

MINING OPERATIONS (BLOOMFIELD COLLIERY)

FINAL VOID MANAGEMENT PLAN

Ver	Date	Description	By	Chk	App
1	13/06/12	Final Draft	GL	JH	GB
2	22/08/17	Revised Final – Revised and Updated	GL		BC
3	7/11/17	Revised Final – incorporating DPE consultation	GL		BC
4	27/09/18	Revised Final – incorporating Modification 4	GL		CK
5	16/03/20	Final – Reviewed	GL		CK
6	18/05/20	Revised Final – incorporating DPI&E consultation	GL		CK
7	27/08/22	Final – Reviewed post IEA	GL		CK

BLOOMFIELD GROUP MINING OPERATIONS

Final Void Management Plan

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INTRODUCTION

This Final Void Management Plan (FVMP) has been prepared in response to Project Approval, 07_0087, (Approval) granted under section 75J of the Environmental Planning and Assessment Act (EP&A) and all Modifications issued under section 75w of the Environmental Planning and Assessment Act 1979.

The FVMP takes into consideration the commitments stated in the Part 3A Environmental Assessment, various conditions outlined in schedules 2 to 5 of the Approval granted under Section 75 J of the Environmental Planning and Assessment Act 1979. In addition, commitments outlined in Bloomfield Group Environment Management Policy are also taken into account.

PURPOSE AND OBJECTIVES

The purpose of the FVMP is to:

- ☐ address the relevant conditions of the development consent;
- ☐ address commitments made within the Environmental Assessment;
- ☐ address legislative requirements and guidelines relevant to the FVMP and related management plans; and
- ☐ provide a clear and concise description of responsibilities in relation to Landscape Management (including Rehabilitation, Final Void Management & Mine Closure) during the operation and subsequent closure of the Bloomfield group mining operations.

SCOPE

This FVMP outlines the planning strategy for the cessation of mining operations covered by the project area as shown in Figure 1. It should be noted that the scope of this plan specifically addresses the area covered by the Approval. The Coal Handling Preparation Plant (CHPP) and associated infrastructure will continue to operate after mining operations cease and is operating under the Abel Coal Project (05_0136).

The Bloomfield Colliery Mining Operations Plan (MOP) approved by DRG provides a detailed outline of the objectives, closure criteria and monitoring for mine closure on a domain by domain basis covering ML1738. This includes the CHPP operating under the Abel Coal Project (05_0136).

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RELATIONSHIP WITH OTHER PLANS

The EMS establishes the overall environmental management strategy for mining and related activities on the site. The LMP provides the framework for rehabilitation and mine closure related issues. This document, the FVMP outlines the planning strategy for the cessation of mining operations at the Bloomfield Colliery.

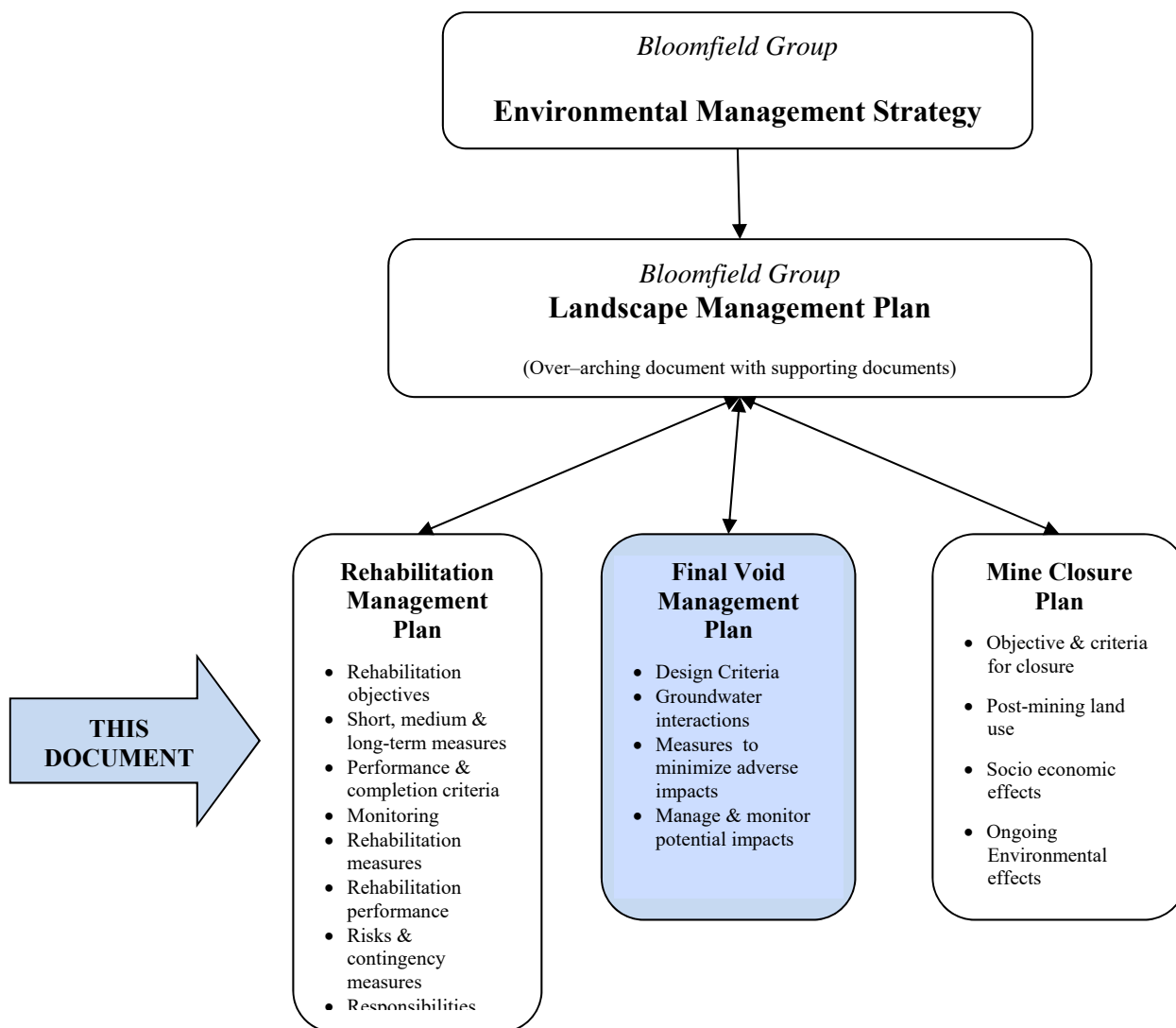


Figure 2 RELATIONSHIP WITH OTHER DOCUMENTS

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STATUTORY OBLIGATIONS

Approval was granted by the Minister for Planning on 3 September 2009 under Section 75J of the Environmental Planning and Assessment Act, 1979. Section 28 and 28A of Schedule 3 of the Approval states that:

Requirement	FVMP Reference
28. The Final Void Management Plan must:	
(a) justify the final location and future use of the final void;	Location of Final Void, Future Use of Final Void
(b) incorporate design criteria and specifications for the final void based on verified groundwater modelling predictions and a re-assessment of post-mining groundwater equilibration; and	Design Criteria of Final Void
(c) describe what actions and measures would be implemented to: <ul style="list-style-type: none">• minimise any potential adverse impacts associated with the final void; and• manage and monitor the potential impacts of the final void	Potential Impacts of the Final Void Monitoring of Final Void
28A. Prior to any decision to construct the embankment as described in EA (MOD 4), the Proponent must submit relevant details to the DSC.	Consultation with Regulatory Authorities

In addition to the Approval granted under the Environmental Planning and Assessment Act, 1979 there is a range of other relevant legislation that has been taken into consideration in developing the FVMP. These include the Mining Lease and requirements of the Environment Protection Licence (EPL) that must be satisfied.

CONSULTATION WITH REGULATORY AUTHORITIES

The closure, decommissioning and rehabilitation process will be regulated by the DRG. Relevant agencies will be consulted throughout the process and include the following:

- ☐ environmental inspections following the submission of the Annual Review;
- ☐ submission of Mining Operations Plan for Closure, Decommissioning and Rehabilitation;
- ☐ periodic inspections with Departmental throughout closure process;
- ☐ the preparation and submission to DRG of “as constructed” drawings of final landforms on completion of decommissioning.
- ☐ consultation with DSC on design details of new tailings dam embankment.

Throughout the mining phase, copies of the Annual Review will continue to be distributed to the relevant authorities to enable feedback on the strategy and overall progress of rehabilitation.

ROLES AND RESPONSIBILITIES

The company directors are responsible for the overall rehabilitation and environmental performance of Bloomfield Colliery. Senior Operational managers have direct responsibility for the mine closure process. The Environmental Officer provides direction and advice to ensure site environmental compliance is maintained. The key management positions are shown in Table 1.

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Table 1 MANAGEMENT TEAM

Position	Name
CEO	Brett Lewis
Manager Technical Services	Simon Grassby
Manager of Mining Development	Geoff Moore
Mine Manager	Brad Donoghoe
Environmental Advisor	Greg Lamb

LOCATION OF FINAL VOID

The location of proposed final void was nominated in the 2017 Environmental Assessment (MOD4). There will be one final void remaining post closure, located in the northern extension of S Cut where it will join with Creek Cut. Development of this void will progress generally in accordance with the 2017 Environmental Assessment (MOD4).

Figures 3 and 4 show the general location of final void as detailed in the Mining Operations Plan 2021 – 2023 and 2017 Environmental Assessment (MOD4). With the Abel Underground Mine currently in care and maintenance, the final landform presented as part of this MOP would depend on whether the Abel Underground Mine resumes operations. Therefore final landform designs have been prepared for two scenarios:

- One which assumes Abel Underground Mine resumes operations; and
- A second scenario which assumes the Abel Underground Mine remains in care and maintenance.

The indicative final landform for both of these scenarios is shown in Figures 3 and 4.

FUTURE USE OF FINAL VOID

The Bloomfield washery, rail loading facility and associated infrastructure will continue to operate after the mining is scheduled to be completed. Active washery infrastructure and transport will therefore continue in the mining lease area after mining is completed.

The washery, rail loading facility and associated infrastructure is approved under Project Approval 05_0136 for the Abel Underground Mine. Project Approval 05_0136 was issued to Donaldson Coal (owned by Yancoal) and was granted in June 2007. It allows for the Abel Underground Mine as well as the continued use of the Bloomfield washery and rail loading facility, management of water associated with the washery, coarse reject and tailings disposal and coal handling.

These items associated with the operation of the washery are currently used to process coal from Bloomfield and Abel Underground Mine. When mining is completed at Bloomfield Colliery, the washery will continue processing coal from the Abel Underground Mine. Project Approval 05_0136 permits operations until 2030.

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A final void will remain at the end of Bloomfield mining operations. This void will be used as an active disposal site for reject material from the washery, as approved by the Abel Project.

The Bloomfield Colliery Mining Operations Plan (MOP) approved by DRG provides a detailed outline of the objectives, closure criteria and monitoring for mine closure including the final void. Further details are also outlined in the Mine Closure Plan.

DESIGN CRITERIA FOR FINAL VOID

The final void remaining at the end of Bloomfield mining operations will be used as an active disposal site for reject material from the washery, as approved by the Abel Project.

Once capacity has been reached, the reject disposal area will be rehabilitated by shaping to a stable, undulating self-draining landform with mixed cover of pasture and native vegetation. The Bloomfield Colliery Mining Operations Plan (MOP) approved by DRG provides a detailed outline of the objectives, closure criteria and monitoring for mine closure including the final void.

Groundwater Model

The groundwater levels in the Bloomfield mining area shows the cumulative effects of long-term mining activity both at Bloomfield and at former open cut and underground mines to the west (eg Buchanan). There is no evidence to suggest what pre-mining groundwater levels might have been as mining commenced at Bloomfield over 170 years ago.

Groundwater modelling was undertaken as part of the 2017 Environmental Assessment (MOD4). A numerical groundwater model of the groundwater system was designed to simulate groundwater conditions over a 380 km² area which extends 23 km west to east and 16 km north to south. The area of potential impact incorporated the neighbouring Donaldson, Abel and Tasman mining projects.

A model simulation of the mining operation was run for the proposed life of the project, and for a period of 107 years (7 years prediction and 100 years recovery period) after completion of mining to predict the post-mining recovery of regional groundwater levels.

The void has been assumed to remain as a permanent open void in the groundwater modelling so that the impact of the project could be assessed (as far as possible) separately from the impacts of neighbouring mines. However with ongoing processing of coal at the washery the final void will be progressively backfilled by deposition of washery rejects.

A summary of the key groundwater modelling predicted for each open cut pit in the 2017 EA (MOD4) is presented below.

- ❑ Dewatering will continue to be required as mining progresses. During the prediction period (2018 – 2031) simulated refined inflows were predicted to peak at 1.3 ML/day during 2020-2021, with inflows at the cessation of mining in 2025 predicted to be approximately 0.8 ML/day.
 - ❑ Drawdown as a result of mining activities at the Colliery are expected to reach a maximum in 2025, at which time mining activities are scheduled to cease in the southern end of the approved extraction area and the groundwater levels would start to recover.
-

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- ☐ Drawdown of 100 m is predicted in the surficial aquifer layer 1 in the Bloomfield extraction area and final mine void (alluvial and regolith) although it is limited in extent;
- ☐ Drawdown is generally less than 0.5 m outside the Bloomfield lease area apart from the southwest corner where the 2 m drawdown contour extends outside the lease approximately 600 m beneath Buttai Creek;
- ☐ The predicted drawdowns are not expected to negatively impact GDE's as historical mining in the area has previously lowered water levels far below the ground surface;
- ☐ The final void will remain a sink and will have a wide spread effect of lowering water levels in the vicinity of the mine in the long term. A hypothetical monitoring point within the final void is predicted to only recover 15 m after 100 years, with a void water surface of -40 m AHD;

To verify the impacts the project may potentially have on groundwater and comparison with the groundwater model predictions, groundwater monitoring will be undertaken in accordance with the Water Management Plan (WMP). A summary of the results will be included in the Annual Review.

After completion of mining at Bloomfield, the washery will continue to operate and tailings/rejects disposal to the final void will continue. Water will be recycled from the tailings as part of the washery water circuit. Therefore it is expected that groundwater levels will recover faster than the modeling prediction.

POTENTIAL IMPACTS OF THE FINAL VOID

The measures to be implemented to minimise or manage potential adverse impacts of the final void are grouped into the following:

- ☐ Air quality;
- ☐ Surface Water;
- ☐ Groundwater; and
- ☐ Rehabilitation.

Air Quality

Post mining, dust generation may occur as a result of the emplacement of coarse rejects, overburden capping and topsoil, as well as during the period of exposure before groundcover is established during rehabilitation. Dust management will continue to be carried out in accordance with EPL conditions.

The methodology for air quality monitoring is established in the Bloomfield Colliery Air Quality Monitoring Program. Existing mitigation techniques and monitoring methods will continue to be carried out during the filling of the final void with washery rejects material and rehabilitation.

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Surface Water

While the final void is being used as the tailings deposition area surface flows within the void footprint will collect in the tailings area and will be recycled from the tailings as part of the washery water circuit.

Post rehabilitation, surface flows will continue to be directed through a series of drains to the site water storage dams. Appropriate catchment management will be undertaken for the final landform to ensure there is no residual risk of contamination or nutrient enrichment occurring in site water storage dams and drainage structures. Surface water monitoring will be conducted for a minimum of five years after the completion of rehabilitation, in accordance with the methods outlined in the Water Management Plan and reported in the Annual Review.

Groundwater

Monitoring of groundwater in the vicinity of the final void will continue for a minimum of five years after the completion of rehabilitation to ensure no adverse impacts on the groundwater system occur and to verify groundwater modelling predictions. Monitoring will be conducted as per the Water Management Plan, with analysis of groundwater data reported in the Annual Review.

Rehabilitation

Rehabilitation of the mine site area is proposed to be rehabilitated in accordance with its pre mining land capability to create a stable, undulating landscape with a mix of pasture and tree areas suitable for grazing and general habitat. Mitigation of potential impacts on ecological systems will be mitigated through use of the completion criteria outlined in the Bloomfield MOP. A summary closure criteria is provided in the Mine Closure Plan.

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MONITORING OF FINAL VOID

Bloomfield employs an extensive environmental monitoring program as part of the Bloomfield Colliery environmental monitoring network, as required by PA 07_0087 and EPL 396. This program is designed to incorporate all impact assessment criteria and other regulatory required monitoring regimes and includes monitoring of the following:

- ☐ Air quality;
- ☐ Noise and blasting
- ☐ Surface and groundwater quality
- ☐ Rehabilitation assessments;
- ☐ Erosion assessments; and
- ☐ Visual and lighting assessments.

This monitoring network will be reviewed in consultation with relevant departments to ensure it is appropriate for future use of the final void prior to the completion of mining operations. The reviewed monitoring program will continue to operate for a period of five years following the completion of mining operations or until lease relinquishment is achieved. Monitoring results during the mine closure phase will continue to be reported in the Bloomfield Colliery Annual Review.

Monitoring of the environment within and surrounding Bloomfield Colliery will include the assessment of:

- ☐ Air quality impacts;
- ☐ Surface and groundwater levels and quality;
- ☐ Landform stability and landscape design performance; and
- ☐ Vegetation community establishment.

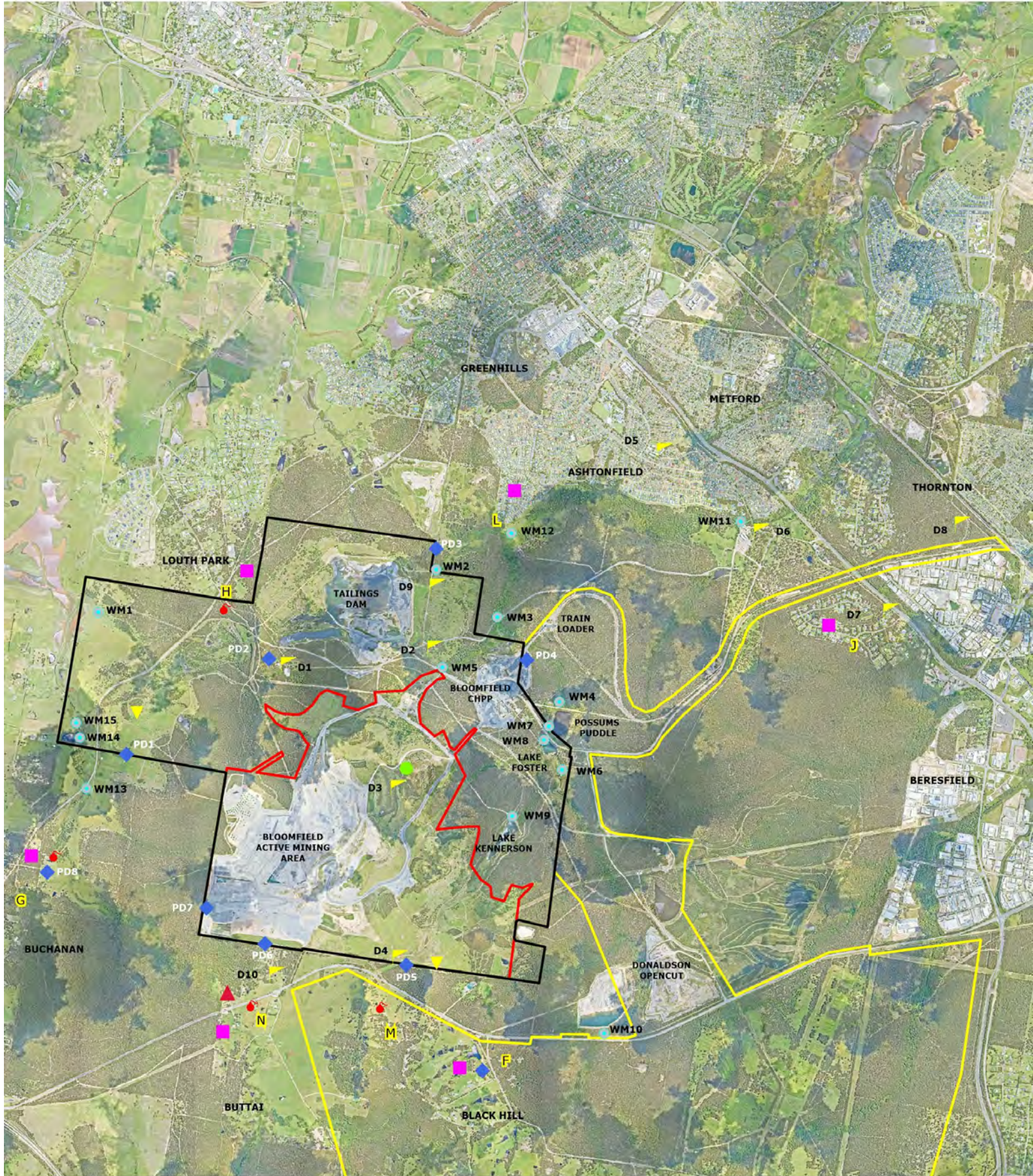
Rehabilitation Management Plan

As part of the RMP, Bloomfield Colliery has established Completion Criteria that identifies and outlines a number of criteria which have been developed as a result of previous onsite rehabilitation successes as well as generally accepted industry practices. In accordance with the RMP, performance and completion criteria for rehabilitation areas will be assessed periodically post seeding. The adopted criteria provide a simple and effective checklist which enables objective testing of rehabilitation success and will continue to be utilised following the completion of mining operations.

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FIGURES



LEGEND

0 1 km



- | | |
|--|--|
| — Bloomfield Project Area | ▲ High Volume Air Sampler |
| — Abel Mine Project Area | ■ Noise Monitor |
| — Bloomfield Mining Lease | ● Peizometers |
| ● Weather Station | ● Water Monitoring |
| ● Blast Monitor | ▲ DustTrak |
| ▲ Dust Gauge | |



Bloomfield Colliery

Final Void Management Plan

Figure 1 Blommfield Colliery Project Area

Scale: 1:33,333

Date: May 2022
Photo: 30 December 2021

Drawing: A3

- Cross-section
- ML1738
- AMA1001
- 07-0087 Approval Area
- 05-0136 Able Coal Project
- Cadastral Boundary
- Contour (5m)
- Creek
- Clean Water
- Mine Water
- Rehabilitation Monitoring Site
- Powerline
- Hunter Water Pipeline
- Roads
- Rail Line
- ↑ Wildlife Corridor

Primary Mine Domains

- Infrastructure Area
- Water Management Area
- Tailings Storage Area
- Overburden Emplacement

Secondary Mine Domains

- Rehabilitated Area - Pasture
- Rehabilitated Area - Trees over Pasture
- Relinquished Lands

Land and Soil Capability Class

- L&SC Class 4
- L&SC Class 5

Title Holder - Bloomfield Collieries Pty Ltd
Plan prepared by Greg Lamb
Bloomfield Orthophoto - 31/1/20

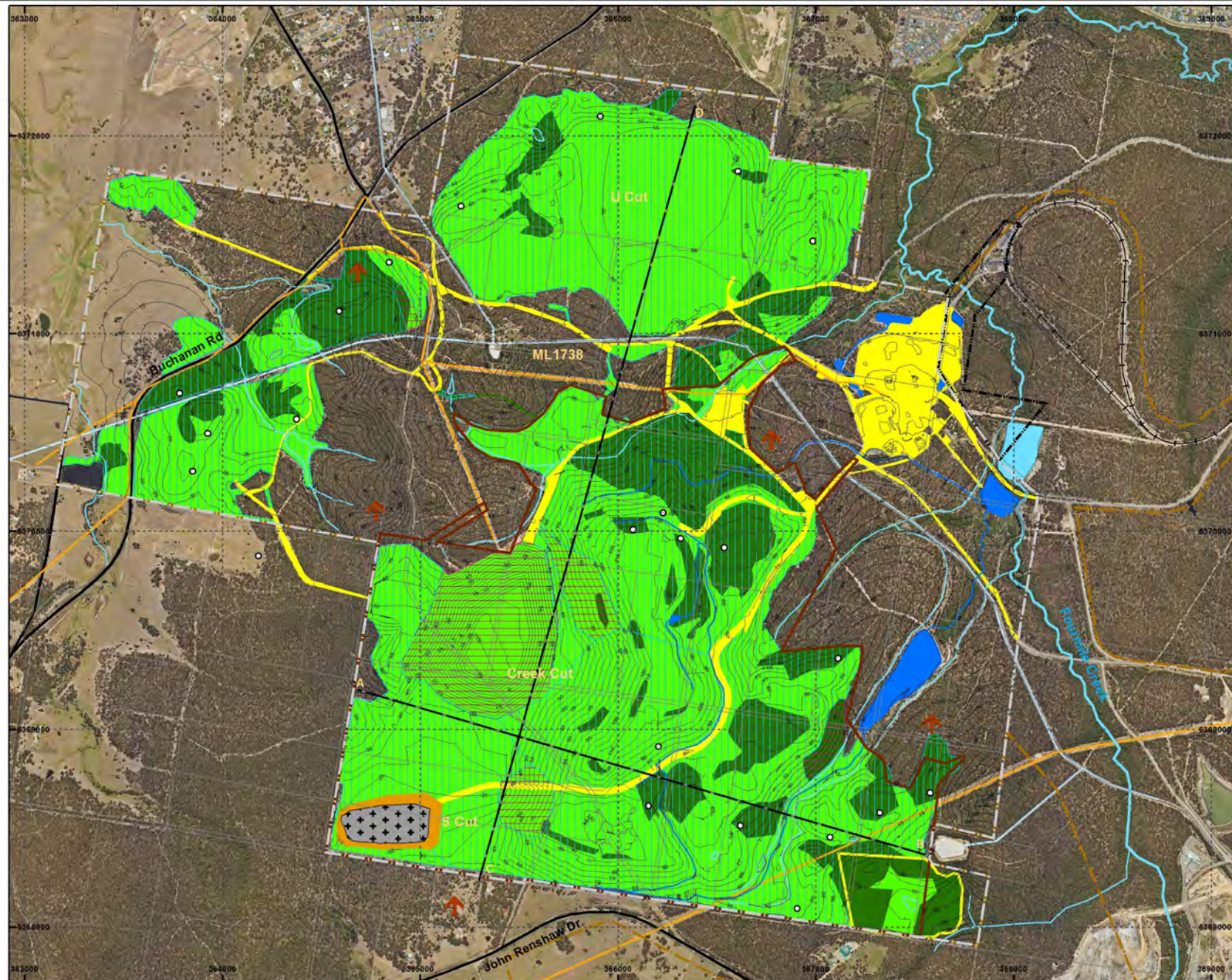


Kilometers



Scale: 1:20,000

MGA Zone 56



Source: MOP 2021 - 2023

Bloomfield Colliery
Final Rehabilitation and Post Mining Land Use - 2028
Abel Coal Mine Resumes Operation
Final Void Management Plan

Date: 13/05/2022



Figure 3

- Cross-section
- ML1738
- AMA1001
- 07-0087 Approval Area
- 05-0136 Able Coal Project
- Cadastral Boundary
- Contour (5m)
- Creek
- Clean Water
- Mine Water
- Rehabilitation Monitoring Site
- Powerline
- Hunter Water Pipeline
- Roads
- Rail Line
- ↑ Wildlife Corridor

Primary Mine Domains

- Infrastructure Area
- Water Management Area
- Relinquished Lands

Secondary Mine Domains

- Rehabilitated Area - Pasture
- Rehabilitated Area - Trees over Pasture

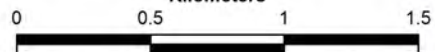
Land and Soil Capability Class

- L&SC Class 4
- L&SC Class 5

Title Holder - Bloomfield Collieries Pty Ltd
 Plan prepared by Greg Lamb
 Bloomfield Orthophoto - 31/1/20

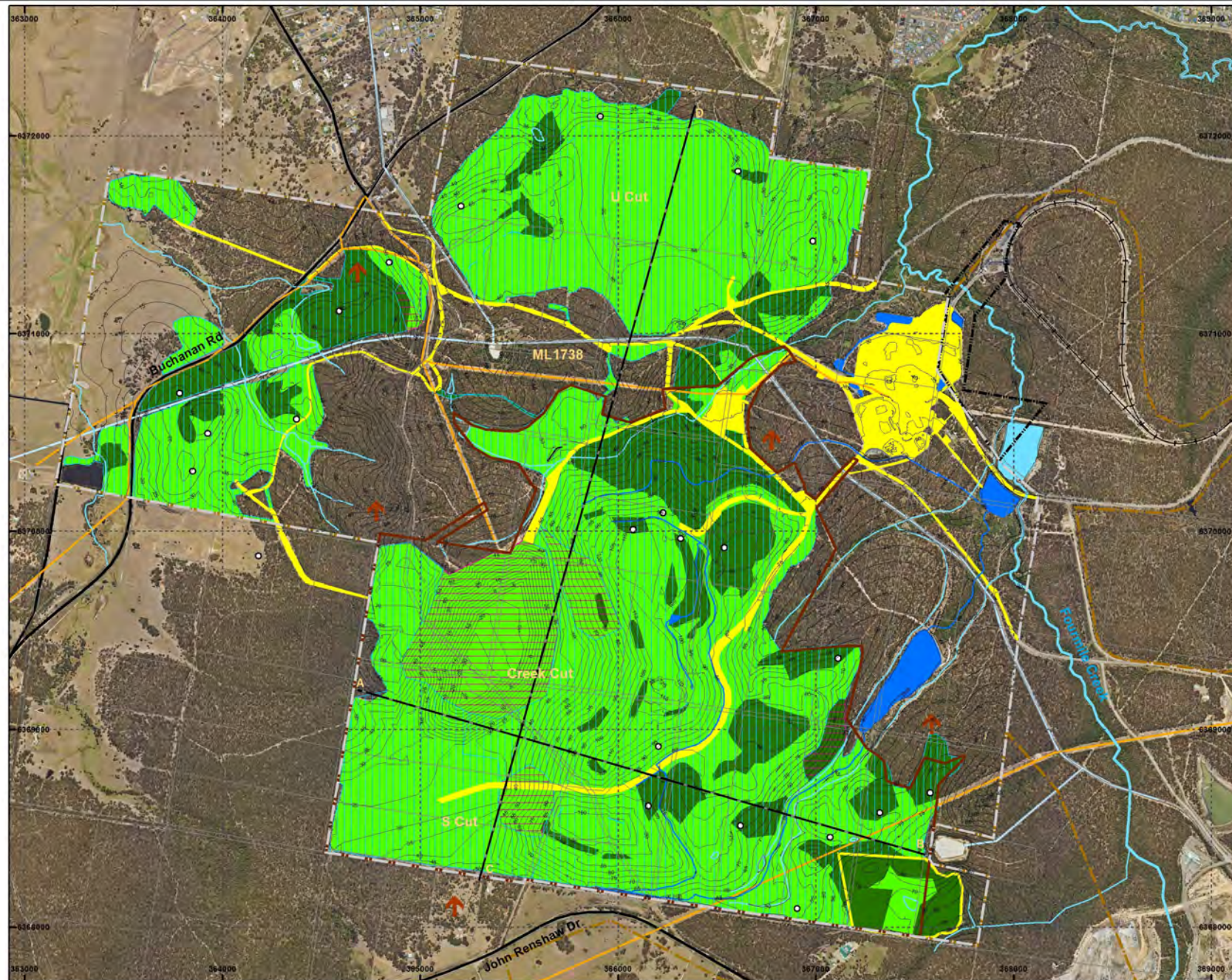


Kilometers



Scale: 1:20,000

MGA Zone 56



Source: MOP 2021 - 2023

Bloomfield Colliery
 Final Rehabilitation and Post Mining Land Use - 2028
 Abel Coal Mine in Care and Maintenance
 Final Void Management Plan

Date: 13/05/2022



Figure 4

BLOOMFIELD GROUP MINING OPERATIONS

Final Void Management Plan

APPENDIX A

APPROVAL CORRESPONDENCE



Greg Lamb
Environmental Advisor
PO Box 4
East Maitland, NSW, 2323

13/07/2020

Dear Greg

**Bloomfield Coal Project (PA 07_0087)
Final Void Management Plan**

I refer to the Final Void Management Plan submitted in accordance with Condition 28 of Schedule 3 of the Project Approval for the Bloomfield Coal Project (PA 07_0087).

The Department has carefully reviewed the document and is generally satisfied it meets the requirements of the relevant Conditions of Consent.

Accordingly, the Planning Secretary has approved the Final Void Management Plan (Version 6, dated 18 May 2020). Please ensure that the approved plan is placed on the project website at the earliest convenience.

If you wish to discuss the matter further, please contact Wayne Jones on 6575 3406.

Yours sincerely

A handwritten signature in black ink, appearing to read 'M Sprott'.

Matthew Sprott
Director
Resource Assessments (Coal & Quarries)

As nominee of the Planning Secretary