are currently utilising tailings decant ponds as discussed in Section 6.3.

The location of the cells has been recorded on the CCO ***Contaminated Land Register***. A ***Contaminated Land Register*** and spatial data is to be maintained and should include the number/ volume of wastes disposed of and the locations of dumps. Refer to ***Appendix F*** for a map of the locations of existing areas of contaminated land.

Where rejects are classified as “clean”, the coarse rejects can be truck dumped in-pit. If additional coarse rejects material is available and confirmed as “clean”, it can be used within the in-pit area to improve haul road conditions. Coarse reject waste should be confirmed as “clean” before use anywhere on site as construction material.

Should the coarse reject be classified as “reactive”, it should be disposed of in a similar manner to run of mine “reactive” waste. Fine rejects or dried tailings should be trucked to an intermediary dump for eventual co-disposal with coarse rejects in-pit. Rejects should be capped by being buried under net acid consuming material as per the methodology outlined above for reactive/potentially acid forming material (Figure 6.3). The operational geology team will be involved in the management of reject areas to ensure the geotechnical risks posed by these structures are considered and managed.

Monitoring bores are in place along the outer side of Mega Cells, and are checked for seepage and leachate on a regular basis. Clermont has an extensive groundwater monitoring network as identified in the ***Groundwater Management Plan*** which can be used to identify impacts to groundwater from mining operations.

The coal rejects/processing wastes will be subject to sampling as per the provisions of the ***Environmental Compliance Monitoring and Reporting procedure***.

7. Annual review of water quality data trends, specific evidence of ARD process and sources on site

To provide identification of geochemical risks CCO utilises the ***Geochemical Risk Annual Review Form*** to undertake an annual review in accordance with the GCAA Protocol ***11.26 Managing Geochemical Risks***, including the following:

1. A field inspection, which includes visits to the following:

Overburden and inter-burden waste dumps, tailings storage facilities, rejects stockpiles and storage areas, coal product stockpiles, sediment and anti-pollution points, drainage and seepage channels, lines and systems.

During the field inspection, collect information on locations and details of the following examples:

- Iron staining on rocks or in drainage/creek lines,
- Discolouration of water to a red or purple colour,
- Sulphate precipitation on dump batters, seepage areas and drainage lines,
- Die-back of vegetation on and/or below the phreatic surface of a tailings dam, dump batter or dam wall.

If, at the end of the annual review any adverse trends of evidence have been identified, the site Environment and Community Manager has to review the adequacy of the following:

- The operations' basic geochemical characterisation (static) and mining materials balance,
- Materials leachability characteristics (kinetic) results,
- Management processes for different material types and or ARD sources, and
- Targeted environmental monitoring.

2. A review of data trends for surface water and groundwater, using the Environmental Monitoring Database (EMD). Monitoring should consider ongoing changes/trends in the parameters listed below of more than (>) 40% over three quarters of a year (not just a short-term spike), or more than (>) 60% over any longer timeframe, compared to the baseline. The parameters that could act as indicators are:

- Acidity (pH)
- Electrical conductivity (EC)
- Total Dissolved Solids (TDS)]
- Aluminium (Al), Iron (Fe), Manganese (Mn), Selenium (Se), Chromium (Cr), Arsenic (As), Molybdenum (Mo), Lead (Pb), Copper (Cu), Zinc (Zn) and Mercury (Hg)
- Sulphate (SO4) and Chloride (Cl)
- Sodium (Na) and Potassium (K)
- Calcium (Ca) and Magnesium (Mg).

Compare the below sample sites in EMD:

- Surface water
  - IAD01
  - Megacell
  - Tailings cells
  - MWD01
  - Stockpile Dam
  - Western Diversion
  - Pit sump
- Groundwater
  - Nearfield groundwater bores (full analysis conducted annually in December)

Based on the outcomes of the Annual Review and field inspections, the Environment and Community Manager may either conduct additional testing and analysis (if more information is required), or use the existing information to develop an ARD Management Plan (refer to **Section** Error! Reference source not found. of ***11.26 Managing Geochemical Risks Protocol***). Where additional drilling and sampling is required, the process should involve a geological review as part of the annual LOM planning process, refer to the *Exploration Planning Standard XCN BD STD 0003*, and include adequate geochemical tests, which may require input from a specialist geochemist.

It is required, for environmental assurance processes, that a formal annual review or file note is kept for the record, to show that this annual process has been completed, and if so, whether any additional work has been identified for implementation.

8. Review of Management Plan

This Mineral Waste Management Plan should be reviewed as needed, based on changes or consistency to site practices, but must occur every two years based on the provisions of condition C5 of the EA.

8.1 Environmental Review

The Environmental Team should complete the following verification:

- That sampling and testing has been carried out in accordance with the requirements of the ***Mineral Waste Sampling and Analysis procedure***;
- Inspect all ex-pit facilities where reactive materials are not expected for signs of ARD (water sampling and visual assessment);;
- Review data collected during the year; and
- Review any major anomaly's which require management during the year.

8.2 Geology Review

Geology should:

- Collect samples as part of exploration and other opportunistic drilling programs;

- Assess lithology and likelihood for sulphides;
- Update the classification of “reactive” and “clean” to encompass both ARD and spontaneous combustion should new information become available (eg units previously regarded as low sulfur show increased sulfide content); and,
- Ensure ARD/Mineral Waste criteria are included in the block model (alongside spontaneous combustion criteria) and planning and reviewed as required.

8.3 Short and Medium-Term Planning Review

Short and medium-term planning should verify that:

- Reference criteria for spontaneous combustion and ARD in the block model are utilised when selecting placement locations for waste
- Operators are aware of the handling requirements for “reactive” and “clean” waste
- Active dump zones exist for each material type being mined in the short term; and,
- The dumping schedule for materials with special handling requirements, e.g. Reactive-classified mineral waste remains within the general criteria for life-of-mine plans.

8.4 Survey Control

Mine surveyors record the layout and location of all waste facilities, and complete survey pick-ups to locate and record footprint boundaries of:

- Waste dumps and sub-grade stockpiles
- Facilities housing “reactive” waste should be surveyed to confirm these are within the pit domain and lie within / below the required placement RL, interfaces between waste materials and cover layers, and between adjacent cover layers.

9. Training

Site induction and environmental training will be provided to relevant personnel and contractors, to provide a general awareness of the risks and management measures/requirements.

Personnel involved in identification, assessment, management and remediation of issues relating to mineral wastes should ideally have a background in environmental science / geology / geochemistry / hydrogeology.

10. Document Information

Relevant legislation, standards and other reference information must be regularly reviewed and monitored for updates and should be included in the site management system. Related documents and reference information in this section provides the linkage and source to develop and maintain site compliance information.

10.1 Related Documents

Related documents, listed in the table below, are *documents* directly related to or referenced from within this document.

Number	Title
CLEOC-520960306-2580	Rehabilitation Management Plan
CLEOC-520960306-2783	PHMP – Strata Failure
GCAA-625378177-10249	GCAA Guideline – 11.08 Waste Management
GCAA-625378177-13097	GCAA Protocol – 11.26 Managing Geochemical Risks
GCAA-625378177-16337	GCAA Guideline – 11.26 Managing Geochemical Risks
GCAA-625378177-15551	GCAA Protocol – Tailing Storage Facilities
CLEOC-520960306-170	CPP Coal Stockpile and Reject Management Procedure
CLEOC-520960306-11830	Mineral Waste Sampling and Analysis procedure
CLEOC-520960306-936	Stockyard Spontaneous Combustion Management Procedure
CLEOC-520960306-6631	SOP - Spontaneous Combustion Management
CLEOC-520960306-13447	TARP - Spontaneous Combustion Management
CLEOC-520960306-2693	Environmental Compliance Monitoring and Reporting Procedure
CLEOC-520960306-14286	Groundwater Management Plan
CLEOC-520960306-14634	WI - Sample Fine Rejects
CLEOC-520960306-14635	WI - Sampling Course Rejects
CLEOC-520960306-14675	WI - Surface Water Monitoring WI
CLEOC-520960306-14676	WI - Groundwater Monitoring
CLEOC-520960306-15787	Geochemical Risk Annual Review Form

Table 10-1 – Related documents

10.2 Reference Information

Reference information, listed in the table below, is *information* that is directly referred to for the development of this document.

Reference	Title
EA	EPML00634113 CCO Environmental Authority (EA)

Reference	Title
EP Act	Environmental Protection Act 1994
EP Reg	Environmental Protection Regulation 2019
USEPA, 1994	Acid Mine Drainage Prediction. USEPA Technical Document EPA530-R-94-036. December, 1994
Price, W.A., Morin, K. and Hutt, N., 1997	Guidelines for the Prediction of Acid Rock Drainage and Metal Leaching for Mines in British Columbia: Part II. Recommended Procedures for Static and Kinetic Testing. In: Proceedings of the Fourth International Conference on Acid Rock Drainage, Vancouver, Canada, pp. 15-30
Commonwealth of Australia, 1997	Managing Sulphide Wastes and Acid Drainage. Best Practice Environmental Management in Mining. 1997.
RTTS, 1997	Clermont Coal Project Overburden Characterisation Report. Rio Tinto Technical Services Report, June 1997
RTCA, 2004	Clermont Coalmine Project – Environmental Impact Assessment.
RTCA, 2004	Clermont Coalmine Project – Environmental Impact Assessment, Supplementary Report.
EGi, 2004	Geochemistry and ARD Characterisation of Clermont Coal Waste Materials. Report 8151/606, May 2004
RTCA, 2004a	Clermont Coal Mine Project Environmental Impact Statement – Volume 1. August 2004
RTCA, 2004b	Clermont Coal Mine Project Environmental Impact Statement – Volume 2. August 2004
RTTS, 2005	Rio Tinto Acid Rock Drainage Risk Review Program Development. Rio Tinto Technical Services Report, AR1956, September 2005
Department of Industry, Resources and Tourism, 2007	Managing Metalliferous and Acid Drainage
Commonwealth of Australia. February, 2007	Leading Practice Sustainable Development Program for the Mining Industry
RT OTX, 2007	Protocol for Excellence in Mineral Waste Management. Rio Tinto Operational and Technical Excellence Report, 2006/141, February 2007
EGi, 2010	ARD Assessment of Overburden and Coal from the Clermont Mine. Report 8151/935, December 2010
Klohn Crippen Berger, 2018	ARD Field Sampling Report, August 2016 – November 2017 Summary

Reference	Title
CLEOC-520960306-1671	Statutory Water Management Plan, February 2015
HEC 2019	Clermont Open Cut Mine 2019 Operational Water Management Plan
Klohn Crippen Berger, 2020	ARD Field Sampling Report, 2018/19
Klohn Crippen Berger, 2021	Southeast Waste Rock Dump Geochemical Characterisation Report, October 2021

Table 10-2 – Reference information

10.3 Change Information

Full details of the document history are recorded in the document control register, by version. A summary of the current change is provided in the table below.

Version	Date	Change Details
1.0	3 July 2014	New document
2.0	22 April 2016	Re-published by migration script.
3.0	3 May 2016	Updated to include more detail around monitoring requirements
4.0	26 July 2016	Re-published by migration script after conversion to Office 2013 format.
5.0	8 December 2017	Updated with new geochemical data; and simplified to aid comprehension
6.0	29 November 2018	Updated with new geochemical data; and simplified to aid comprehension, updated footers, document numbers and change information table
7.0	18 November 2020	Updated document to new GCAA Template Updated to bring greater consistency in terminologies between Spontaneous Combustion and ARD management Incorporated findings from 2018/2019 sampling campaigns
8.0	30 March 2021	Map showing the locations for mineral waste placement included. Materials balance included. Contaminated lands register reference included. EA conditions updated following amendment. Description of tailings containment methods included. Removed accountabilities section.
9.0	30 April 2021	Updated references to Mineral Waste Removed superseded EA requirements. Updated planned review date to 5 years as per change management 20210211103.0
10.0	3 June 2022	Reviewed against updates to 11.26 Managing Geochemical Risks Protocol (GCAA-625378177-13097). Updated Appendix D Materials Balance. Included Section 7 Annual review. Created reference to the Geochemical Risk Annual Review Form.

Version	Date	Change Details
11.0	15/11/2022	Minor formatting. Update to Section 4.4 to identify the Megacell 2 is inactive but not decommissioned. Update to Section 5.3 to reflect HSEC & HR Self-Assessment CMO Action 1957314 requirements. Update to Section 6.3 regarding the tailings decant process and the method of disposal in-pit.

Table 10-3 – Change information

Appendix A - Acronyms

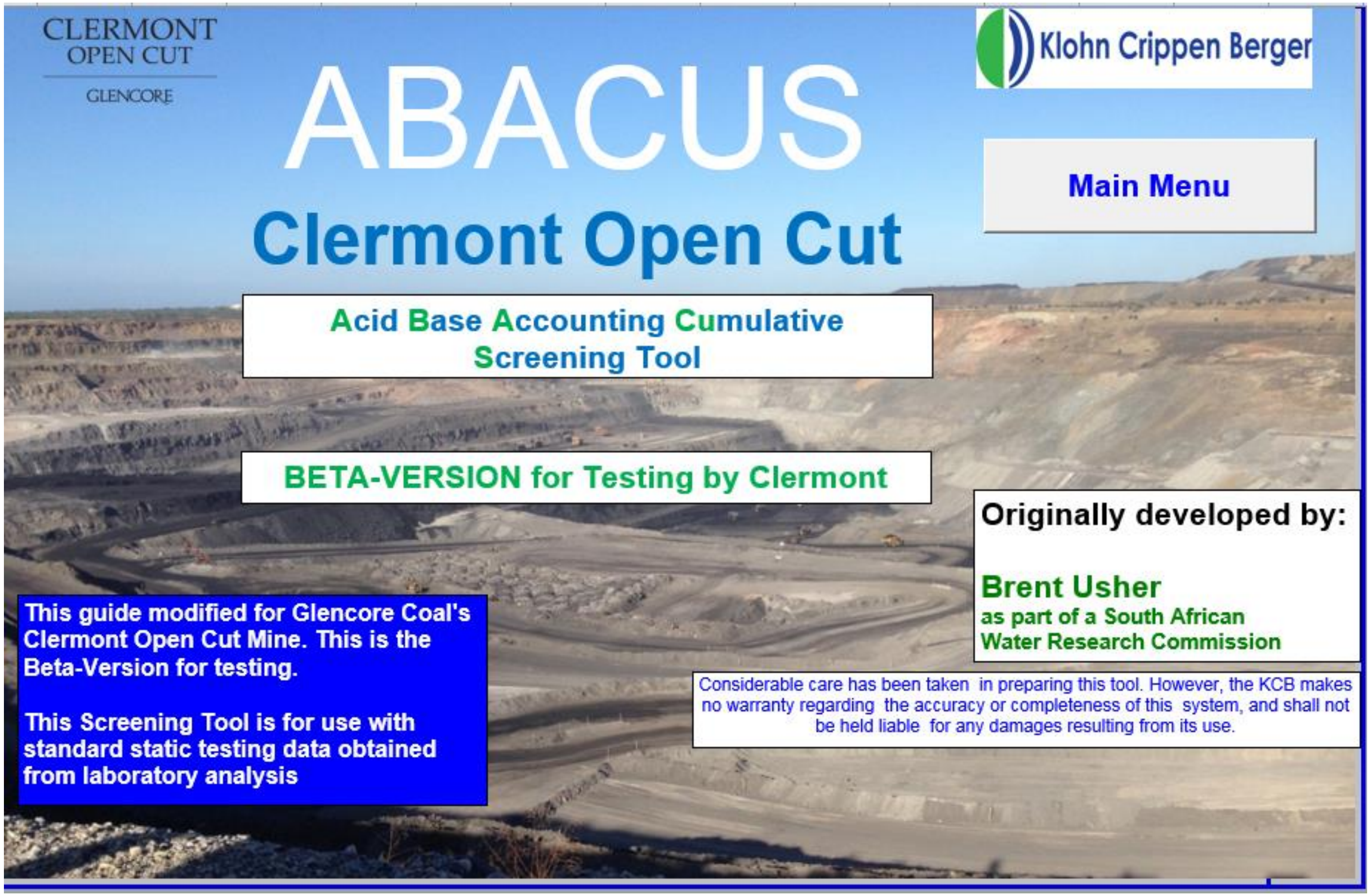
Term	Definition
ABA	Acid Base Accounting
AMD	Acid Mine Drainage
ANC	Acid Neutralising Capacity
APP	Acid Producing Potential
ASS	Acid Sulphate Soils
ASSMAC	Acid Sulfate Soils Management Advisory Committee
CRS	Chromium reducible sulfur
DI	Deionised
EC	Electrical Conductivity
EMD	Environmental Monitoring Database
GAI	Geochemical Abundance Index
GARD	Global Acid Rock Drainage (Guide)
ICP – AES	Inductively Coupled Plasma Atomic Emissions Spectrometry
ICP-MS	Inductively Coupled Mass Spectrometry
K-NAG	Kinetic NAG
ML	Metal Leaching
MPA	Maximum Potential Acidity
NAF	Non Acid Forming
NAG	Net Acid Generation
NAPP	Net Acid Production Potential
NATA	National Association of Testing Authorities
NMD	Neutral Mine Drainage
NPR	Neutralisation Potential Ratio
PAF	Potentially Acid Forming

Term	Definition
PSA	Particle Size Analysis
ROM	Run of Mine
TDS	Total Dissolved Solids
TOS	Total Organic Sulphur

Appendix B - Mineral Waste TARP

Condition	Trigger	Actions	Responsible for Implementing Action	Notification	Monitoring	Criteria for Downgrading
Normal	Drilling, ARD sampling and lab testing program is completed as per schedule and less than 5% of samples indicate higher ARD risk than expected for that area/facility. Mine waste is placed in areas according to criteria defined by Mine Waste Plan. Block model, mine plans/schedules are up to date with latest ARD criteria. Water management plan links to ARD plan. Closure plan consistent with ARD plan.	Verify drilling and ARD Sampling plan is followed and data is current (quarterly)	Delegate assigned by Environment and Community Manager	N/A	As required	N/A
		Confirm Mineral Waste Management Plan is followed	Delegate assigned by Environment and Community Manager	N/A	As required	
		Confirm ARD Criteria in Block Model and Planning (quarterly)	Delegate assigned by Environment and Community Manager; Geology; Long-term Planning	N/A	As required	
Level 1- Negligible	ARD is not included in geology description for geo-interpretation of potential PAF (Quarterly Geology logs and Updates)	ARD to be included in geology description of potential PAF	Delegate assigned by Environment and Community Manager; Geology; Long-term Planning	Short Term Planning, Long-Term Planning, Geology	Quarterly confirmation from Planning	ARD criteria included in block model and mine planning
	ARD rules are not coded into the block model (ARD criteria not included or not confirmed as current on a quarterly basis)	Update/populate block model with ARD	Delegate assigned by Environment and Community Manager; Geology; Long-term Planning	Short Term Planning, Long-Term Planning, Geology	Quarterly confirmation from Planning	ARD criteria included in block model and mine planning
	Waste sourced from below RL 222 placed ex- pit	Sampling, field testing and lab ARD testing. If confirmed NAF, no action. If PAF, rehandle back to Pit	Delegate assigned by Environment and Community Manager; Geology; Short-term Planning	Short Term Planning, Long-Term Planning, Geology	Monthly	Waste confirmed as NAF or placed in-pit
	Waste placed incorrectly (Management plan for High PAF lithologies not followed e.g. all Gowrie waste placed with blending with NAF material))	Sampling, field testing and lab ARD testing. If confirmed High PAF or potentially spon com; encapsulate as per mine waste management plan.	Geology; Long-term Planning	Environment	Quarterly	Waste stored as per Waste Management Plan
	Planning requests that material below the 222RL is placed ex-pit	Geology to assess lithology and likelihood for sulphides. Environment to implement in field testing program	Planning to notify Environment; Environment to liaise with Geology and to implement field testing program.	Environment	N/A; only as required	Material confirmed to be less than 5% PAF.
	Drilling, ARD sampling and lab testing program is not completed to schedule (6 month delay)	Regard all material as PAF until confirmed. Implement field and lab testing program.	Environment	Short Term Planning, Long-Term Planning, Geology	Quarterly verification that sampling and ARD results are current	Sampling plan completed and field testing indicates material is as expected. Confirm lab testing.
	The water monitoring program is not completed (3 month delay)	Assess most recent data. Undertake minimum of field parameter testing. Re-implement normal water sampling schedule	Environment	?	Quarterly; also after "first flush" rainfall events	Measured pH all neutral and within 20% of previous. EC within 20% of long-term average for each site.
Level 2- Minor	Material placed ex-pit is not confirmed as NAF (Information from planning verified by field testing)	Dumping of this material should be stopped immediately until confirmed as NAF. Incident investigation triggered to identify if waste management plan followed.	Delegate assigned by Environment and Community Manager; Geology; Long-term Planning	Short Term Planning, Long-Term Planning,	Field checks of ex-pit material on annual basis.	Ex-pit material confirmed as NAF or placed back in pit
	Expected ARD properties are not confirmed through drilling or spoils/in pit monitoring (Ex pit material has more than 5% PAF or in pit material has overall NAPP > 50 kg/t H_2SO_4)	Confirm ARD results with lab testing. If needed updated criteria and Block Model. Move to a more conservative waste management schedule	Delegate assigned by Environment and Community Manager; Geology; Long-term Planning	Short Term Planning, Long-Term Planning, Geology	Annual confirmation of block model; 6 monthly check on sampling schedule and inclusion of ARD. 6 monthly check on ex-pit NAF and in-pit NAPP	Next rounds of sampling and field assessment of ARD indicates that this is isolated and does not add more than 10% additional PAF to waste schedule.
	Drilling, ARD sampling and lab testing program is not completed for more than 1 year	Undertake field testing of last year's material.	Delegate assigned by Environment and Community Manager; Geology; Long-term Planning	Short Term Planning, Long-Term Planning, Geology	Annual confirmation of block model; 6 monthly check on sampling schedule and inclusion of ARD. 6 monthly check on ex-pit NAF and in-pit NAPP	ARD sampling implemented and reported and showing results consistent with historical results/block model
	The water monitoring program is not completed (6 month delay)	Field testing of pH and EC; Implement monitoring plan	Delegate assigned by Environment and Community Manager; Geology; Long-term Planning	Environment and community manager	Quarterly check; 6 monthly check environment and community manager	Water monitoring is completed and indicates no immediate risk of ARD
Level 3- Moderate	Further sampling and testing verifies material more reactive (increase in average %S by more than 10% or overall NPR) or significantly more PAF tonnage (PAF increases by more than 15%) than expected	Confirm ARD Criteria in Block Model; Field testing of placed material; Fast track next ARD sampling event	Delegate assigned by Environment and Community Manager; Geology; Long-term Planning	Planning	As required (quarterly)	Overall waste management strategy able to deal with more PAF than planned (i.e. WRD design, NAF quantities, and other mitigation such as capping)
	Continued evidence of ARD in water monitoring results (ph dropping and changes in SO_4/ Cl and alkalinity ratios or metal increases)	Confirm ARD Criteria in Block Model; Increase frequency of field testing at monitoring points where evidence is found; undertake sampling and testing of nearest waste source.	Delegate assigned by Environment and Community Manager; Geology; Long-term Planning	Planning	As required (quarterly)	ARD can be controlled through water management, water treatment and updated waste management plan
Level 4-Major	New drilling and sampling shows significant associated sulphides in waste rock (> 10% above 75th percentile for lithological units)	Implement High PAF waste disposal strategy. Confirm with further testing.	Environment; Geology	Planning	As part of annual review	Ongoing waste management plan assumes PAF material, short-term planning deals with material as PAF. Alternatively further testing
	Kinetic laboratory testing results and overall Clermont acid-base account suggest that long-term and/or post closure acid mine drainage is likely (as determined from annual ARD review)	Confirm results; independent review of data and management plans	Environment	Geology; Planning	Annual ARD review	Independent review and regulators agree that ARD risk remains low or can be managed with updated site plans
	Water quality monitoring results show rapidly increasing sulphate/chloride ratio and pH dropping below pH 6 for 3 consecutive quarters	Confirm ARD Criteria in Block Model and Planning (quarterly)	Delegate assigned by Environment and Community Manager; Geology; Long-term Planning	Environment and Community Manager	Within 1 month of receiving laboratory results for second quarter. Within 1 week of completing sampling for field results in third quarter	3 consecutive quarters of neutral water quality with expected ionic ratios and metals.

Appendix C - ABACUS Interpretation Tool



Appendix D - Materials Balance 2008 - 2021

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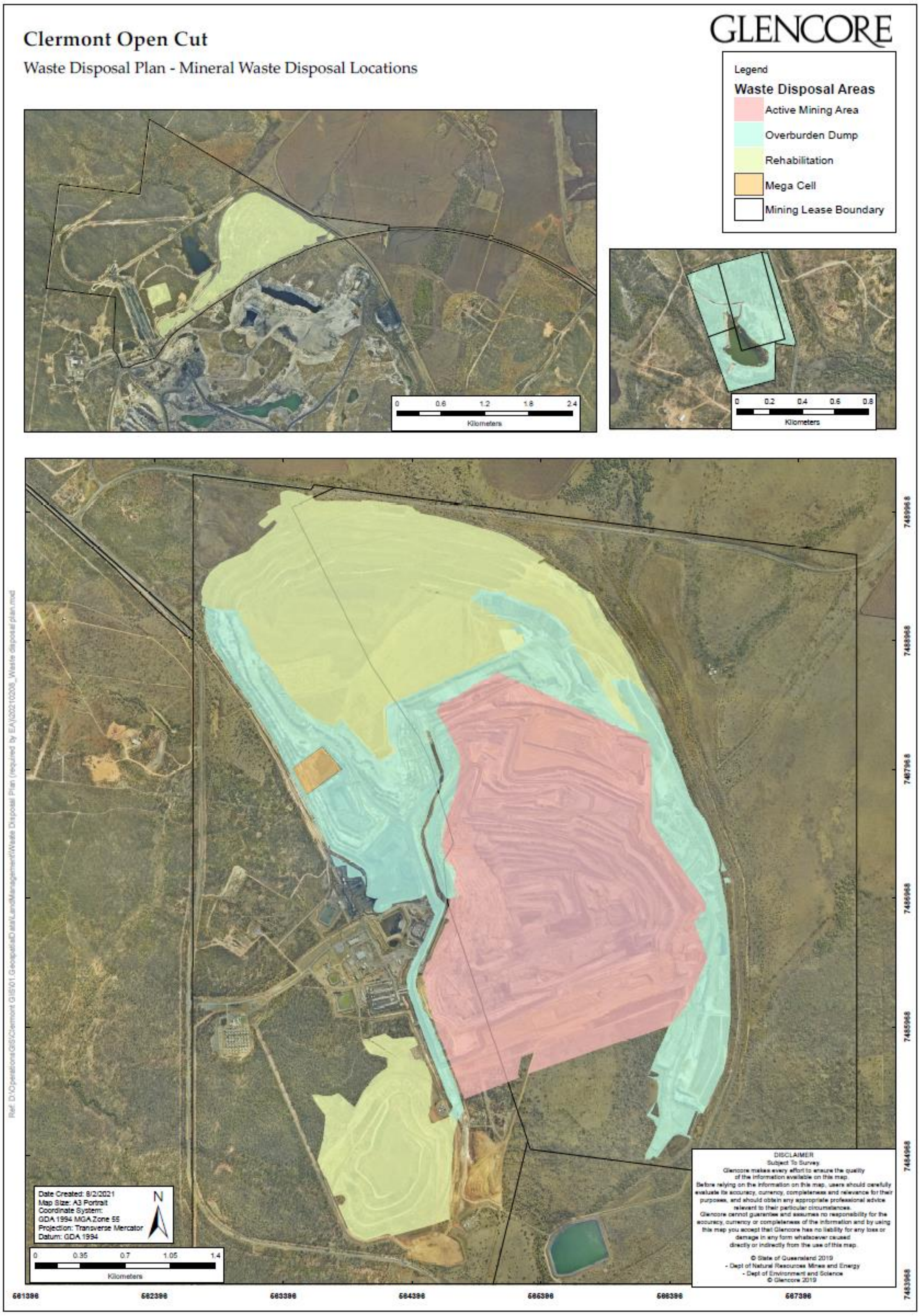
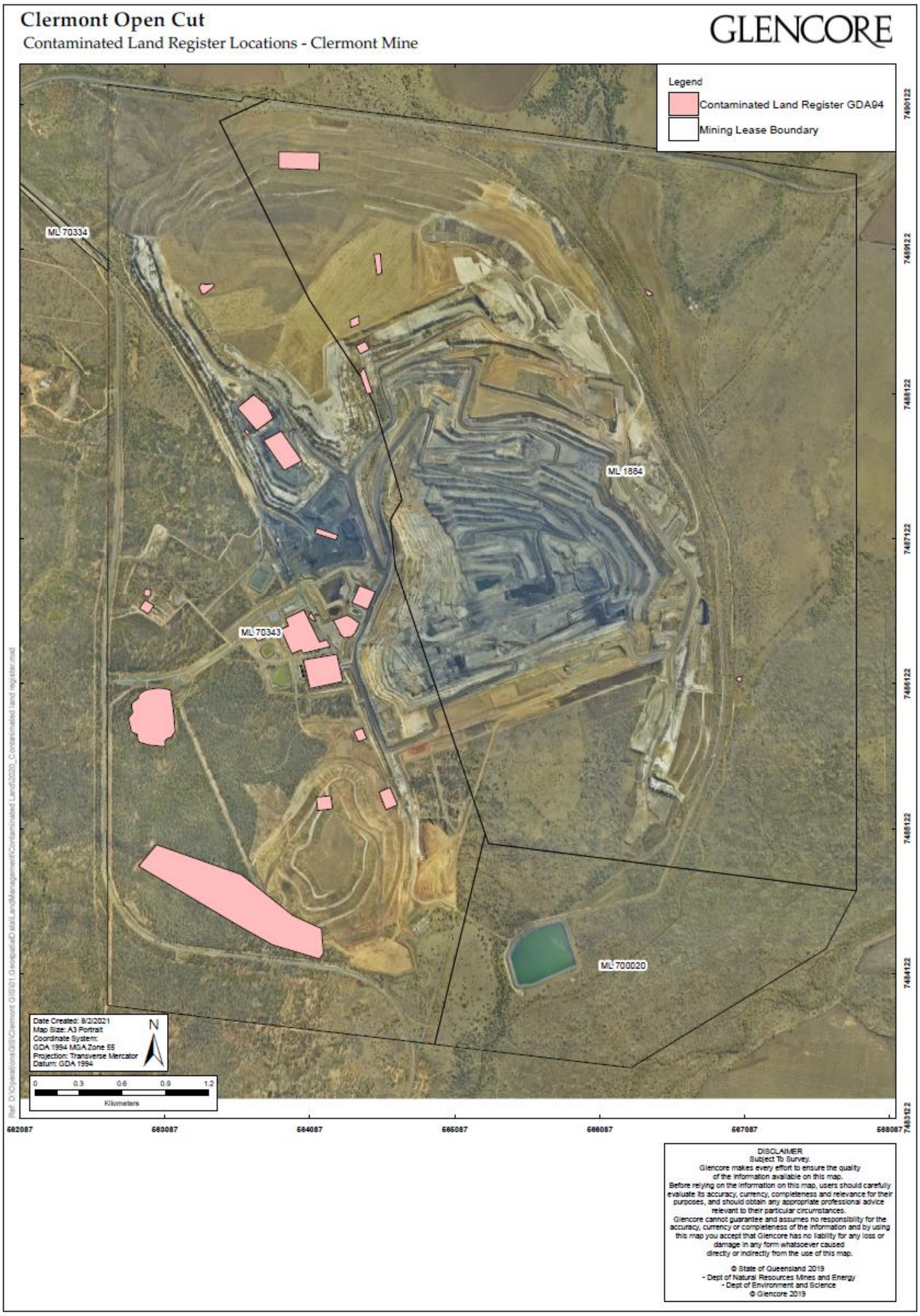
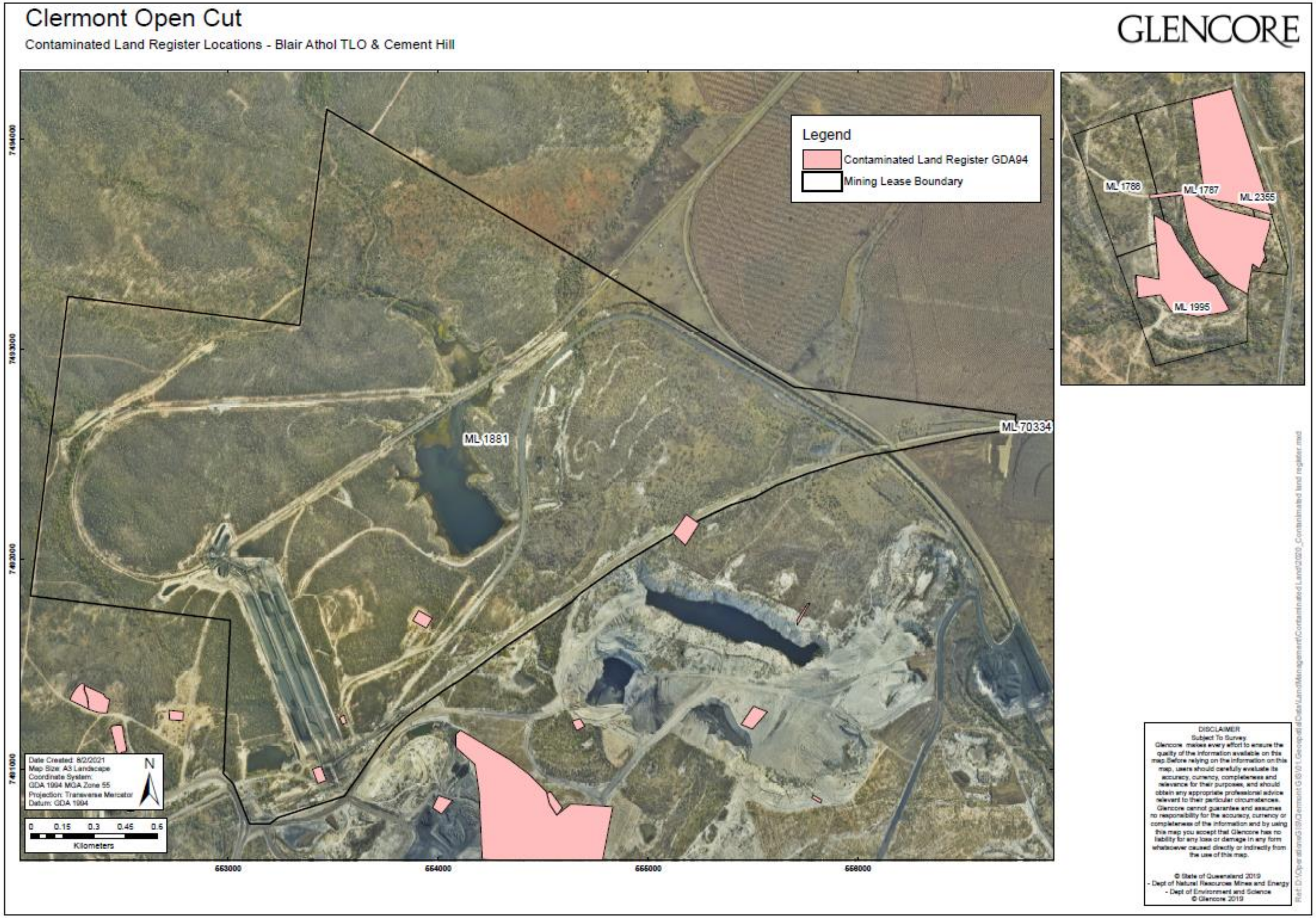
Appendix E - Waste Disposal Plan



Appendix F - Contaminated Land Register




Clermont Open Cut
Contaminated Land Register Locations - Blair Athol TLO & Cement Hill
GLENCORE
Legend
Contaminated Land Register GDA94
Mining Lease Boundary
ML 1881
ML 70334
ML 1788
ML 1787
ML 2355
ML 1995
7494000
7493000
7492000
7491000
653000
654000
655000
656000
Date Created: 8/2/2021
Map Size: A3 Landscape
Coordinate System:
GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994
N
0 0.15 0.3 0.45 0.6
Kilometers
DISCLAIMER
Subject To Survey
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