



CENTENNIAL COAL CLARENCE

REJECT MANAGEMENT STRATEGY

March 2026



TABLE OF CONTENTS

1. EXECUTIVE SUMMARY	1
2. INTRODUCTION	3
2.1 TAILINGS PRODUCTION	3
2.2 REJECT CHARACTERISATION	3
2.3 EXISTING COAL REJECT STORAGE FACILITIES	4
3. REJECT MANAGEMENT OPTIONS.....	6
3.1 REA 3 FCR RECLAIM AND CCR EMPLACEMENT.....	6
3.2 REA 5 CONSTRUCTION AND CCR EMPLACEMENT	8
3.3 ALTERNATIVES TO REJECT EMPLACEMENT	8
3.3.1 Minimising Reject by Optimising Coal Product Processing	9
3.3.2 Emplace CCR Underground at Clarence	9
3.3.3 Beneficial Re-use for Charbon Rehabilitation.....	11
3.3.4 Beneficial Re-use for Clarence Hanson Quarry Rehabilitation	14
3.3.5 Beneficial Re-use for Wallerawang GPM Ash Dam Rehabilitation	15
3.3.6 Beneficial Re-use for Regional Civil Projects	16
4. REJECT MANAGEMENT STRATEGY	16
5. REHABILITATION	18
5.1 MAXIMISING / OPTIMISING PROGRESSIVE REHABILITATION SCHEDULE	18
5.1.1 Rehabilitation Trial.....	18
5.1.2 Maximising / Optimising Performance of Final Landform	20
5.1.3 Rehabilitation Schedule.....	20
5.2 FINAL LANDFORM DESIGN	22
5.2.1 Optimisation of Final Landform.....	22
5.2.2 Short term, long term, and Differential Settlement.....	22
5.2.3 Stability.....	23
5.2.4 Surface Water Erosion and Surface Water Management Structure ...	23
5.2.5 General Risks Associated with Rehabilitation	23
5.2.6 Monitoring, Validation and Remediation.....	23

LIST OF TABLES

Table 1	CCR Geochemical Testing Results	4
Table 2	CCR Geotechnical Testing Results	4
Table 3	CCR Geochemical Property VS EPA Rejects Order 2014.....	16
Table 4	Conservative Reject Management Strategy	17
Table 5	Conservative Reject Management Strategy – Emplacement Schedule for Scenario 1 and 2	17
Table 6	Rehabilitation Material Balance	18
Table 7	Rehabilitation Schedule Option Assessment	21
Table 8	Performance Optimising Schedule	22

LIST OF FIGURES

Figure 1 – Locality Plan.....	3
Figure 2 – REAs Site Layout.....	5
Figure 3 – Approved REAs Life Scenario 1.....	6
Figure 4 – REA 3 West Cell Excavation Stages.....	7
Figure 5 – REA 3 Final Landform Design.....	7
Figure 6 – REA 5 General Layout.....	8
Figure 7 – Charbon Existing Open Cut Areas and MREA Site Layout.....	12
Figure 8 – Rehabilitation Trial on REA 2.....	19
Figure 9 – Rehabilitation Trial on REA 4.....	20

1. EXECUTIVE SUMMARY

This Reject Management Strategy (Strategy) has been developed in accordance with the Clarence Colliery (Clarence) Development Consent (DA 504-00) to satisfy Schedule 3 Condition 24A and 24B. The purpose of this strategy is to

- provide an overview of the current reject emplacement facilities located at Clarence Colliery;
- provide some details as to the geochemistry of the reject material;
- provide details of the future proposed reject emplacement opportunities in the short, medium and long term;
- develop a strategy for the preferred long term reject emplacement facility; and
- comply with Clarence's development consent conditions (set out below).
 - 24A. The Applicant must prepare and implement a long term Reject Management Strategy for the project to the satisfaction of the Planning Secretary. This plan must be:
 - (a) prepared in consultation with DPE Water, EPA and BCS;
 - (b) consider alternatives to reject emplacement, including beneficial re-use and underground disposal; and
 - (c) be submitted to the Planning Secretary for approval by the end of November 2014.
 - 24B. Prior to the commencement of coarse coal reject transfers to Charbon Colliery, the Applicant must revise the Reject Management Strategy to the satisfaction of the Planning Secretary. The revised plan must be prepared in consultation with the EPA and Resources Regulator, and include:
 - (a) a definition and criteria for determining whether coarse coal reject material is geochemically suitable to be used for rehabilitation activities at Charbon Colliery;
 - (b) a process for assessing the geochemical suitability of coarse coal reject prior to transfer to Charbon Colliery; and
 - (c) a process for managing and/or treating coarse coal reject that does not meet the definition and criteria established in accordance with condition 24B(a).

Clarence is an underground coal mining operation which is located in the western coalfields of NSW in the Lithgow Local Government Area (LGA). Clarence washes run of mine coal to produce a low ash product. There are two primary by-products from the beneficiation process which includes a fine coal by-product and a coarse coal reject (CCR) by-product. Contemporary management of the CCR is to emplace the material into above ground emplacement areas known as Reject Emplacement Areas (REA). The fine coal (FCR) component, initially in slurry form, passes through a Belt Filter Press (BFP) to remove the water, producing a solid fine coal "cake" that can be stored on site for future blending into the coal product.

This report provides a Life of Mine (LOM) strategy for coal reject management at Clarence. Clarence has six existing REA's.

- REA 1, 2 and 3 (collectively, considered as REA 3) – fine coal has been partially reclaimed for sale and CCR has been emplaced into REA 3. Reclaim of remaining fine coal will continue to allow for CCR storage.
- REA 4 – rehabilitated, except for an access road leading to REA 5. Rehabilitation trials on REA 4 are in progress.
- REA 5 – consists of two stages. Stage 1 is currently active for CCR emplacement. Stage 2 construction commenced in January 2023.
- REA 6 – Nearing full capacity.

REA 3 is the only facility that contains fine coal material which is currently being reclaimed. REA 3 will be transformed into a coarse material stockpile. All the other REAs are coarse material stockpiles.

Two mine plans have been developed in July 2023 for Clarence LOM until 31 December 2026 based on a 15% ash product as below, quantity may vary depending on final market product and ash specifications:

Scenario 1: 1.6m Contour – 2.6m Development, reject production 1.13MT, LOM 2024 ~ 2026

Scenario 2: 1.6m Contour – 2.1m Development, reject production 0.85MT, LOM 2024 ~ 2026

It is expected that existing approved REAs at Clarence have sufficient capacity to support Clarence LOM until 31 December 2026 for both Scenario 1 and 2. To achieve the required CCR emplacement capacity for Clarence LOM the following strategy is to be adopted:

Fully utilise existing approved CCR emplacement options:

- Fully reclaim (or as much as practical) fine coal material from REA 3 and backfill with CCR; and
- REA 5 Stage 2 construction and CCR emplacement.

The following alternatives and opportunities for improvement, including beneficial re-use options that are discussed in this strategy include:

- Blending CCR with low ash coal and fine coal to market specification;
- Beneficial reuse of CCR for civil construction projects such as rehabilitation of Charbon Colliery and nearby quarries and power station ash dams; and
- Underground disposal of CCR.

2. INTRODUCTION

Clarence is an underground coal mining operation located in the Western Coalfields of New South Wales (NSW). Located within the Lithgow City Council Local Government Area, Clarence is situated approximately 10 kilometres to the east of the city (Figure 1).

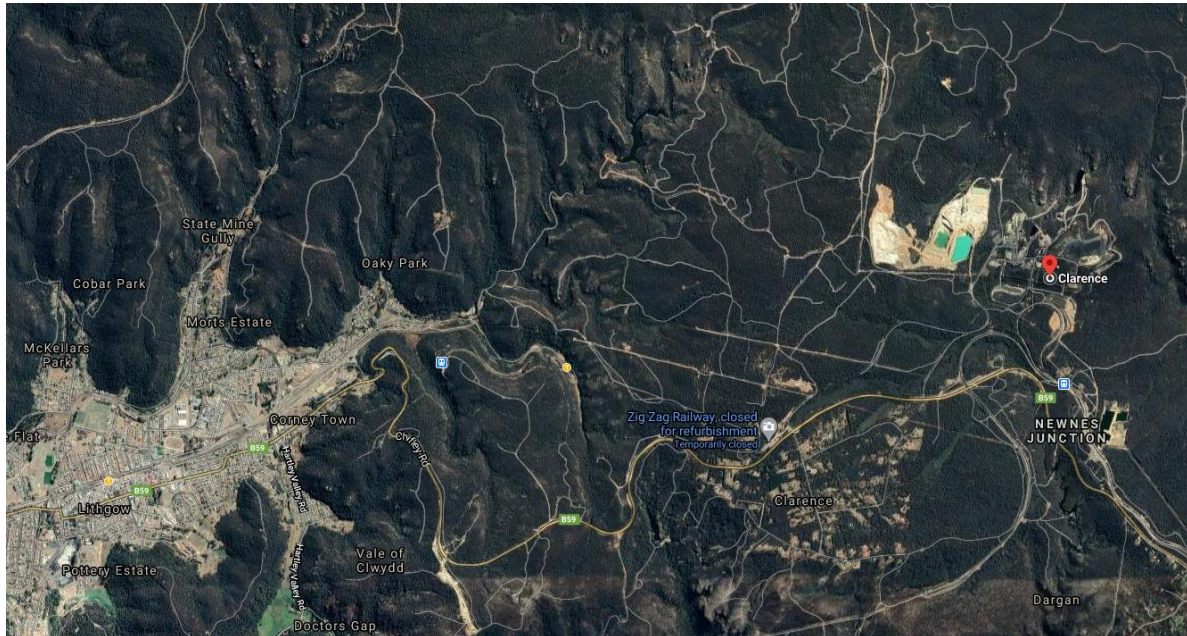


Figure 1 – Locality Plan

Clarence extracts coal from the Katoomba seam using partial extraction methods. Coal is extracted and beneficiated within the on-site Coal Handling and Preparation Plant (CHPP). The majority of processed coal is transferred from the facility by rail to be exported. Clarence also has approval to transport coal to Mount Piper Power Station (MPPS).

2.1 Tailings Production

There are two primary by-products from the CHPP which includes FCR and CCR. Contemporary management of the CCR is to emplace the material into above ground emplacement areas known as REAs. The FCR, initially in slurry form, passes through a Belt Filter Press (BFP) to remove the water, producing a solid fine coal “cake” that can be stored on site for future blending into the coal product (when market specifications allow). Historically, some FCR was pump into a fine coal holding cell (REA 3) in the slurry form until July 2015. However, this operation has stopped due to an overtopping incident and all fine coal material is currently being reclaimed.

2.2 Reject Characterisation

Latest Clarence CCR testing were conducted in 2023, results are shown in Table 1 and 2 below.

Chemicals and other attributes	Clarence Reject Average
Mercury	0.06
Cadmium	0.12
Lead	8.6
Arsenic	4.8

Chemicals and other attributes	Clarence Reject Average
Chromium (total)	42.5
Copper	19.0
Nickel	49.7
Selenium	0.7
Zinc	65.4
Electrical Conductivity (dS/m)	0.016
PH	5.3
Combustible content	20.5%
Sulphur %	0.19%
SponCom (R70 deg C/hour)	<0.25

Table 1 CCR Geochemical Testing Results

Geotechnical Properties	Clarence Reject Average
Particle Size	Sandy GRAVEL
Plasticity Index %	Non Plastic
Maximum Dry Density (t/m ³)	1.57~1.8
Friction Angle (°)	>36
Cohesion (kPa)	>20
California Bearing Ratio (%)	70

Table 2 CCR Geotechnical Testing Results

2.3 Existing Coal Reject Storage Facilities

Clarence has six existing coal reject management facilities, the locations of these REA's is provided in Figure 2.

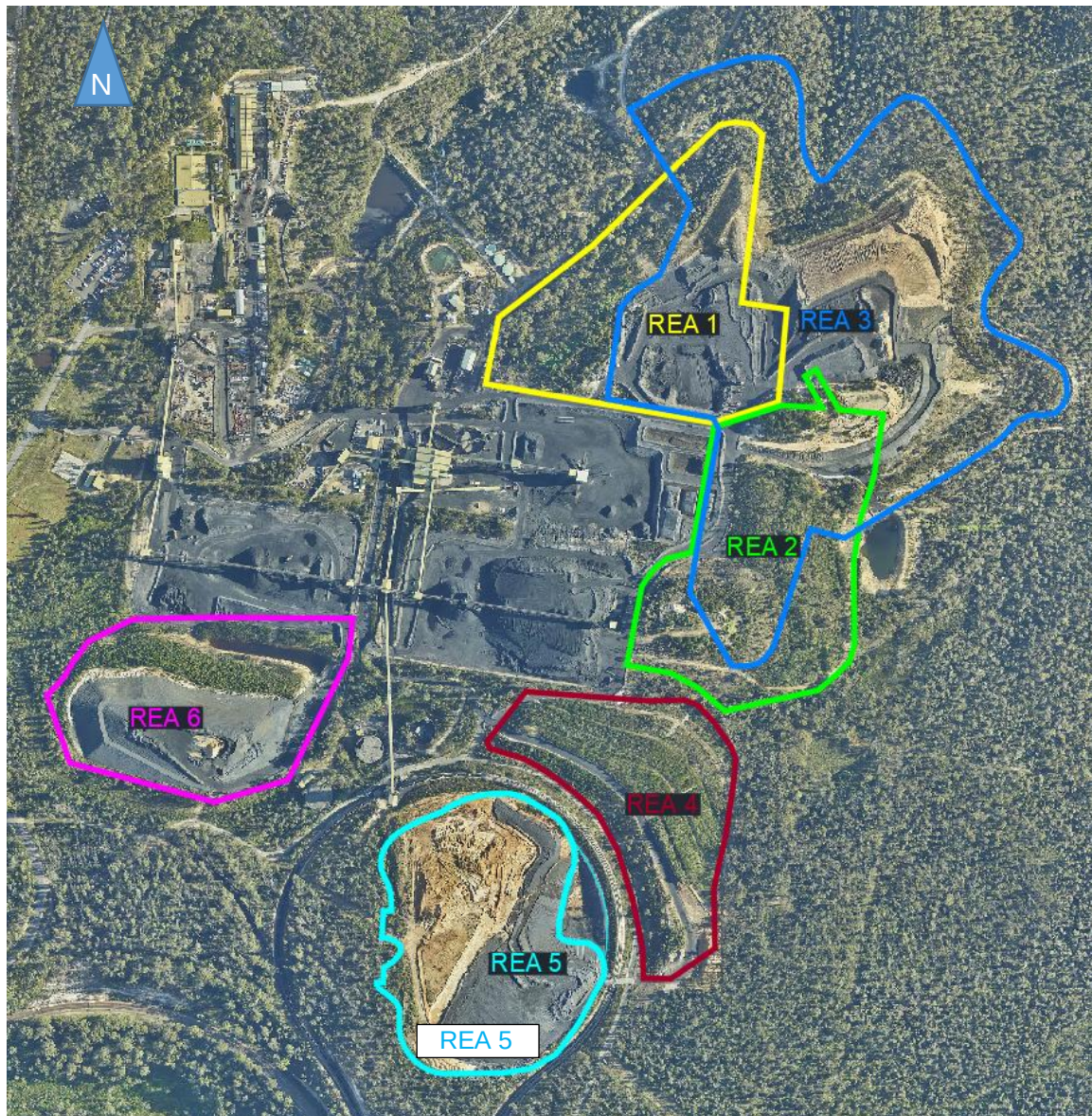


Figure 2 – REAs Site Layout

REA 1, 2 and 3 (collectively, considered as REA 3) – REA 3 Facility. Fine coal has been partially reclaimed for sale and CCR has been emplaced into parts of REA 3 to establish base of final landform. Reclaim of remaining fine coal will continue to allow for further CCR emplacement.

REA 4 – REA 4 is a CCR stockpile, which has been decommissioned and capped at the end of 2014. Rehabilitation of REA 4 are well progressed, while the east section of REA 4 is being utilised to conduct various rehabilitation trials.

An access road was established in 2018 at the top of REA 4 leading to REA 5. This access road is essential for the construction and operation of REA 5.

REA 5 – REA 5 is a CCR stockpile that consists of two stages. Stage 1 is currently active for CCR emplacement. Stage 2 construction commenced in 2023.

REA 6 – REA 6 is a CCR stockpile and is nearing full capacity.

3. REJECT MANAGEMENT OPTIONS

Two mine plans have been developed in July 2023 for Clarence LOM as below:

Scenario 1: 1.6m Contour – 2.6m Development, reject production 1.13MT, LOM 2024 ~ 2026

Scenario 2: 1.6m Contour – 2.1m Development, reject production 0.85MT, LOM 2024 ~ 2026

FCR will also be produced but does not require permanent storage. The FCR will be processed through the BFP to allow blending into the coal product for sale.

The following approved operations forms part of the reject disposal strategy to support Clarence LOM until 31 Dec 2026:

- REA 3 FCR reclaim and CCR emplacement.
- REA 5 Construction and CCR emplacement.

Figure 3 below shows the combined life of REA 3 and REA 5.

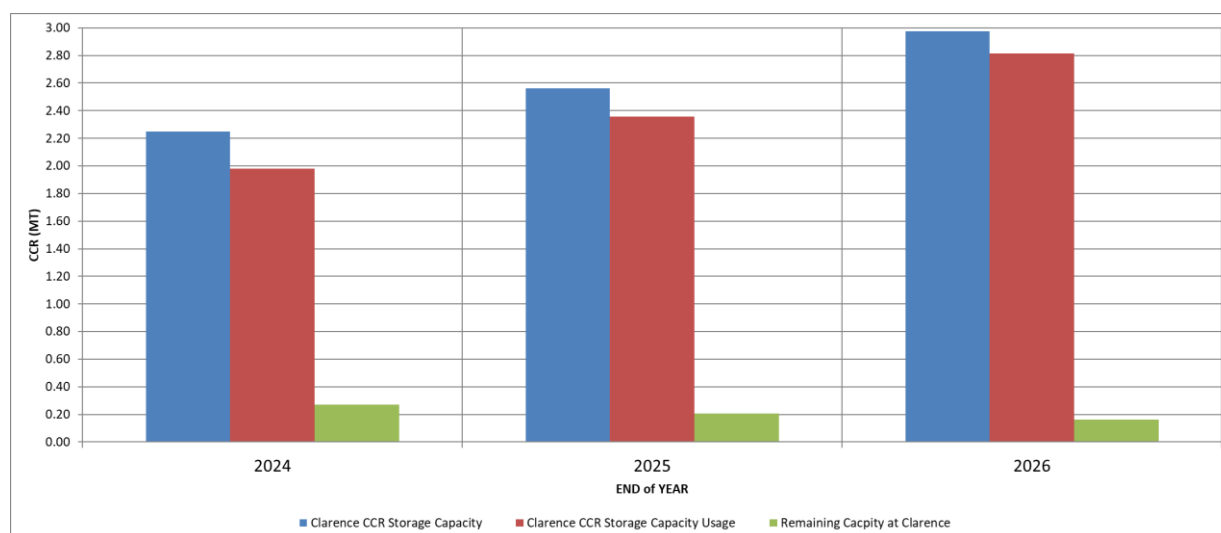


Figure 3 – Approved REAs Life Scenario 1

3.1 REA 3 FCR Reclaim and CCR Emplacement

The design and operation of REA 3 FCR reclaim and CCR emplacement has been detailed in the High Risk Activity (HRA) notification to the Resource Regulator (APP182725 – Reject Emplacement Area 3, Version 1, September 2018). It involves the following key aspects outlined below.

Rehabilitation Trials - The rehabilitation trial areas are located at REA 2 and REA 4. Continuous ecological monitoring and erosion monitoring will be undertaken.

Reclaim of FCR material - The FCR is being extracted on a campaign basis. FCR from the Northeast Cell (approximately 130,000m³) has been fully extracted and successfully blended and sold as product. Extraction of FCR from the West Cell (approximately 150,000m³) is currently underway. Excavated material from REA 3 is transported to the Fine Coal stockpile located on the washed stockpile area. Presently, it is anticipated that Clarence will be able to

sell in the order of 10,000t of FCR per month (subject to market demand). All the FCR from REA 3 is expected to be reclaimed and sold by the end of 2025.

Coarse Coal Reject Emplacement – After the FCR being reclaimed from the REA 3, approximately 420,000m³ of storage capacity will be created for CCR. At a compaction rate of 1.7t/m³, up to 0.71 MT will be emplaced to achieve the proposed final landform.

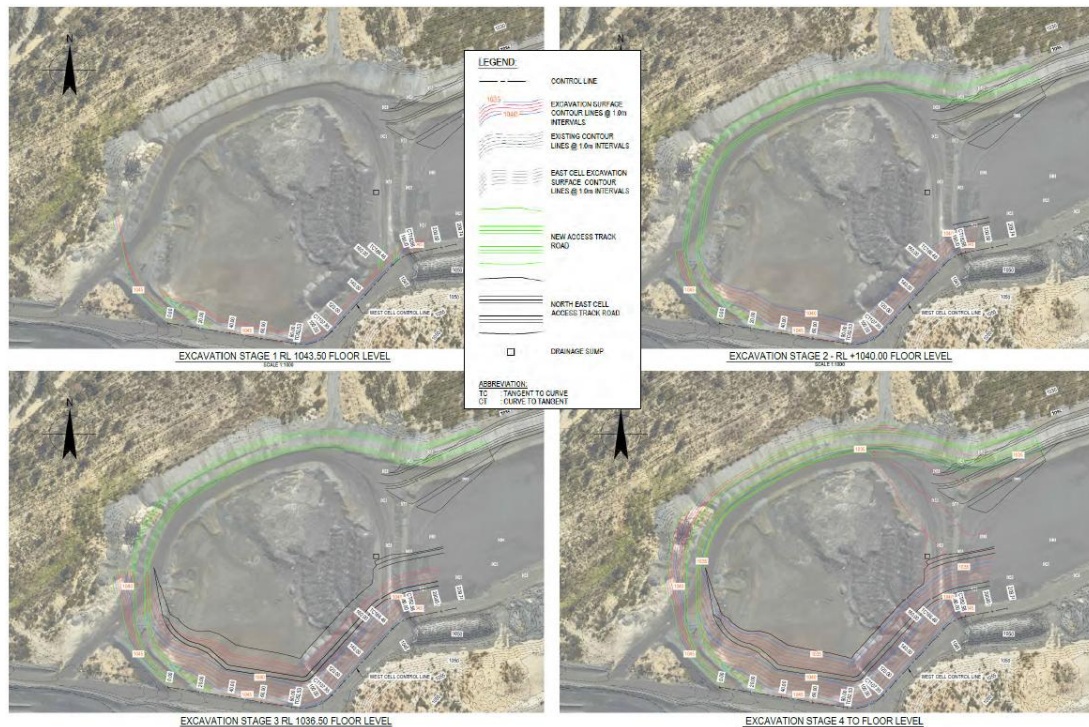


Figure 4 – REA 3 West Cell Excavation Stages

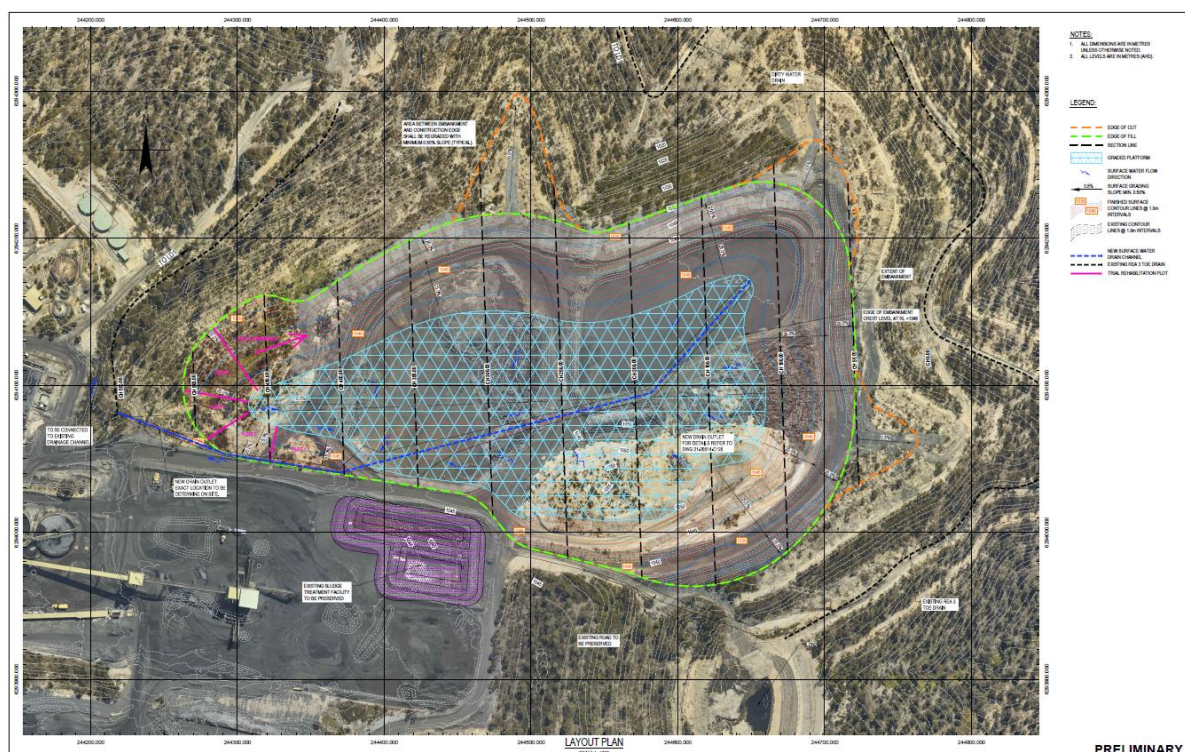


Figure 5 – REA 3 Final Landform Design

3.2 REA 5 Construction and CCR emplacement

The design and operation of REA 5 is detailed in the HRA notification to the Resources Regulator (APP133811 – Reject Emplacement Area 5, Version 1, July 2016).

The REA 5 will be raised in four 8m lifts to reach a maximum level of RL 1094 m, creating a stockpile height of 32m. It will ultimately provide storage capacity for approximately 815,000 tonnes of CCR.

REA 5 will be constructed and operated in two stages. The first stage of construction and operations consists of the first two lifts (Stage 1). Stage 1 is designed to provide 196,795m³ of capacity (approximately 315,000t). The second stage consists of the third and fourth lifts (Stage 2) designed to provide 309,443m³ of capacity (approximately 500,000t).

Currently REA 5 Stage 1 construction and emplacement has been completed, and emplacement into REA 5 Stage 2 has commenced. CCR is emplaced by end dumping from trucks and compacted through traffic of bulldozers and trucks.

Remaining capacity of REA 5 is approximately 0.41 MT.

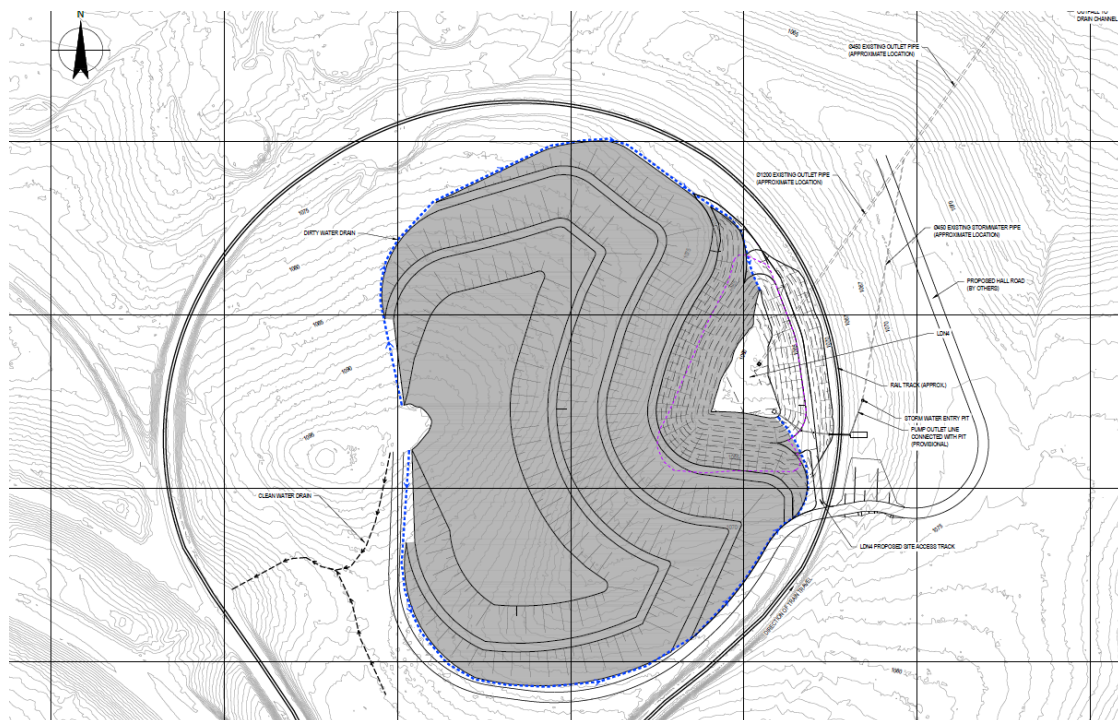


Figure 6 – REA 5 General Layout

3.3 Alternatives to Reject Emplacement

To minimise environmental impact, alternatives options for reject management have been considered and listed below:

- Minimising reject by optimising coal product processing.
- Emplace CCR underground at Clarence.
- Beneficial Re-use for Charbon Rehabilitation.

- Beneficial Re-use for Clarence Hanson Quarry Rehabilitation.
- Beneficial Re-use for Wallerawang Generator Property Management (GPM) Ash Dam Rehabilitation.
- Beneficial Re-use for Regional Civil Projects.

3.3.1 Minimising Reject by Optimising Coal Product Processing

CCR from Clarence can be blended with low ash fine coal material reclaimed from REA 3, BFP cake or coal product to meet the market specification.

The blended product can be sent by train for export and by truck for domestic use.

The feasibility of this option is highly dependent on market condition and limited by DA 504-00 trucking restrictions. It is estimated this strategy could eliminate from 0.2 MT to over 0.5MT of CCR by end of 2026.

3.3.2 Emplace CCR Underground at Clarence

Underground disposal of fine rejects materials has previously been undertaken at Northern Coal Services (NCS) (Newstan Washery at that time). Fine coal rejects materials were pumped, via surface pipelines to underground workings through a number of boreholes, into disused and abandoned coal workings. This process proved to be a cost effective method of rejects disposal however, it was suspended in 2008 when fine rejects materials started to discharge from surface openings as the underground voids were progressively filled. This discharge of fines materials led to compliance and potential pollution issues.

The uncontrolled discharge of fines material resulted in the suspension of all underground emplacement of fine coal rejects material at NCS. The main contributing factors to this event were:

- Inability to inspect voids prior to pumping activities;
- Unknown condition of abandoned mining voids,
- Poor understanding of standing water levels in abandoned mining voids;
- Inability to accurately predict the capacity of the mining void; and
- Unpredictable dispersion characteristics of coal fines rejects after discharge from borehole.

A trial into the underground disposal was conducted at Western Coal services in the mid 1990's, however the project was abandoned due to technical difficulties with blocked boreholes and high process water requirements.

A study into the potential emplacement of coal fines into underground voids at Airly was conducted in April 2014. The study was conducted by GHD on behalf of Centennial Airly. The study affirmed that the technical risks associated with the underground emplacement of coal washery fines presented unacceptably high risks to the project in the current operating circumstances.

Metropolitan Mine carried out a trial of pumping a reject paste to areas of disused void. The trial and subsequent underground emplacement targeted specific areas at Metropolitan Colliery including:

- abandoned mine roadways accessible by mine personnel;
- abandoned mine roadways inaccessible to mine personnel but accessible by fill depending on flow characteristics;
- limited access to previously extracted areas; and
- future mine developments.

These investigations confirmed that underground emplacement was technically possible on a small scale, however the costs were significantly higher than traditional emplacement methodologies.

Whilst the operating cost can be three to four times more than typical surface emplacement, underground emplacement of reject material may be viable in some situations. Backfilling of mine workings might seem to be an obvious solution to mine waste management, however it is a relatively complex endeavour and operations require detailed multi-disciplinary engineering solutions to develop site specific processes and methods, compared to more common practices of disposal of mine wastes on surface.

There are some challenges associated with underground emplacement of rejects including but not limited to the following:

- Challenges arising from the actual proportions between the fine and coarse reject waste streams compared with the optimal proportions. The ideal ratio for achieving a good mixture of coarse reject to dewatered tailings on a dry mass basis is about 3.3:1 (for a coarse to fine split at 2 mm, and assuming spherical particles). Too low a coarse: fine ratio may require underground bulkheads to contain the excess tailings. Too high a coarse: fine ratio may result in excessive wear and pumping costs;
- Requirement for flocculants and/or other additives;
- Delivering the rejects materials to underground, via pipelines, requires boreholes to the underground workings, and moving the discharge point to effectively fill the underground voids;
- The requirement to move the discharge point will require that areas are inspected and ventilated;
- Potential risk to the ongoing underground operations from flooding and inundation;
- Potential Acid Metalliferous Drainage (AMD) from the material pumped underground;
- Potential for liquefaction of excess fines;
- Potential groundwater impact from the seepage of excess process water;
- High maintenance input required to maintain pump and pipeline;
- Considerable energy required to pump rejects materials to underground voids and return the water recovered to the plant for reuse; and
- Possible emergence of seepage and fines on the surface generated from disposal in shallow mining voids.

To enable this option would require the construction of infrastructure to manage the fines materials and to pump to the discharge points. This infrastructure includes:

- mixing Plant (including a mixing tank);
- centrifugal slurry pumps and pipelines to discharge the slurry from CHPP into the underground voids;
- the construction of underground bulkheads;
- the ability to ventilate and inspect previously abandoned areas of the mine;
- work force and supporting ancillary services;
- inspection programs to make sure emplaced rejects do not impact on the existing underground water management system of free drainage to sumps and pumps (which is currently the case at Clarence);
- surface pipeline with discharge borehole or, underground pipework that would need to traverse long distances to “non goafed” areas; and
- water management infrastructure, including sumps and transfer pumps and pipelines within the reject emplacement working area.

The pumping of reject material underground is not considered viable at this time due to local geological conditions, groundwater management (wet or flooded conditions underground), the economic environment, the rate of reject production, and unknown possible environmental impacts.

3.3.3 Beneficial Re-use for Charbon Rehabilitation

Charbon consists of large open cut pits that are currently being rehabilitated, large quantity of earthen fill is required to fill the void space to achieve a long term stable final landform. A potential option has been developed to utilise the void space in the open cut for CCR emplacement from Clarence.

Several potential areas are identified for Clarence CCR emplacement. Those areas are listed below.

- 2 and 3 Trunk, and MREA Area – Maximum capacity approximately 0.3 Mt

The CCR may be shipped to Charbon is approximately 0.3 Mt.

CCR can be loaded onto trains at Clarence and railed to Charbon for unloading and then to be transported to above mentioned area for emplacement.

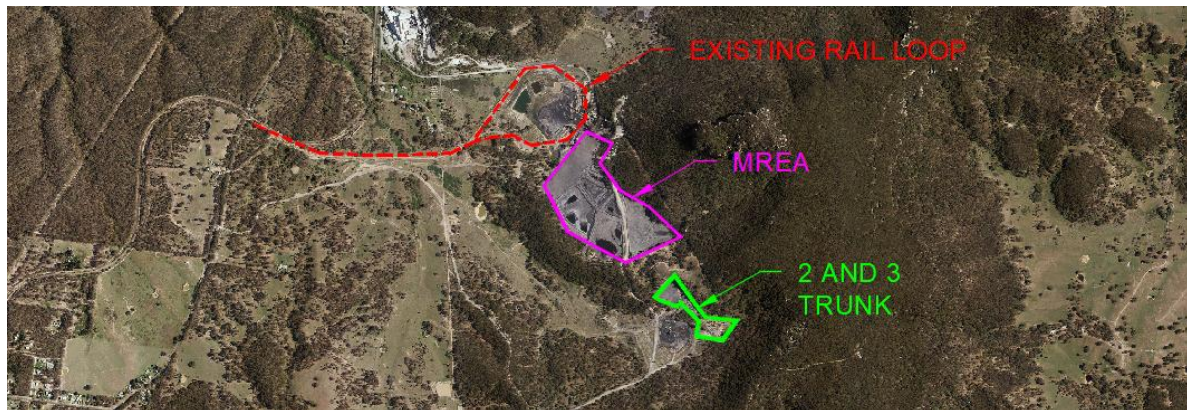


Figure 7 – Charbon Existing Open Cut Areas and MREA Site Layout

The following definition and criteria are to be used to determine whether CCR material is geochemically suitable

Definition:

CCR refers to the heavier materials, predominantly stones, shale and other non-coal substances, which are separated from coal during the coal mining or processing operations based on their weight and size.

CCR is removed from coal through gravity-based separation processes and screening at Clarence Coal Handling and Preparation Plant. CCR is then transferred to a storage bin and loaded onto trucks for transport to REAs or stockpiles.

Criteria:

The CCR shall generally comply with “Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, The coal washery rejects order 2014” by the EPA.

However, a special condition is to be made for the PH and Nickel level, the minimum is to be adjusted to a PH value of 4, and Nickel level maximum average to be 55.

Geochemical suitability assessing process prior to transfer to Charbon:

a) Sampling:

The objective of the sampling plan is to collect representative samples of CCR produced by Clarence for geochemical analysis to assess its suitability for transfer to Charbon Colliery in compliance with regulatory requirements.

Sample of CCR is to be collected from the following key areas:

- Coarse coal reject storage bin.
- Reject Emplacement Area 3, 5, and 6

Sampling will include the collection of 5 composite samples from the Clarence reject bin during continuous reject production process every year. In addition, routine sampling will also include collection of either 5 composite samples from every 10,000 tonnes processed or 5 composite samples every 6 months (whichever is the lesser).

Collection of 10 composite samples from every 4,000 tonnes of existing CCR from each REA.

Additional sampling can be collected if the above sampling does not reach 20 composite samples during 2-year period.

Sampling is to be taken by an external analytical laboratories accredited by the National Association of Testing Authorities (NATA), or equivalent. Follow standardized sampling protocols to minimize sampling bias and ensure sample integrity.

Samples are to be collected using clean sampling equipment to prevent contamination. Five sub-samples are to be taken from each sampling location to account for variability within the coal rejects. Label each sample with a unique identifier, including sampling location, date, and any relevant descriptive information. Record sampling conditions, such as temperature, humidity, and weather conditions, to provide context for data interpretation.

Handle samples with care to prevent physical degradation or alteration of geochemical properties. Store samples in clean, sealed containers to minimize contamination and preserve sample integrity during transport to the laboratory.

The external analytical laboratories shall provide evidence of implemented QA/QC measures to ensure the reliability and accuracy of sample data. Maintain detailed records of all sampling activities, including sample collection, handling, and storage.

The external analytical laboratories shall prepare a sampling report summarizing sampling locations, methods, and results, including any deviations from the sampling plan and associated corrective actions.

Periodically review and revise the sampling plan based on feedback from stakeholders, changes in operational practices, and emerging regulatory requirements.

Continuously monitor and improve sampling procedures to optimize data quality and regulatory compliance.

By following this sample plan, Clarence can systematically collect representative samples of CCR for geochemical analysis, ensuring the accuracy and reliability of assessment results for decision-making purposes.

b) Testing:

Testing of the samples is to be undertaken by analytical laboratories accredited by the National Association of Testing Authorities (NATA), or equivalent.

Tests to be conducted shall comply with "Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, The coal washery rejects order 2014" by EPA.

On or before each transfer, Clarence will provide the following to Charbon Colliery with a written statement of compliance certifying that all the requirements set out in Section 3.3.3 has been met.

Process for managing and/or treating coarse coal reject that does not meet the definition and criteria:

Reject material not meeting the definition and criteria above shall be transported to an isolated area within an REA to be permanently stored away from suitable reject material.

Resampling and testing shall be conducted until the definition and criteria are met prior to recommencing the transfer.

3.3.4 Beneficial Re-use for Clarence Hanson Quarry Rehabilitation

The Hanson Quarry is located less than 1 km from the Clarence mine. Whilst Hanson is an operational sand quarry, it extracts resource from discrete cells within its approved area. Clarence has been in discussions with Hanson since 2012 and it is understood, that Hanson's Quarry will have available capacity for reject emplacement by 2017. Hanson's report that by 2017, approximately 1,000,000 m³ of capacity would be open void space available for reject emplacement in an initial "cell". At a current compaction rate of 1.7 t/m³, approximately 1.7 Mt of capacity could potentially be available initially.

Furthermore, there are old workings underneath the Hanson Quarry which provides the opportunity to direct dirty water directly underground as opposed to transferring leachate water back to Clarence via a surface pipeline. To this end, Clarence has considered two options of transporting reject material from Clarence including a trucking option and a conveying option.

Trucking of Reject Material

Clarence has considered the trucking of reject material from the Clarence Mine to the Hanson Quarry. The activities would require the following:

- the campaign trucking of 30 tonne sized trucks;
- operating on one 8 hour shift per day, 11 months of the year;
- dual lane haul road;
- water management infrastructure including borehole for leachate water drainage into the Clarence underground; and
- a formal crossing at the Clarence Entrance road and a formal crossing at the Hanson Entrance road. This may take the form of stop signs, boom gates and traffic lights or overpasses.

Conveying of Reject Material

Clarence has also considered the conveying of reject material from the Clarence Mine to the Hanson Quarry. The activities would require the following:

- low profile enclosed conveyor, transfers with access road overpasses;
- engage contractors to push out reject material every 2 days for 2 – 3 hours;
- light vehicle access road alongside the conveyor route; and
- water management infrastructure including surge dam and borehole for leachate water drainage into the Clarence underground.

Trucking versus Conveyor

The risks associated with utilising a haul road and a conveyor system were considered in a Risk Assessment which is discussed in Section 5. It is noted that the haul road would cross the

primary access for Hanson along which they dispatch sand product between the hours of 4am – 12 midnight.

Agreement with Hanson Quarry

Clarence Colliery has been continuing negotiation with Hanson Quarry since 2012 and briefed the new management of Hanson Quarry again in 2023. However, no formal agreement or timeline has been confirmed.

Therefore Clarence is currently not relying on this option to manage reject material.

3.3.5 Beneficial Re-use for Wallerawang GPM Ash Dam Rehabilitation

Generator Property Management Pty Ltd (GPM) is the owner of the Ash Storage Dams and stockpiles in Kerosene Vale at Lidsdale comprising of an area approximately 528 Hectares (ha) that was part of the now-closed Wallerawang Power Station. GPM's current key focus is planning for and undertaking the rehabilitation and closure of the Kerosene Vale Ash Repository (KVAR) and the Sawyers Swamp Creek Ash Dam.

In order to rehabilitate the Sawyers Swamp Creek Ash Dam a large amount of fill material will be required to achieve the final landform. Given the quantity of material this fill material may need to be sourced from a variety of locations including other construction projects i.e. tunnelling projects in Sydney.

Clarence CCR material presents as a robust opportunity as a fill material supplier to GPM, as the Clarence CCR is geotechnically stable, is suitable as road and ash dam fill, the CCR is available in appropriate quantities and has existing transportation opportunities to the GPM sites either via road or rail. It is estimated that over 3million tonnes (MT) of VENM or ENM can be replaced by CCR within the final landform capping system at Sawyers Swamp Creek Ash Dam.

The CCR fill will improve the final landform shape of the ash dam, acting as the general fill without compromising the minimum thickness of the required VENM capping layer. The CCR material has a much more stable geochemical property comparing to the material contained within the ash dam and is not expected to introduce any additional risk to the ash dam.

Geochemical property testing of the Clarence CCR has been conducted in 2023. Samples were collected from REA 3, REA 5 and directly from CHPP. The testing results generally meets the conditions, except for PH and Nickel, as per "Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, The coal washery rejects order 2014" by EPA. Test results are shown below.

Chemicals and other attributes	Maximum average concentration for characterisation (mg/kg 'dry weight' unless otherwise specified)	Maximum average concentration for routine testing (mg/kg 'dry weight' unless otherwise specified)	Absolute maximum concentration (mg/kg 'dry weight' unless otherwise specified)	Clarence Reject Average
1. Mercury	0.5	Not required	1	0.06
2. Cadmium	0.5	Not required	1	0.12
3. Lead	50	50	100	8.6
4. Arsenic	10	Not required	20	4.8
5. Chromium (total)	75	75	150	42.5
6. Copper	50	50	100	19.0
7. Nickel	40	40	80	49.7
8. Selenium	2	Not required	5	0.7
9. Zinc	100	100	200	65.4
10. Electrical Conductivity (dS/m)	1	1	2	0.016
11. pH*	8 to 11	Not required	7 to 12	5.3
12. Combustible content	30%	30%	40%	20.5%
13. Sulphur %	0.50%	0.50%	1%	0.19%

Table 3 CCR Geochemical Property VS EPA Rejects Order 2014

Centennial is currently in discussions with GPM to understand and better define this potential opportunity.

This option would constitute a minor change to the development consent, Rehabilitation Management Plan and Clarence Landform so further design and approval would be required.

3.3.6 Beneficial Re-use for Regional Civil Projects

Clarence Colliery has conducted geotechnical and geochemical testing of the CCR to validate the material is competent and suitable for use in civil projects such as road base construction. Clarence Colliery is actively seeking partnership with civil construction contractors such as John Holland to progress this option.

4. Reject Management Strategy

The above mentioned reject management options are summarised in table 4 below. The total capacity of all the potential options is over 4.6 MT, which would satisfy the required CCR storage capacity 1.13 MT for Clarence LOM.

Table 5 present a conservative strategy to meet the required reject storage capacity for Clarence LOM. The strategy assumes most restricted market condition for the waste to product option. It also prioritised storing CCR on site at Clarence within approved REAs. Improvement opportunities such as beneficial reuse for rehabilitation and regional civil projects have a lower priority due to uncertainties of approval, financial agreement and schedule.

The options available to Clarence have been prioritised based on certainty. Should negotiations with GPM and/or other third party regarding beneficial re-use be successful and approvals to support beneficial re-use options are procured, CCR placement priorities will be reassessed.

Reject Management Option	Capacity (MT)	Priority / Assumption
Blending CCR With Low Ash Coal and Fine Coal	• 0.2	• Priority 1 / assuming worst market condition
Existing REA 3 and REA 5	• 1.12	• Priority 2 / assuming all fine coal reclaimed from REA 3
GPM Ash Dam Rehabilitation	• 3.0	• Priority 3 (may become Priority 2 depending on approval and cost)
Charbon Colliery Rehabilitation	• 0.3	• Priority 4
Regional Civil Projects	• TBC	• TBC
• Total Capacity = 4.6 MT > 1.13 MT		

Table 4 Conservative Reject Management Strategy

Clarence Reject Management Emplacement Schedule 1.6m Contour - 2.6m Dev	24	25	26
Blending CCR With Low Ash Coal and Fine Coal	0.06	0.06	0.02
Existing REA 3 and REA 5 (1.12Mt)	0.24	0.32	0.44
GPM Ash Dam Rehabilitation			
Charbon Colliery Rehabilitation			
Regional Civil Projects			
Clarence Reject Management Emplacement Schedule 1.6m Contour - 2.1m Dev	24	25	26
Blending CCR With Low Ash Coal and Fine Coal	0.06	0.06	0.02
Existing REA 3 and REA 5 (1.12Mt)	0.19	0.20	0.32
GPM Ash Dam Rehabilitation			
Charbon Colliery Rehabilitation			
Regional Civil Projects			

Legend: 0.15 Active CCR Emplacement 0.15 Mt
 Opportunity to improve

Table 5 Conservative Reject Management Strategy – Emplacement Schedule for Scenario 1 and 2

5. Rehabilitation

Rehabilitation consideration of the REAs has been detailed in HRA notification (APP182725 – Reject Emplacement Area 3, Version 1, September 2018). Adjustments has been made as discussed below.

The rehabilitation plan is based on the Conservative Reject Management Strategy as presented in Table 2. If any of the improvement opportunity becomes feasible, the rehabilitation plan will be optimised to suit, result in a lower and flatter final landform.

It is expected that about 215,000 m³ of inert material are available from existing stockpiles on site and from floor excavation of REA 5. This amount will be sufficient to provide 0.8m to 1.0m thick inert capping over remaining unrehabilitated surface of all REAs. A detailed material balance is shown in Table 6 below.

Area	INERT COVER THICKNESS & Required Volume (m/m ³)	Source of Material & Material Balance
REA 3	0.8m / 95,000 m ³	Existing Stockpile on REA 3 (70,000 m ³) REA 5 excavation 3m depth profile (145,000 m ³) REA 5 Benched excavation (52,000 m ³) Borrow Area – ROM (Run of Mine) Stockpile Pad (11,000 m ³ ~ 60,000 m ³)
REA 5	0.8m / 57,000 m ³	
REA 6	0.8m / 46,000 m ³	
Total	214,000 m ³	Approx 278,000 m ³

Table 6 Rehabilitation Material Balance

5.1 Maximising / Optimising Progressive Rehabilitation Schedule

Assessment for maximising / optimising progressive rehabilitation schedule has been conducted to ensure optimised outcome of rehabilitation of REA taking into consideration of safety, schedule, long-term performance, and opportunity for reclaim FCR from REA and blend with coal to turn into a product.

5.1.1 Rehabilitation Trial

Progressive rehabilitation has been conducted at Clarence, including partial rehabilitation of REA 3, REA 4, and REA 6. Additional rehabilitation trials as detailed in HRA notification on REA 2 (Part of REA 3) and REA 4 are also in progress. The general layout of the rehabilitation trial is shown in Figure 8 and 9 below.



Figure 8 – Rehabilitation Trial on REA 2



Figure 9 – Rehabilitation Trial on REA 4

5.1.2 Maximising / Optimising Performance of Final Landform

To maximise and optimise the long-term performance of the rehabilitation, it would be ideal to eliminate the fine coal in REA 3. This would reduce risks associated with fine coal especially settlement and long-term stability.

The excavated fine coal will be used to blend with CCR and coal product to turn waste into product and the void will be used to emplace CCR. This would increase the CCR storage capacity.

5.1.3 Rehabilitation Schedule

The rehabilitation schedule is highly dependent on the LOM reject emplacement plan, especially the FCR reclaim operation at REA 3.

To maximise the short-term schedule, it is possible to progressively rehabilitate REA 3, REA 6, and REA 5. However, the outcome of maximised short-term schedule would prematurely end Clarence mining operation around 2025 due to shortage of CCR storage capacity.

It will also prevent the elimination of the fine coal holding cell in REA 3. Compromising the most efficient option to control the risk associated with fine coal holding cell.

Considering above, the preferred approach is to allow all the FCR be reclaimed from REA 3.

An assessment of a fast-tracked schedule and performance optimising schedules is shown in Table 7 below.

Option	Fast Tracked Schedule	Performance Optimising Schedule
Rehabilitation Schedule	- Enable capping of REA 3, 6 and 5	- Longer schedule to allow reclaiming of FCR, but allow reduced reject production via product blending, schedule affected by market condition
Long term Settlement / Stability	- Increased settlement period and magnitude at REA 3, although limited - Long term stability risk associated with fine coal holding cell not eliminated	- Eliminate settlement risk as FCR are removed - Eliminate long term stability risk associated with fine coal holding cell
Short term and differential settlement	- Manageable risk during construction	- Manageable risk during construction
Consolidation	- no consolidation issues - FCR already over-consolidated, - CCR is compacted	- No consolidation issues
Storage Capacity	- Reduced total capacity to store CCR - Introduce need to establish additional REA	- Maximising capacity of REA 3, REA 5, REA 6
Operation	- Not value adding - Mine Closure prior to end 2026	- Support LOM to end 2026 and potentially enable mine life extension - Value adding (waste to product)

Table 7 Rehabilitation Schedule Option Assessment

Considering above, the fast-tracked schedule is not preferred due to limit benefit in risk control and significantly shortened mine life. The performance optimising schedules are to be adopted. Table 8 below shows the schedule and key activities for Performance Optimising Schedule.

Clarence Rehabilitation Schedule	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
REA 1,2,3 Existing Rehab Area (14.5 ha)																	
REA 2 Existing Rehab Area (1.2 ha)																	
REA 2 Top Area (0.5 ha)																	
REA 3 Batter Correction Area (3.6 ha)																	
REA 3 Top Area (5.1 ha)																	
REA 4 Existing Rehab Area (3.7 ha)																	
REA 4 Existing Rehab Area - South (0.5 ha)																	
REA 5 (6.1 ha)																	
REA 5 Leachate Dam 4 (0.5 ha)																	
REA 5 Haul Road on REA 4 (0.8 ha)																	
REA 6 Existing Rehab Area (0.9 ha)																	
REA 6 Remining Area including Proposed Extension Area (3+1.9 ha)																	
REA 6 Leachate Dam 3 (0.4 ha)																	
Pit Top Area (excluding dams) (22.0ha)																	
Leachate Dam 1 (0.3 ha)																	
Leachate Dam 2 (0.6 ha)																	
Polishing Lagoon (1.0 ha)																	
Main Dam (1.7 ha)																	
Demolish, clearing and grubbing																	
Compacted Zone B capping over CCR																	
Growth media Zone A1/A2 over Zone B																	
Seeding																	
Vegetation Establishment																	
E - Monitoring and Maintenance																	

Table 8 Performance Optimising Schedule

5.2 Final Landform Design

A final landform design of Clarence including the REAs has been included into Section 5.0 of the Rehabilitation Management Plan of Large Mines, Clarence Colliery, 29 November 2023. If any of the improvement opportunity becomes feasible, the final landform will be optimised to suit, result in a lower and flatter final landform.

5.2.1 Optimisation of Final Landform

As discussed in Section 4.1, to optimise the performance of final landform, it would be best to eliminate the fine coal holding cell in REA 3 and in the process eliminate most of the risks a fine coal holding cell could pose to the final landform.

5.2.2 Short term, long term, and Differential Settlement

As the REAs at Clarence are compacted CCR stockpiles, the risk associated with tailings settlement does not apply.

Exceptions being REA 3, where a fine coal holding cell exists. Although the preferred plan is to reclaim all the FCR from REA 3 and eliminate the fine coal holding cell, engineering assessment has been conducted based on worst case scenario where the fine coal holding cell remains and no FCR being reclaimed. The design has been detailed in Appendix 3 of HRA notification (APP182725 – Reject Emplacement Area 3, Version 1, September 2018). It is concluded that the FCR within REA 3 is inferred to be over-consolidated by air-drying, resulting in an unsaturated firm to stiff solid deposit as demonstrated in the REA 3. Expected settlement is ranging from 50mm to 150mm.

If the fine coal holding cell is eliminated as per plan, there will be no settlement risks.

5.2.3 Stability

The stability of REAs comprises of compacted CCR stockpiles has been designed to be long term stable. The long-term stability for rehabilitated REA 3 will be improved if the fine coal holding cell is eliminated. The risks associated with tailings liquefaction will also be eliminated.

5.2.4 Surface Water Erosion and Surface Water Management Structure

CCR media is the construction material for shaping the landform beneath the soil capping/plant growth media zone. This material, if exposed, is stable under moderately erosive conditions other than for concentrated flows. It will be used to provide a base for the soil capping/plant-growth media zone.

The existing final landform has been designed to be free draining incorporating drainage channels, drop structures and spillways where applicable in accordance with Blue Book requirements.

It is to be noted that if the FCR is eliminated from REA 3, the spillway design criteria suggested in ANCOLD (Australian National Committee on Large Dams) for rehabilitated fine coal holding cells would not be applicable.

5.2.5 General Risks Associated with Rehabilitation

General risks associated with rehabilitation has been assessed in as detailed risk assessment as part of Rehabilitation Management Plan of Large Mines, Clarence Colliery, 29 November 2023.

5.2.6 Monitoring, Validation and Remediation

As progressive rehabilitation and rehabilitation trial in progress, continuous monitoring is being conducted including Ecological monitoring (Ecosystem Function Analysis, Vegetation Assessment, Habitat Complexity) and Erosion monitoring.

The trial will inform whether the proposed capping arrangement is adequate in terms of capping thickness, material types, batter slope angles and erosion protection measures.

Design amendment and remediation work will be conducted based on the outcome of the trial to achieve a satisfactory final landform.

APPENDIX 1 COMPLIANCE TABLE

Table A1-1: Development Consent DA 504-00 Requirements

Approval	Condition	Requirement	Management Plan Section
Development Consent			
DA 504-00 DA 504-00	Schedule 3 Condition 24A	The Applicant must prepare and implement a long term Reject Management Strategy for the project to the satisfaction of the Planning Secretary. This plan must be:	This document
		(a) prepared in consultation with DPE Water, EPA and BCS;	Appendix 2
		(b) consider alternatives to reject emplacement, including beneficial re-use and underground disposal; and	Section 3.3
		(c) be submitted to the Planning Secretary for approval by the end of November 2014.	Original Strategy submitted 27/11/2014. Approved by DPE on 4/2/2015.
	Schedule 3 Condition 24A	Prior to the commencement of coarse coal reject transfers to Charbon Colliery, the Applicant must revise the Reject Management Strategy to the satisfaction of the Planning Secretary. The revised plan must be prepared in consultation with the EPA and Resources Regulator, and include:	This document
		(a) a definition and criteria for determining whether coarse coal reject material is geochemically suitable to be used for rehabilitation activities at Charbon Colliery;	Section 3.3.3
		(b) a process for assessing the geochemical suitability of coarse coal reject prior to transfer to Charbon Colliery; and	Section 3.3.3
		(c) a process for managing and/or treating coarse coal reject that does not meet the definition and criteria established in accordance with condition 24B(a).	Section 3.3.3

APPENDIX 2 CONSULTATION LOG

Consultation Date	Regulator	Details	Where addressed in the MP
9 May 2024	DPE Water	Original Strategy submitted to the DPE Water for consultation via Planning Portal.	Appendix 2
9 May 2024	EPA	Original Strategy submitted to the EPA for consultation via Planning Portal.	Appendix 2
9 May 2024	BCS	Original Strategy submitted to the BCS for consultation via Planning Portal.	Appendix 2
9 May 2024	Resource Regulator	Original Strategy submitted to the RR for consultation via Planning Portal.	Appendix 2