



Ashton Coal Operations Mining Operations Plan

2018 - 2024

ASHTON COAL OPERATIONS PTY
LIMITED


MINING OPERATIONS PLAN
2018-2024
FINAL

Amendment 1

MOP - 2018 to 2024

Revision	Date	Description	Author	Reviewer	Approved
1	24/04/2018	Draft for review	AECOM	D. Murdoch	
2	25/05/2018	Final for issue	AECOM	D. Murdoch	
3	13/09/2019	Amendment 1	ACOL	P Brown	

MOP - 2018 to 2024

Ashton Coal Operations Pty Limited	
Mining Operations Plan	
Name of Mine	Ashton Coal Mine
MOP Commencement Date	01 July 2018
MOP Completion Date	26 February 2024
Mining Authorisations (Lease / Licence No.)	ML 1529, ML 1533, ML 1623
Name of Authorisation / Title Holder(s)	ML 1529 - White Mining (NSW) Limited (ACN 089 414 595) and ICRA Ashton Pty Ltd (ACN 097 499 780) ML 1533 - White Mining (NSW) Limited (ACN 089 414 595) and ICRA Ashton Pty Ltd (ACN 097 499 780), ML 1623 - White Mining (NSW) Limited (ACN 089 414 595) and ICRA Ashton Pty Ltd (ACN 097 499 780)
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Name of Representative(s) of the Authorisation Holder(s) Title	Aaron McGuigan Operations Manager
Signature	
Date	13 th September 2019

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1 Introduction

This Mining Operations Plan (MOP) outlines the proposed operational and environmental management activities planned for the Ashton Coal Project (ACP) for the period from 1 July 2018 to 26 February 2024. This MOP has been developed to satisfy conditions of mining lease (ML) 1529, ML1533, ML1623 and conditions to Development Consent (DA) No. 309-11-2001-i (as modified). The approval authority for the MOP is the Department of Planning and Environment, Division of Resources and Geoscience (DRG) (formerly referred to as Department of Resources and Energy (DRE)).

Due to the synergies between the MOP requirements and rehabilitation requirements of the ACP DA (309-11-2001-i), this MOP has also been developed to satisfy DA (309-11-2001-i) Schedule 3, Condition 43 which relates to the development of a Rehabilitation Management Plan (RMP). This approach was approved by the DRG within the previous version of the MOP (2013 – 2017).

Ashton Coal Operations Pty Limited (ACOL) operates the ACP, located approximately 14 kilometres (km) north-west of Singleton in the Camberwell district of the upper Hunter Valley, NSW (refer to Map 1A).

The approved ACP includes:

- A now exhausted and predominantly rehabilitated North East Open Cut (NEOC), where the final void is utilised for reject coal storage.
- A descending multi-seam underground mine using retreating longwall (LW) mining methods (Ashton Underground).
- Associated surface infrastructure for the underground mine that includes gas management and extraction infrastructure.
- A Coal Handling and Preparation Plant (CHPP), rail siding, site office and associated infrastructure.
- The Bowmans Creek Diversion (BCD) which allows coal recovery from the underground mine while protecting surface water.

The ACP and ACOL are wholly owned subsidiaries of Yancoal Australia Ltd (Yancoal).

ACOL also holds Project Approval (PA 08_0182), issued on 17 April 2015, to commence open cut mining within the South East Open Cut (SEOC). A modification to DA 309-11-2001-i (MOD 5) was approved in June 2016 to allow for the integration of the existing ACP operations and the SEOC project. The modified development consent defines the 'Ashton Mine Complex' to be the operation of the development, either solely or in combination with the SEOC project. The modification resulted in a number of changes to the conditions of consent, and this MOP has been prepared to satisfy the amended conditions.

Commencement of the SEOC project is subject to economic market conditions and therefore the timing of open cut mining operations is not fixed. Whilst consent conditions specifically relating to the SEOC operations are not within the scope of this MOP, the MOP does include discussion of how the SEOC operations will integrate with existing ACP operations and rehabilitation activities.

1.1 History of Operations

The ACP was granted planning approval under Development Consent (DA) 309-11-2001-i, by the Minister of Planning in October 2002. Subsequent modifications of the approval were approved in 2003, 2005, 2007, 2010, 2011, 2012 and 2016. The current approval allows for extraction of Run of Mine (ROM) coal at a rate of up to 5.45 Million tonnes per annum (Mtpa) and for the undertaking of associated coal mining activities.

Since opening in 2002 the ACP has been made up of a number of discrete operational areas. The history of these operations is outlined in Sections 1.1.1 – 1.1.3.

MOP - 2018 to 2024
1.1.1 North East Open Cut

A brief history of operations within the NEOC is outlined in Table 1.

Table 1 North East Open Cut Development and Mining

Year	Details
2003 – September	Construction commences
2004 – January	Operations begin
2004 – March	First ROM coal produced
2011 – September	Mining operations at the NEOC conclude

As of September 2011, coal extraction from the NEOC ceased, having reached the approved and economically viable limit of available coal. ACOL obtained approval under Section 100 of the *Coal Mines Health and Safety Act 2002* (since repealed) to place coarse reject material within the NEOC void, and this activity will be ongoing for the period of this current MOP. The rejects are being deposited in such a way as to allow for the later use of the void as a coal fines storage and coarse reject placement as the long term operational strategy prior to final landform rehabilitation activities.

1.1.2 Ashton Underground

A brief history of operations at Ashton Underground is outlined in Table 2.

Table 2 Ashton Underground Development and Mining

Year	Details
2005 – December	Development of underground workings commences
2007 – March	First longwall coal extracted from underground workings within the Pikes Gully Seam (PG)
2012 - August	First longwall coal extracted from underground workings within the Upper Liddell Seam (ULD)
2012 – November	Construction of the Bowmans Creek Diversion (BCD) is completed
2017 - July	First longwall coal extracted from underground workings within the Upper Lower Liddell Seam (ULLD)

Construction of the Bowmans Creek Diversion (BCD) commenced in 2012. The works included two diverted sections of Bowmans Creek to enable extraction of coal from areas beneath sections of Bowmans Creek. Construction of the BCD was completed in November 2012.

1.1.3 Coal Handling and Preparation Plant

A brief history of operations at CHPP is outlined in Table 3.

Table 3 CHPP Operations

Year	Details
2004 - April	CHPP Commissioned
2006/2007	Expansion of CHPP to increase capacity from 400t/hr to 1000t/hr

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1.2 Mining Operations Plans

The ACP has operated under a number of MOP's which are outlined in Table 4.

This new MOP has been prepared to reflect existing practices and proposed mining activities in accordance with DA 309-11-2001-i (MOD 5). This MOP has been prepared in accordance with the DRE *ESG3 Mining Operation Plan (MOP) Guidelines, September 2013* (the MOP Guidelines). This current MOP covers the period of 01/07/2018 to 26/02/2024.

This is the first amendment to the approved MOP being the shortening of Longwall Panel 203 by 666m.

Table 4 History of MOPs at ACOL

Detail	Granted	Authority	Status	Expiry
- Interim MOP Construction and initial 12 months operation of NEOC and CHPP.	11/08/03	DRE	S/S	11/08/09
- MOP for NEOC Addressing all associated life of mine activities.	22/07/04	DRE	S/S	22/07/09
- MOP Modification Included an increase in the Eastern Emplacement Area (EEA) height & removal of the Western Emplacement Area (WEA).	01/2005	DRE	S/S	01/2010
- MOP Modification Included the construction and management of the Glennies Creek Road Environmental Bund	31/05/05	DRE	S/S	25/05/10
- Interim Underground MOP Enabled commencement of limited first workings development.	20/12/05	DRE	S/S	09/12/09
- MOP for Ashton Underground Mine Addressed the development of underground operations for LW1-4 and associated facilities.	23/01/06	DRE	S/S	31/12/11
- MOP Modification for Underground Mine Modified the length of LWs 1-2, and to include boreholes and additional surface infrastructure.	28/02/07	DRE	S/S	16/02/2013
- MOP for the Ashton Coal Mine Consolidated the NEOC, Underground, CHPP and all previous MOP variations into a single MOP.	01/09/08	DRE	S/S	16/02/2013
- Ashton Coal Mine MOP Modification Included Arties Pit Variation.	17/01/11	DRE	S/S	16/02/2013
- Addendum to the MOP for the Ashton Coal Mine. Construction Mining Operations Plan Bowmans Creek Diversion.	14/03/11	DRE	S/S	16/02/2013
- Ashton Coal Mine MOP Modification	17/06/11	DRE	S/S	16/02/2013

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Detail	Granted	Authority	Status	Expiry
Variation to the MOP for the Hebden Seam & Surface Gas Drainage wells Variation.				
- Ashton Coal Mine MOP Modification Ashton MOP – Upcast ventilation shaft, fans and mine service infrastructure (MOD9) and backroad vent shaft variation.	12/06/12	DRE	S/S	16/02/2013
- Ashton Coal Mine MOP 2013 - 2017 New MOP prepared to for the 2013 – 2017 MOP period. Amendment A (2014), Amendment B (2016) and Amendment C (2017) to the MOP were subsequently approved by DRE.	28/03/2013	DRE	S/S	01/07/2018
- Ashton Coal Mine MOP 2018 – 2024 - New MOP prepared for the period 2018-2024	27/09/2018	DRE		30/09/2021

S/S - superseded

1.3 Current Consents, Authorisations and Licenses

A licence summary is provided in the following tables:

- Table 5: Current approvals and tenements for the ACP
- Table 6: Licenses (excluding water licences)
- Table 7: Water licenses
- Table 8: AHIPs
- Table 9: Dam and emplacement area approvals.

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Table 5 Current Approvals and Tenements

Approval Number	Description	Issue Date	Expiry Date
Approvals			
DA 309-11-2001-i (as modified)	Development Consent for the ACP, including ten previous modifications. MOD 5 is the most recently approved modification and includes integration of the SEOC project.	20/06/2016	26/02/2024 ¹
Mining Authorisations			
ML 1533	Mining Licence	26/02/2003 (as modified on 19/02/2018)	26/02/2024
ML1529	Mining Licence	17/09/2003 (as modified on 19/02/2018)	11/11/2021
ML 1623	Mining Licence	30/10/2008 (as modified on 19/02/2018)	30/10/2029
EL 5860	Exploration Licence	21/05/2012	21/05/2020
EL 4918	Exploration Licence	17/12/2010	17/12/2015 Renewal submitted on 17/12/2015. Pending renewed title from DRG.

¹ Or a period of 12 years following the recommencement of open cut mining operations (including overburden removal) at the Ashton Mine Complex, whichever is longer

Table 6 Licences (excluding water licences)

Licence / Permit No.	Description	Expiry Date
EPL 11879	Environment Protection Licence (EPL) NEOC Area and processing facilities	N/A
Dangerous Goods Notification NDG036424	Issued - 19/05/2015	N/A
Radiation Licences		
RML 5061098	Radiation Management Licence (General Management – Simple)	06/04/2019
Crown Lands Permits		
Crown Lands LI354487	Pipeline permit Issued - 18/09/2003	Annually - 15 th January
Crown Lands LI363792	Pipeline permit Issued - 16/01/2004	Annually - 5 th November

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Licence / Permit No.	Description	Expiry Date
Crown Lands LI370218	Pipeline permit	Annually - 16 th April
Crown Lands LI386385	Pipeline permit Issued - 16/09/2008	Annually - 6 th September
Crown Lands LI408628	Pipeline permit Issued - 04/07/2008	Annually - 4 th July
Crown Lands LI450779	Licence Permit	Annually - 24 th December
Crown Lands LI454691	Licence Permit	Annually - 30 th July

Table 7 Water Licences

Surface Water Licences	Type	Renewal Date
WAL1358 Glennies Creek Supplementary 4ML	Water Access Licence	Perpetuity
WAL15583 Glennies Creek General Security 354ML	Water Access Licence	Perpetuity
WAL8404 Glennies Creek High Security 80ML	Water Access Licence	Perpetuity
WAL997 Glennies Creek High Security 11ML	Water Access Licence	Perpetuity
WAL1120 Hunter River High Security 3ML	Water Access Licence	Perpetuity
WAL1121 Hunter River General Security 335ML	Water Access Licence	Perpetuity
WAL6346 Hunter River Supplementary 15.5ML	Water Access Licence	Perpetuity
WAL23912 Bowmans Creek 14ML	Water Access Licence	Perpetuity
WAL29565 Bowmans Creek 266ML	Water Access Licence	Perpetuity
WAL872 Glennies Creek General Security 12ML	Water Access Licence	Perpetuity
WAL984 Glennies Creek General Security 9ML	Water Access Licence	Perpetuity
WAL19510 Hunter River High Security 130ML	Water Access Licence	Perpetuity
WAL 36702 Bowmans Creek Unregulated River 116 ML	Water Access Licence	Perpetuity
WAL 36703 Bowmans Creek Unregulated River 150 ML	Water Access Licence	Perpetuity
Groundwater Licences	Type	Renewal Date
WAL29566 Alluvial (aquifer) 358ML	Water Access Licence	Perpetuity
20BL169508 Mining (dewatering) 100ML	Bore	14/03/2020
20BL173716 – 10 dewatering bores 511 ML	Bore	29/05/2019
20BL173735 – Test / monitoring bores (224 total)	Bore	Perpetuity

Work Approvals	Type	Renewal Date
20CA201565	Combined water supply works / water use approval	11/03/2019
20WA203822	Water Supply Works Approval	13/12/2027
20CA201626	Combined water supply works / water use approval	07/04/2019
20CA201032	Combined water supply works / water use approval	30/06/2027

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Work Approvals	Type	Renewal Date
20CA201284	Combined water supply works / water use approval	18/10/2027
20CA211424	Combined water supply works / water use approval	31/07/2022
20WA200500	Water Supply Works Approval	30/06/2019
20WA200509	Water Supply Works Approval	30/06/2027
20WA200569	Water Supply Works Approval	14/03/2019
20WA200691	Water Supply Works Approval	30/06/2027
20WA200880	Water Supply Works Approval	30/06/2027
20WA201713	Water Supply Works Approval	30/06/2027
20WA201796	Water Supply Works Approval	07/04/2019

Table 8 Permits

Permit No.	Location Description	Issue/Expiry Date
Section 90 Consent Permits AHIP 1131017 AHIMS Permit ID 3436	Longwalls 1-4: Salvage excavations. Community collection. Harm to certain Aboriginal objects through proposed works. Certain Aboriginal objects must not be harmed	23/12/2021
Section 90 Consent Permits AHIP 1130976	Longwalls 5-8: Movement only of certain Aboriginal objects. Test excavations. Salvage excavations. Community collection. Harm to certain Aboriginal objects through proposed works. Certain Aboriginal objects must not be harmed	26/08/2031

Table 9 Tailings Emplacement Area Approvals

Approval	Approval Date
S126 Approvals for emplacement of carbonaceous materials Ashton NEOC	08/04/2004
S126 Approvals for emplacement of carbonaceous materials Ravensworth Void 4	17/01/2007
S100 Approval for emplacement of coarse rejects materials in the NEOC void	01/03/2012
S100 Approval for emplacement of fine rejects in the Ravensworth Void No. 4	02/01/2007

1.4 Land Ownership and Land Use

The ACP is contained entirely within the Singleton Local Government Area. The land covered by the ACP is held by a number of owners. Land ownership for these areas has been outlined in Table 10 and can be seen on Map 1C.

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Table 10 Land Ownership

Owner	Lot	DP	Parish	County
Ashton Coal Operations Pty Ltd	101	DP 635131	Vane	Durham
Ashton Coal Operations Pty Ltd	128	DP 752499	Vane	Durham
Ashton Coal Operations Pty Ltd	1	DP 1056200	Vane	Durham
Ashton Coal Operations Pty Ltd	2	DP 1056200	Vane	Durham
Ashton Coal Operations Pty Ltd	3	DP 1114623	Vane	Durham
Ashton Coal Operations Pty Ltd	102	DP 738182	Vane	Durham
Crown Land	2	DP 1114623	Vane	Durham
Crown Land	1	DP 1114623	Vane	Durham
Crown Land	7300	DP 1121685	Vane	Durham
Glencore	31	DP 585169	Vane	Durham
Freehold Land	70	DP 1107703	Vane	Durham
Freehold Land (church)	103	DP 738182	Vane	Durham
Glendell Tenements Pty Ltd	3	DP 195598	Vane	Durham
Glendell Tenements Pty Ltd	11	DP 261916	Vane	Durham
Glendell Tenements Pty Ltd	1	DP 745486	Vane	Durham
Glendell Tenements Pty Ltd	59	DP 752499	Vane	Durham
Glendell Tenements Pty Ltd	1	DP 1048686	Vane	Durham
Glendell Tenements Pty Ltd	1	DP 608457	Vane	Durham
Glendell Tenements Pty Ltd	2	DP 622070	Vane	Durham

1.5 Stakeholder Consultation

Consultation with landowners, residents, stakeholders and regulatory bodies surrounding and associated with ACOL has been consistent and open through personal contact, newsletters and public meetings. ACOL has committed to a community program which includes undertaking activities that aim to reduce the impact of mining on the residents of Camberwell.

Consultation commenced with the granting of EL 4918 and EL 5860 when a project office was established in Camberwell and has continued with personal contact with landowners in the area.

Table 11 outlines ACOL's requirements for consultation with stakeholders for the MOP and the Rehabilitation Management Plan required under its development consent conditions. While there are no specific requirements related to the MOP within the development consent conditions, the MOP is a requirement of ACOL's mining leases.

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Table 11 Consultation requirements under ACP Development Consent Conditions

Management Plan	Condition	DP&E	DRG	DPI Water	EPA	OEH	SC	CCC
Mining Operations Plan	N/A		S*					
Rehabilitation Management Plan	Schedule 3 Condition 43	C	S*	C	C	C	C	C

S* – Submitted and Accepted

C – Prepared in Consultation with

Specific consultation undertaken during development of this MOP is detailed in Table 12.

Table 12 MOP Consultation Log

Stakeholder	Date	Issues
DP&E	12/04/18	Initially invited to participate in the MOP consultation process via letter (refer Appendix C).
	16/04/18	DP&E confirmed that the requirements of the Rehabilitation Management Plan may be incorporated into the MOP. DP&E clarified that the new MOP must be prepared in accordance with the Department's <i>ESG3: Mining Operations Plan (MOP) Guidelines</i> , September 2013 and accompanied by a Rehabilitation Cost Estimate prepared in accordance with <i>ESG1: Rehabilitation Estimate Guidelines</i> and the Department's Rehabilitation Cost Estimate Tool.
DRG	12/04/18	Initially invited to participate in the MOP consultation process via letter (refer Appendix C).
DPI Water	12/04/18	Initially invited to participate in the MOP consultation process via letter (refer Appendix C).
EPA	12/04/18	Initially invited to participate in the MOP consultation process via letter (refer Appendix C).
OEH	12/04/18	Initially invited to participate in the MOP consultation process via letter (refer Appendix C).
	16/04/2018	OEH responded by email indicating that OEH had no comment or feedback to inform preparation of the revised MOP.
Singleton Council	12/04/18	Initially invited to participate in the MOP consultation process via letter (refer Appendix C).
CCC	June 2018	A presentation and overview of the MOP and opportunity for comment will be provided at the June 2018 CCC meeting. ACOL will continue to consult with the CCC as required.

1.5.1 Community Consultation Committee

ACOL has a Community Consultative Committee (CCC) that monitors compliance with conditions of consent and provides a forum for important community discussion. The ACOL CCC was established in 2003. Members are from the local Camberwell community, Singleton Council (SC). DP&E officers have an open invitation to all meetings, which are conducted every four months and provide a direct forum for the community to communicate environmental and operational concerns with site management, SC and regulatory authorities. CCC meetings are conducted in accordance with 2016 DPE Guidelines for CCC.

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ACOL has also implemented a community enquiry and complaints telephone line (1800 657 639) to enable direct contact with ACOL personnel.

1.5.2 Statutory Authorities

ACOL has consulted with the DRG and relevant regulatory authorities regarding the preparation and content of the MOP (refer to Appendix C). Consultation with regulatory authorities has also occurred during recent approval submissions and environmental assessments.

Statutory authorities also have the opportunity for ongoing involvement in the ACP operations through their representation on the CCC.

1.5.3 Aboriginal Groups

ACOL works closely with local Aboriginal people through professional engagement and consultation on cultural heritage management. A Wonnarua liaison committee has been formed with representatives from the local Wonnarua People and ACOL.

A Deed has been signed between Thomas Oliver Miller on behalf of the Wonnarua People, the Hon Edward Obeid on behalf of the State of NSW, and the proponents of the ACP which establishes the rights and obligations of each party and defines the purpose of the Ancillary Deed. The Ancillary Deed (prepared by the NSW Native Title Services) between Thomas Oliver Miller on behalf of the Wonnarua People, the Wonnarua Nation Aboriginal Corporation and the proponents of the Ashton Coal Project defines the Aboriginal Heritage Protection Protocol, provides access for traditional purposes and the environmental parameters under which the mine will be operated. Employment and business opportunities that will be provided for the Wonnarua People at the ACP are also discussed in the Ancillary Deed.

Consultation with registered Aboriginal stakeholders was also undertaken during the recent preparation of the Heritage Management Plan (approved on 4 October 2017).

2 Proposed Mining Activities

2.1 Project Description

ACOL operates the ACP, located approximately 14 km north-west of Singleton in the Camberwell district of the upper Hunter Valley, NSW (refer Map 1A). The current ACP is made up of a number of discrete operational areas including the former NEOC, Ashton Underground, the CHPP, surface infrastructure and rail load-out facility.

The NEOC is located to the north of the New England Highway and Camberwell Village. The area is roughly bound by the Main Northern Rail Line in the north and by the New England Highway in the south and to the east by Glennies Creek Rd. Coal extraction from the NEOC ceased in September 2011 and the area is now used for reject emplacement and potentially for future tailings emplacement from the onsite processing of ROM coal.

The Ashton CHPP is located to the west of the NEOC adjacent to the New England Highway and the Main Northern rail line. ROM coal is processed through the CHPP and product coal is loaded onto trains for transport to the port at Newcastle.

The Ashton Underground is located to the south of the New England Highway and is bound by Glennies Creek to the east and by the Hunter River to the south. The Ashton Underground Mine is currently operational and uses the longwall extraction method to produce approximately 2.9 – 3.2 Mtpa of ROM coal. Coal is extracted and transported by conveyor directly to the CHPP via the portal and first workings underlying the New England Highway.

ACOL has development consent to commence open cut mining within the SEOC through Modification 5 of DA 309-11-2001-i. While the timing for the recommencement of open cut mining operations is not fixed, this MOP includes discussion of how the SEOC operations will integrate with the existing ACP operations and rehabilitation activities.

2.1.1 Expected Mine Life

The operational mine life is approved (DA 309-11-2001-i) to operate until 11 February 2024 or a period of 12 years following recommencement of open cut mining operations (including overburden removal) at the Ashton Mine Complex, whichever is longer. The timeframe may alter depending on the proposed commencement of mining within the SEOC. Mining during the term of this MOP will be conducted in conjunction with the proposed mine schedule (as discussed in Section 2.3.3).

2.1.2 Proposed Mining

ACOL intends to continue mining operations at Ashton Underground, extracting coal from the Upper Liddell (ULD), Upper Lower Liddell (ULLD) and Lower Barrett (LB) coal seams via a descending longwall arrangement. The mine plan has been designed to minimise surface subsidence effects on overlying natural and built features, as far as practically possible. This includes the diversion of Bowmans Creek and adherence to a 40 m horizontal setback between the high bank of the creek (in its diverted form) and the projected vertical edge of the longwall void.

The ACP underground mine operates seven days a week, 24 hours a day on a rotating shift basis. At present, the ACP's mining schedule in the underground mining area is subject to subordinate approvals and production rates. However, based on various approval scenarios, the start date and subsequent mining schedule is provided in Section 2.3.3. At the commencement date of this MOP, extraction of LW 201 (ULLD Seam) has been completed and extraction of LW 202 (ULLD Seam) is underway.

2.1.3 Coarse and Fine Rejects Disposal and Materials Handling Operations

ROM coal from the underground mine is processed through the CHPP which results in the production of product coal, coarse rejects and fine rejects (tailings).

In early 2012 ACOL gained approval under Section 100 of the *Coal Mines Health & Safety Act 2002* (since repealed) to utilise the NEOC void to emplace rejects following the conclusion of NEOC mining operations.

Currently, tailings are disposed of in the Ravensworth Void 4 tailings dam and coarse rejects are disposed of in the NEOC void. Once the Ravensworth Void 4 tailings dam reaches capacity, tailings will be disposed of in the NEOC void.

Tailings disposal techniques employed at the ACP have the capacity to support underground mining for the life of the mine.

2.1.4 Waste Management

Waste segregation and recycling is encouraged through providing appropriate recycling facilities. Materials that are available for recycling are collected and recycled off-site.

Materials that cannot be recycled are disposed of to a licensed landfill. Licenced contractors remove waste offsite to licensed landfills that may accept the category of waste.

Three on-site sewage management systems are used to service the underground mine bathhouse and administration facilities, the CHPP facilities, and the NEOC Workshop and bathhouse .

2.2 Asset Register

In accordance with the MOP Guidelines (DRE, 2013) an Asset Register is provided in Table 13, listing the domains with the MOP area, their approximate size and the major assets within each domain. The domain areas consider the disturbance footprint at the start of the MOP term and reflect the maximum extent of disturbance planned to occur during the MOP term. The asset register provides a comprehensive list of the items included and costed within the Rehabilitation Cost Estimate. It is noted that no decommissioning activities are required during the MOP term.

Table 13 Asset Register

Domain	Size (ha)	Major Assets
Domain 1: Infrastructure and Roads	89.6	Areas identified as 'Infrastructure' including: <ul style="list-style-type: none"> - CHPP and former open cut offices - Rail line and loop - Workshop - Administration buildings - Overall footprint of infrastructure (e.g. roadways) - Sewerage and water treatment plant - Hardstand / laydown areas - Underground infrastructure - Other (e.g. gas wells, fencing, boreholes, conveyors, pipelines)
Domain 2: Tailings and Rejects Emplacements	34	<ul style="list-style-type: none"> - Tailings Emplacement Facility (incorporating the NEOC void) - Slopes / steep slopes of coarse rejects emplacement area

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Domain 3: Rehabilitation and underground mine area	610.2	Areas identified as <ul style="list-style-type: none"> - Pasture - Underground Mining Area - Trees over Grass - Underground Mining Area - Pasture - NEOC - Trees over Grass - NEOC - Revegetated areas - Subsidence areas
Domain 4: Water Management	87.4	<ul style="list-style-type: none"> - Water Management Areas (e.g. structures, clean water dams and dirty water dams) - Bowmans Creek Diversion - Bowmans Creek Riparian Zone
Domain 5: Other	44.1	<ul style="list-style-type: none"> - Southern Voluntary Conservation Area

2.3 Activities during the MOP Term

2.3.1 Construction Activities

Proposed construction during the MOP term will include:

Upcast Ventilation Shafts

Construction of additional mine ventilation infrastructure comprising:

- A main 5.5 m diameter upcast ventilation shaft and fans, developed into the ULD, ULLD and LB Seams at the eastern end of the main headings; and
- A 2 m diameter backroad upcast ventilation shaft and fan, developed into the ULD, ULLD and LB Seams.

Additional Mine Dewatering Boreholes

- A 600 mm diameter dewatering borehole developed into the ULD, ULLD and LB Seams adjacent to the backroad ventilation shaft; and
- Additional dewatering bores, as may be required to ensure the safe operation of the mine.

Gas Drainage Network

Construction of a gas drainage network comprising:

- a central gas drainage plant (constructed);
- gas flaring facility (constructed);
- a pipeline network to convey gas from the bores to the gas drainage plant and flaring facility; and
- additional goaf gas drainage boreholes (staged over the life of the mine).

Gas Drainage Boreholes

Construction of additional goaf gas drainage boreholes in the ULD, ULLD and LB Seams, generally comprising:

- Establishment of a level pad (up to approximately 20 x 15 m);
- Drilling a 300 mm diameter borehole;
- Completing the drill hole with metal casing, vent stack, lightning arrestor, flame suppression apparatus and shut-off valve;

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- Erecting a 1.8 m high perimeter security fence around the pad and well head; and
- Temporarily installing pump apparatus associated piping, real-time monitoring and alarm system and support infrastructure on the secured pad area at the active well head.

Bowmans Creek Diversion – Block Banks

The Bowmans Creek Diversion (BCD) was completed in November 2012. Construction involved the diversion of two sections of the Bowmans Creek (total 1.7km) to allow additional extraction beneath the excised creek channel and its alluvium. Temporary block banks are currently positioned upstream of the excised creek channel and constructed to divert all flows up to and including the six month average recurrence interval (ARI). Specific construction works are detailed in the BCD Environmental Assessment (ACOL, 2009).

Construction of full height block banks is scheduled to occur within the current MOP period, to divert up to five year average recurrence interval (ARI) creek flows into the constructed diversion channels. The block banks will be constructed twelve months prior to mining LW 106B (ULD Seam). Construction of the block banks are currently scheduled to occur in 2020, however the timing of these construction activities will be dependent on mine scheduling.

Other Construction Works

Additional construction activities planned during the term of the MOP:

- Additional EPL monitoring point to be installed within the decommissioned NEOC area adjacent to the Main Northern Railway (the proposed NEOC Drainage Off-site Discharge Point);
- Mine service drop holes (nominally up to 1m in diameter) developed into the ULLD Seam adjacent to the main (5.5m diameter) upcast ventilation shaft or suitable location, for delivery of ballast and concrete to the underground mine; and
- Monitoring of subsidence impacts will be conducted along sections of Lemington Road. Repair of any subsidence impacts will be required throughout the life of this MOP. The owner of the Ravensworth Operations Project (or another third party such as the Mine Subsidence Board) will be responsible for all costs associated with the implementation of these repairs (as per condition 37 to Schedule 3 of DA 309-11-2001-i and condition 46 to Schedule 3 of Project Approval 09_0176 for the Ravensworth Operations Pty Ltd Project).

2.3.2 Future Construction Activities

Any future construction activities which are not addressed within the terms of the existing development consent would be subject to further environmental assessment which would consider relevant impacts and identify appropriate mitigation measures.

Any such environmental assessment would be submitted as an application to modify the ACP development consent.

2.3.3 Mine Development and Sequence

Underground mining during the MOP term intends to recover coal reserves from remaining panels of the ULD Seam and the ULLD Seam. The panels are to be progressively mined using longwall mining methods. The main headings are aligned parallel to the New England Highway with longwall panels aligned parallel to the eastern boundary of ML 1533, extending from the New England Highway in the north to the Hunter River in the south. The western limit of mining is defined by the western limit of ML 1533.

It is planned to continue operations with extraction of the ULD, ULLD and LB Seams.

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Mining within the PG Seam, LW 101 – 106A of the ULD Seam and LW 201 of the ULLD Seam was completed prior to the preparation of this MOP. Mining within LW 202 of the ULLD Seam has commenced. During the current MOP period, mining will continue throughout LW 202 – 208 of the ULLD Seam, LW 106B – 107B of the ULD Seam, and may begin in LW 301 of the LB Seam. Anticipated indicative start and completion dates are summarised in Table 14. However this will depend on relevant mining constraints and status of subordinate approvals.

LW 203 has been shortened due to geological conditions encountered. A letter report regarding the shortening is included in Appendix E to this MOP.

Table 14 Proposed Mining Schedule

Panel	Start Date	Duration	Completion Date
ULLD LW 201	July 2017	9 months	April 2018
ULLD LW 202	May 2018	8 months	December 2018
ULLD LW 203	October 2019	6 months	March 2020
ULLD LW 204	April 2020	11 months	February 2021
ULLD LW 205	March 2021	5 months	August 2021
ULLD LW 206A	September 2021	5 months	February 2021
ULD LW 106B	March 2022	4 months	July 2022
ULD LW 107A	August 2022	8 months	April 2023
ULD LW 107B	May 2023	4 months	August 2023
ULLD LW 206B	September 2023	4 months	December 2023
ULLD LW 207A	January 2024	4 months	June 2024
ULLD LW 207B	July 2024	3 months	October 2024
ULLD LW 208	November 2024	4 months	March 2025
LB LW 301	April 2025	8 months	November 2025

2.3.4 Mining Method

The mining method used at the ACP is the same as that described in previous MOPs.

The Underground Mine utilises the longwall method of coal extraction, following continuous miner development of main headings and twin heading gateroads.

Seam thickness varies from about 1.8 m to 2.8 m high. All underground roadways will be driven at approximately 2.6 m mined height. The longwall has been designed to allow extraction of the full seam thickness.

The current mining equipment will continue to be used. In general, changes may occur due to replacement or as technology changes.

2.3.5 Mine Plan

Three portals provide access and services to the underground mine, these are positioned in the highwall of the Arties Pit, which is located on the north side of the New England Highway. One portal provides access for men and materials, a second access for the main coal conveyor used to remove raw coal from the underground, and the third is currently used for ventilation.

The main headings are located in the vicinity of the New England Highway and consist of five roadways at 25 m centres, however, this is reduced to four and three headings at LW 7 and 8 respectively.

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Gateroads in the upper seams are driven as two headings at 30 m centres, with cut-throughs at 150 m centres and are superimposed on each other. These dimensions may need to be reassessed for the lower seams.

LW panels in the ULD Seam are generally offset 60 m to the west of the overlying PG Seam longwall blocks to mitigate the impacts of surface subsidence. The ULD LW blocks are designed with some variation in the vicinity of Bowmans Creek to mitigate surface subsidence effects on Bowmans Creek, in its diverted form. The ULLD Seam LW blocks are positioned directly below the PG Seam layout and are therefore offset 60 m to the east of the ULD Seam LW blocks.

2.3.6 Equipment Fleet

The continuation of mining operations at the ACP will use existing operational practices and equipment. Table 15 provides an indicative schedule of the underground mine equipment used at the start of the MOP. This schedule may change as the mine develops.

Table 15 Underground Indicative Mining Equipment

No	Description	No	Description
4	12CM 12 Continuous Miners	8	PJB Mk4.5
4	10SC32 Shuttle Cars	7	Jaganaut V2
4	21m ³ /s auxiliary ventilation fans	1	Flakt Woods 110kW centrifugal fan
4	1000 cfm air compressors	2	Flakt Woods 315kW centrifugal fans
2	1050mm temporary conveyors (Jiffy drivers)	3	1400mm conveyors (two VVVF drives each)
5	1600mm Conveyors (two VVVF drives each)	1	1600mm stacker conveyor (single VVVF Drive)

2.3.7 Dewatering

Underground Mine dewatering is via two systems. One is a staged underground pumping system which discharges via the portal to a surface storage for onsite reuse. The other is via a series of surface dewatering boreholes strategically located in a down dip position at the in-bye end (southern end) of the mine, from which water is pumped via a dedicated surface pipeline to the CHPP Settling Dam for reuse in the operations. Additional dewatering bores will be developed as needed to maintain safe underground working conditions, and connect into the existing surface dewatering pipeline.

2.3.8 Coarse Rejects and Tailings Management

ROM coal from the mine contains varying amounts of stone and ash that needs to be removed prior to sale into the export market. This removal occurs in the CHPP and results in two process waste streams; namely coarse rejects and tailings.

Coarse Rejects

Coarse rejects have a bulk density of approximately 2.0 tonnes per cubic metre, therefore requiring a disposal volume of approximately 17 million cubic metres over the life of the mine. Coarse rejects are currently used to fill available void space in the NEOC. Coarse rejects may also be used for the construction of tailings pond walls within the NEOC void to act as a filter medium to enhance the recovery of process water from the tailings for use in the CHPP. Rejects trucks servicing the CHPP operate 24 hours per day, seven days per week in accordance with condition 2.8 of DA 309-11-2001-i.

MOP - 2018 to 2024**Fine Rejects/Tailings**

Tailings are processed through a thickener and are pumped to the old Ravensworth Void 4 East, where they are treated with coagulants and allowed to settle. Water is decanted from the tailings dam and pumped back to the process water dam for reuse on site. As it is located outside the ACP mine site, the management and rehabilitation of the Ravensworth Void 4 Tailings dam is dealt with separately to this MOP and detailed in an approved Tailings Emplacement Operations Management Plan (TEOP) (ACOL, j). The TEOP includes a Life of Mine Tailing Management Strategy, which considers two potential scenarios: required tailings storage volume for both the SEOC and underground mine operating concurrently; and required tailings storage volume for only the ACP underground operations. The TEOP includes a review of environmental issues and management actions required to minimise the risk of potentially adverse environmental impacts during the operational phase of the Ravensworth Void 4 tailings dam.

Following the filling of the Ravensworth Void 4, tailings from underground operations and associated coal processing are intended to be placed in the NEOC void. These combined voids will satisfy tailings storage requirements from underground coal mining at the ACP for the current approved life of the mine.

The NEOC Void has been designed to allow the utilisation of the void for tailings emplacement. The design was undertaken to ensure the efficient dewatering of tailings and maximum water recovery. The indicative final landform is shown on Drawing C1002 at Appendix D. The TEOP identifies actions required prior to tailings emplacement within the NEOC void to ensure its safe construction and operation, maximise water reclaim efficiency and optimise total storage capacity.

To maximise water recovery a decant pump was installed in the northwest corner of the NEOC pit (the deepest point). As mining progressed in the southeast, the northwest corner was backfilled with spoil. The final point of extraction in the NEOC pit was in the southeast corner, with the final void being established in this area.

The area that the emplacement will cover varies from an average of 104 m (width) by 280 m (length). The total volume of emplacement will be in the vicinity of 22 million cubic meters. The deposition of the coarse rejects will take place only in the designated NEOC emplacement area on a 24 hour 7 day week basis.

The emplacement process will utilise existing available equipment including rear dump haul trucks, D10 dozer, grader and water cart. Emplacement will continue until the specified stages have been filled to the finished surface level.

Once operational, the SEOC would provide both an additional source of tailings and a tailings storage area, either within the final void or progressively in in-pit storages. Initially tailings produced during open cut operations associated with the SEOC may be deposited in the NEOC void. The SEOC tailings storage would be used for the disposal of fine reject material once the Ravensworth and NEOC voids have reached capacity.

2.3.9 A Synopsis of Forecast Rehabilitation Activities

Rehabilitation is undertaken progressively across the ACP site. A number of landscape domains have been identified to classify land use activities and management requirements for the site (refer Section 5). Specific performance indicators have been established for each domain to allow the progress of rehabilitation to be measured. Performance indicators will be monitored over the life of the MOP and the results reported in Annual Reviews.

The rehabilitation objectives for the ACP are aimed at blending the disturbed mined areas back into the natural landscape after mining has occurred, to reinstate the land capability of the land to at least the same condition as existed prior to mining, and to create a long term stable landform for sustainable use of the land post mining.

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Rehabilitation activities forecast for the current MOP term include:

- Progressively rehabilitate any lands within the ACP site boundaries which may have been disturbed by mining related operations;
- Continue maintenance on completed rehabilitation of the NEOC;
- Progressive rehabilitation, including revegetation works, of Bowmans Creek in line with the BCD Construction Mining Operations Plan (ACOL, f), and BCD Rehabilitation Strategy (ACOL, g);
- Progressive remediation of disturbed areas above the underground mining area including rehabilitation of subsidence troughs and if required, temporary drainage works; and
- Continued monitoring and remediation (if required as a result of subsidence impacts) of the Southern Woodland Conservation Area.

Proposed rehabilitation methodology and scheduling are discussed further in Section 5.

2.3.10 Drainage / ponding management works

The general lowering of the landform as a result of subsidence is expected to cause ponding in certain areas of the ACP site. This is further discussed in Section 3.21.

Environmental monitoring undertaken in accordance with ACOL Environmental Management Plans will identify these areas of ponding. Mitigation and remediation measures will be implemented as required. The strategies required may be different for each area of ponding and may include:

- cuts in the humps above each of the chain pillars,
- cuts to Bowmans Creek or Hunter River,
- creation of drainage channels, or
- filling of large areas or installation of a permanent pumping system.

Further assessment would be undertaken to evaluate the options for each area.

2.3.11 Proposed Exploration

No further exploration activities for the NEOC area are scheduled to occur during the term of this MOP.

Exploration activities within the Underground area will provide base line geological and coal quality data for modelling and planning purposes. Current exploration projects at the ACP include seam continuity and splitting exploration.

2.3.12 Material Production Schedule

The proposed provisional material production schedule for the period covered by this MOP is shown in Table 16.

Table 16 Proposed Material Production Schedule

Material	Unit	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
		2 nd half 2018	2019	2020	2021	2022	2023	1 st half 2024
Stripped topsoil	m ³	0	0	0	0	0	0	0
Rock / overburden Rock	m ³	0	0	0	0	0	0	0
Ore (ROM coal)	T	1,794,206	3,492,941	3,184,001	2,668,035	2,697,846	3,140,246	1,264,711
Coarse reject	T	731,997	1,308,355	1,112,977	895,974	921,009	970,505	486,673
Tailings	T	182,999	327,089	278,244	223,994	230,252	242,626	121,668
Product coal	T	879,210	1,857,497	1,792,780	1,548,067	1,546,585	1,927,114	762,469

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3 Environmental Issues Management

3.1 Environmental Risk Assessment

Key risks associated with the proposed mining activities at the ACP during the term of this MOP have been identified and assessed in accordance with ACOL's risk management processes, which follows the general principles outlined in *ISO 31000:2009 Risk Management – Principles and Guidelines* (Standards Australia). The method used for the risk assessment encompassed the following key steps:

1. Establish the context for the risk assessment process;
2. Identify risks and potential impact;
3. Analyse risks; and
4. Evaluate risks to determine the necessary controls for mitigation.

The key risks associated with operations at the ACP have been assessed using the probability and consequence ratings, risk matrix and classifications listed in Table 17 and Table 18.

Table 17 Probability and Consequence ratings

Effect / Consequence					
Loss Type	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
(P) Harm to People	Slight injury or health effects – first aid / minor or no medical treatment level	Minor injury or health effects – restricted work or minor lost time injury	Serious bodily injury or health effects – major lost time injury / permanent disability	Single fatality, permanent total disabilities	Multiple Fatalities
(E) Environmental Impacts	Environmental nuisance – trivial or negligible, short term impact to area of low significance, minimal or no physical remediation required, no regulation. Cost < \$1,000	Minor environmental harm – short term impact to area of limited local significance, limited physical remediation Reportable Breach /Minor Non Compliance, potential warning notice, other notices (infringement / prosecution) unlikely. Costs \$1,000 - \$5,000	Serious environmental harm – medium term impact to area of local conservation value, medium term physical remediation, actual community health impacts or significance or pollution or contamination Infringement Notice but Prosecution unlikely Costs \$5k - \$50k	Major environmental harm – long term reversible impacts to area of regional conservation significance, health statistics in community alter as a result of this incident or pollution or contamination Prosecution Costs \$50k - \$500k	Extreme environmental harm – irreversible impacts on environmental values of extreme & widespread areas, or those of national conservation significance, community fatalities or pollution or contamination Prosecution, License revoked Costs > 500k
(O) Asset Damage and Other Consequential Losses	Slight damage < \$0.1M or < 1 shift disruption to operation	Minor damage \$0.1M - \$1.0M. or 1 shift – 1 day disruption to operation	Local damage \$1.0M - \$5.0M or 1 day - 1 week disruption to operation	Major damage \$5.0M - \$25.0M or 1 week – 1 month Partial loss of operation	Extreme damage > \$25.0M.or > 1 month Substantial or total loss of operation
(R) Impact on Reputation	Slight impact Public awareness may exist but no public concern Isolated compliance failure – no brand damage	Limited impact Some local public concern Intervention of regulating authority – minimal brand damage	Considerable impact Regional public concern Major compliance failure involving fines – medium brand damage	National impact National public concern Temporary withdrawal of license to operate – significant brand damage	International impact International public Attention Loss of shareholder confidence – irreparable brand damage

Table 18 Ashton Coal / Yancoal Risk Matrix

Likelihood	Likelihood Examples (Guide)	Level of Risk				
A (Almost Certain)	Likely that the unwanted event could occur several times per year at this location	11 (M)	16 (H)	20 (H)	23 (E)	25 (E)
B (Likely)	Likely that the unwanted event could occur several times per year in the Australian mining industry; or could happen annually	7 (M)	12 (M)	17 (H)	21 (E)	24 (E)
C (Possible)	The unwanted event could well have occurred in the Australian mining industry at some time in the past 10 years	4 (L)	8 (M)	13 (H)	18 (H)	22 (E)
D (Unlikely)	The unwanted event has happened in the Australian mining industry at some time; or could happen in 50 years	2 (L)	5 (L)	9 (M)	14 (H)	19 (H)
E (Rare)	The unwanted event has never been known to occur in the Australian mining industry; or is highly unlikely that it could ever occur	1 (L)	3 (L)	6 (M)	10 (M)	15 (H)

Table 19 outlines the key identified risks and associated inherent risk ratings. The ratings assume that the risks are untreated i.e. have not been addressed by specific risk mitigation measures.

Table 19 Key risks associated with activities undertaken at ACOL over the MOP term

<u>ISSUE</u>	Exploration	Land preparation, vegetation & topsoil stripping	All construction activities including earth moving	Transport (use/maintenance roads, tracks, equipment)	Mine development and mining	Waste rock emplacement management	Processing facilities & product stockpiling/handling	Tailings impoundment management	Water management including storm event contingencies	Sewerage	Rubbish disposal	Rehabilitation activities, Rehabilitated land & remaining features
Air Quality	L5	M12	M7	M12	L4	M8	M7	L4	L4	L2	-	M7
Erosion and Sedimentation	M8	H17	M12	M12	8M	L5	-	M9	M8	-	-	L5
Surface water	M8	-	L3	M6	H18	M8	M9	L5	M8	L5	L5	L5
Ground water	M8	-	L3	M6	H18	M9	L5	L5	M8	L1	L5	-
Contaminated/ polluted land	L5	L3	L3	M6	L5	M8	M12	L4	M7	L4	L5	-
Hazardous substances contamination	-	-	L5	-	M8	L5	M8	-	L5	-	L5	L5
Flora	M8	M9	M10	M6	L5	M6	-	M6	L3	-	-	H13
Fauna	M8	M9	M10	L3	L5	M6	-	M9	L3	-	-	H13
Weeds and pests management	L1	M8	L3	L5	L5	-	-	L5	L2	L4	L3	M8
Operational noise	L4	L4	M7	M7	L4	L5	M7	L4	L3	-	-	L5
Visual amenity, stray light	L1	L1	L3	-	-	L4	M7	L2	-	L4	L2	L1
Aboriginal heritage	M6	M10	M6	M6	H17	M6	-	M6	M6	-	-	L3
European heritage	M6	M6	L3	-	M6	M6	-	M6	M6	-	-	L3
Spontaneous combustion	M6	-	L3	L3	M6	-	M9	-	-	-	M6	-
Bushfire	M6	M10	-	M6	M6	-	-	-	-	-	M9	M6
Mine subsidence	-	-	-	-	H13	-	-	-	-	-	-	-
Methane drainage / ventilation	-	-	-	-	M9	-	-	-	-	L4	-	-
Public Safety	M10	-	M10	M10	M9	L5	L5	M6	M7	M8	L2	M6

3.2 Environmental Management System

In order to appropriately manage environmental issues and ensure that site operations conform to all relevant statutory requirements, ACOL established an Environmental Management System (EMS). The EMS (ACOL, h) is based on an environmental policy and a series of procedures, protocols and management plans that address specific management actions for each aspect of mining operations at the ACP. The EMS has been formulated to provide for the effective management of all environmental issues related to the ACP operations and provide a mechanism for their assessment and mitigation.

3.3 Environmental Management Plans

ACOL manages its day to day activities at the ACP through a series of management plans required under DA 309-11-2001-i and internal procedures. All EMS documents are readily available across the organisation and made available on the ACOL website.

Management strategies, plans and monitoring programmes are prepared as required by development approval conditions, conditions to the relevant mining lease and legislative and operational requirements. Environmental procedures have been established, documented and maintained for all mining related activities that have a potentially significant impact on the environment. Procedures provide details of correct operation and maintenance of facilities, equipment and machinery where required. Where possible a management plan or program has been developed for all operations that entail a degree of environmental risk.

3.4 Air Quality

Air quality at the ACP is managed by the approved Air Quality and Greenhouse Gas Management Plan (AQGGMP) (ACOL, a). The AQGGMP describes the measures implemented by ACOL to manage and mitigate impacts on air quality for the ACP. The potential for air quality impacts from the ACP on surrounding residences is low following the cessation of open cut mining activities at the NEOC with the CHPP only processing coal from underground operations. Activities which do have the potential to impact on air quality consist of topsoil stripping, surface drilling, stockpiling of materials and underground ventilation fan exhaust and associated gas drainage structures.

Controls have been put in place in accordance with the AQGGMP to control potential sources of air pollution and greenhouse gas (GHG). The controls can be split into three categories which are outlined below.

Planning Controls:

- Planning of any new activity with potential for significant dust or GHG generation will consider practical opportunities to minimise emissions, and balance these considerations with any relevant competing considerations such as cost, timelines and other environmental or social factors.

Engineering Controls:

- Keep ground disturbance areas to the minimum and rehabilitate if not required for ongoing activities;
- Day to day planning, taking into account weather forecasts and conditions;
- Water carts utilised around the site to keep trafficked areas in a damp condition;
- All stockpiles are kept damp by the use of fixed or mobile water sprays under dry and windy conditions;
- Roads are regularly graded to ensure that loose dust-generating surface material is kept to the lowest level practicable;
- Speed limits on mine roads are restricted to 60 km/hr. Speed limits will be reduced if required to maintain dust emission at minimum levels;

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- Roads are clearly delineated to minimise trafficked areas and to ensure that traffic is kept to watered areas;
- Dump hoppers will be fitted with a suppression water spray system and windshields;
- Drill areas are wetted down prior to drilling during dry and windy conditions and drills will be equipped with water injection systems where required;
- Haul trucks and other earthmoving equipment with upwardly directed exhausts are used on site to minimise the generation of dust by exhaust emissions; and
- All diesel equipment used on site is maintained properly and fitted with appropriate pollution control devices.
- Energy efficient equipment will be specified for all new upgraded mobile or fixed plant; and
- Flaring of gas extracted from gas drainage bores will be undertaken where feasible to reduce GHG emission.

Responsive / real time actions

Response actions will depend on the activities occurring on-site and may involve:

- Increasing the frequency of watering for exposed areas and stockpiles; and
- Increasing the frequency of watering on unpaved roads.
- Maintenance of unpaved roads and closure of unnecessary roads.

3.5 Soil Types and Suitability

Data derived from previous environmental assessments (HLA, 2001) demonstrates the suitability of the soils at the ACP in terms of suitability for use as top dressing and the required stripping depth.

3.5.1 Topsoil Re-spreading

Topsoil will be sourced from temporary stockpiles of alluvial spoil (remaining stockpiles associated with the previous BCD construction works only) or other acceptable source of Virgin Excavated Natural Material (VENM). Topsoil will only be re-spread on final landforms designated as supporting future pasture (as required). Topsoil will be re-spread at a minimum depth of 100 mm. Topsoil re-spreading operations will not be undertaken when the material is excessively wet or dry. Where required, soil ameliorant and fertiliser would be applied to improve the availability of nutrients. The appropriate application rates for soil ameliorants at ACP established through ongoing trials work of revegetation techniques and varying application rates.

3.6 Steep Slopes

Steep slopes are defined as an area of land having a natural gradient ranging between 18 and 45 (Geotech Solutions 2011) No slopes have been rehabilitated to an incline greater than 18 degrees at the ACP.

The land overlying the underground mining area is predominantly gently sloping with ground slope generally ranging between two and three degrees. However areas of steeper slopes occur within the underground mining area adjacent to Glennies Creek and the Hunter River. Potential impacts to these areas were considered within the context of the ULD LW 101-108 Extraction Plan (EP) (Geotech Solutions 2011) and the risk of slope instability occurring was found to be very low to low.

Whilst the risk has been assessed as very low, if slope instability occurs or is recognised as potentially having an increased risk during extraction a geotechnical engineer will be engaged to assist and measures developed and implemented to mitigate the risk. Inspections of steep slope areas adjacent to Glennies Creek and the Hunter River will occur as part of the implementation of Extraction Plans and potential risks would be identified during monthly environmental inspections.

Surface cracking (occurring as a result of mine subsidence) identified on or immediately above steep slopes along the Hunter River and Glennies Creek will be filled as soon as possible following passing of the longwall face and completion of subsidence movements.

3.7 Erosion and Sedimentation

Land degradation, soil erosion and the generation of sediment can be caused by a variety of activities at the ACP, which include:

- Mine-induced subsidence and cracking;
- Contained reject emplacement in the NEOC;
- Stockpiling in the CHPP area;
- Gas drainage bores;
- Surface disturbance at the gas drainage plant area;
- Failure of the BCD; and
- Rehabilitation of the BCD.

Erosion and sedimentation at the ACP is currently managed by the approved Water Management Plan (WMP) (ACOL, b). The WMP was developed to control and mitigate erosion and sediment impacts that may arise from the ACP operations. The WMP details a range of management safeguards, practices and controls and ameliorative actions to be carried out in mitigating erosion and sediment impacts. Measures to manage erosion and sediment control during ground disturbance activities include:

- Diverting clean water around construction areas;
- Capturing runoff from disturbed areas within a sediment dam for treatment;
- Installing sediment fencing, hay bales, or other suitable controls down slope of disturbed areas to inhibit sediment laden runoff or divert runoff away from the remediated area until sufficient ground cover has been established;
- Surfacing infrastructure pad areas and access tracks with an appropriate road base material, where required;
- Stabilising stockpiles that will be left for any length of time with jute mesh, hydromulch and or grass cover;
- Regular inspection and monitoring;
- Immediately remediating erosion; and
- Promptly rehabilitating disturbed areas no longer required for ongoing operations.

3.8 Existing Landscape Management Practices

ACOL implements a range of land management practices to reduce or prevent land degradation. These practices are implemented in accordance with the following approved management plans (or future approved versions thereof), including:

- **Ashton Coal Bushfire Management Plan** (Ashton Coal, 2014) – identifies ongoing activities which ACOL undertake to manage bushfire risk including maintaining Asset Protection Zones, maintaining tracks and site access, controlling spark emission and maintaining infrastructure. An annual bushfire hazard assessment is conducted prior to each bushfire season;
- **Ashton Coal Project Flora and Fauna (Biodiversity) Management Plan** (ACOL, c) – identifies the ongoing management actions which ACOL undertake to minimise the risk of impacts to threatened species through habitat enhancement and suitable protection measures. It also provides detailed performance measures and indicators of success which are assessed through ongoing monitoring activities.; and
- **Ashton Coal Site Water Management Plan** (ACOL, b) – Identifies the actions ACOL undertakes to manage surface water flows and potential flooding on site. This plan also

contains site specific erosion and sediment control measures which are designed to adequately manage the existing landscape.

General landform management, including subsidence repair and ponding management, is described in the approved Upper Liddell Seam Extraction Plan LW 105 – 107 (ACOL, k; July 2015), the LW 201 – 204 Extraction Plan (ACOL, l; November 2016), the SCT Update of Final Landform Estimate (SCT, 2018), and this MOP (Section 3.21).

3.9 Surface Water

Surface water at the ACP is managed in accordance with ACOL's approved WMP (ACOL, b) which describes the water management system. There are several mine water storages on the ACP site, including the NEOC, Process Water Dam, Settling Dam, Dam 56 and Arties Pit Sump. No discharge of surface water occurs from the ACP, with all mine affected water stored in mine water storages for use on site. Water demand is supplied by site runoff, underground dewatering, tailings reclaim and water sourced from the Hunter River and Glennies Creek via water allocation licences (WALs). ACOL also has an agreement with the neighbouring Glennies Creek Mine (Integra) for the supply of up to 900ML per year of mine affected water from those operations if required.

Measures to minimise use of WAL water include:

- Recovery of tailings bleed water and use of this as a priority for CHPP and truckfill demand.
- Continued supply from Glennies Creek Mine where the water quality is suitable for intended site uses.
- Storage and use of runoff from disturbed areas.
- Use of water reclaimed from underground operations.
- Maintenance of water management infrastructure to ensure efficient operation and minimisation of wastage.

ACOL are also investigating the feasibility of diverting the rehabilitated surface catchment of the NEOC waste rock emplacement away from the mine water catchment once suitable water quality has been demonstrated. The planned concept for redirected drainage from these rehabilitated areas is illustrated in Figure 1. The previous MOP (2013 – 2017) detailed previous assessments undertaken for the proposed NEOC clean water diversion strategy, including a hydrological assessment (Gilbert and Associates, 2015) and aquatic ecology assessment (Marine Pollution Research, 2016). Potential impacts to aquatic habitats or ecology are not expected to occur as a result of the redirection of clean water runoff from the rehabilitated NEOC spoil emplacement area.

The ACOL WMP incorporates a Surface Water Management Plan (SWMP). The SWMP provides baseline data for natural waterways potentially affected by the ACP, nominates surface water impact assessment criteria for investigating potentially adverse impacts, and provides details of the monitoring program used to monitor the effects of the ACP on existing surface water bodies (ACOL, b). If monitoring detects off-site impacts as a result of ACP operations, the response plans provided in the WMP (refer to Section 3.11) are implemented.

The WMP or SWMP outlines surface water monitoring schedule, parameters and resulting management actions. Surface water monitoring activities at ACOL are used to:

- Monitor trends in water use and efficiency;
- Assess mine water inflows;
- Check stored water inventory;
- Validate or re-calibrate the mine water balance; and
- Assist in future mine water supply and management planning.

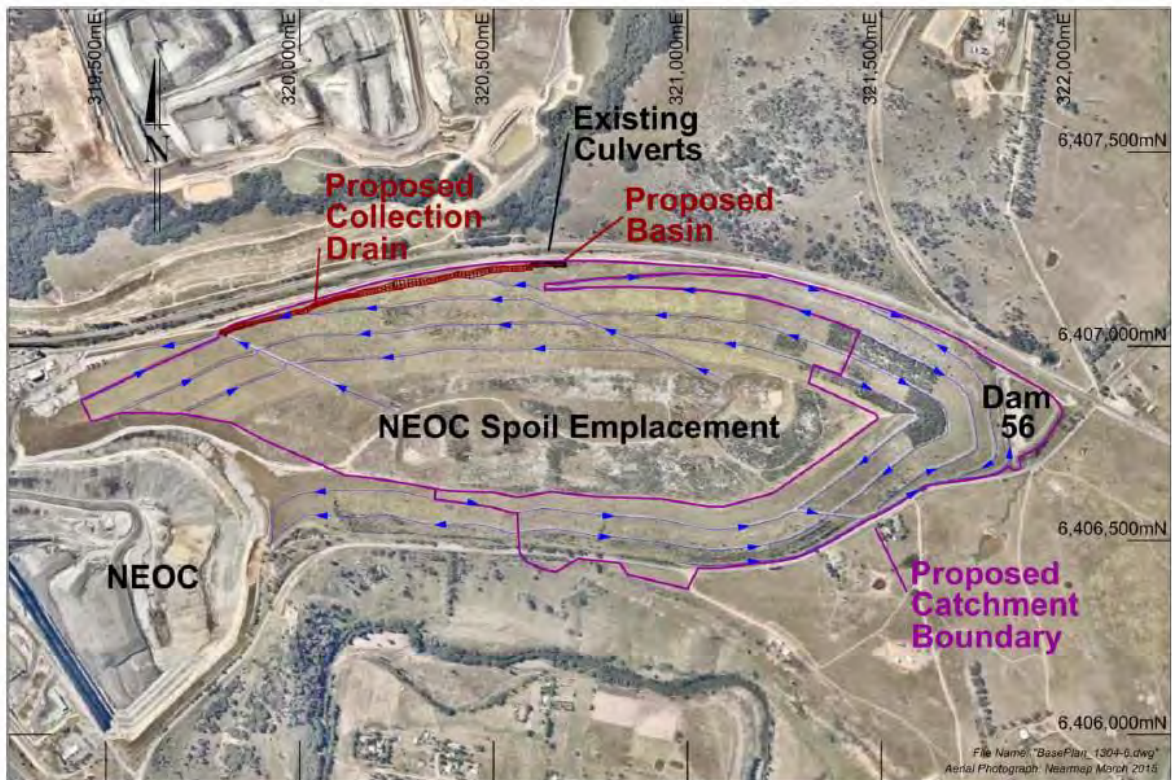


Figure 1: Proposed NEOC Spoil Emplacement Drainage (Gilbert and Associates, 2015)

3.10 Groundwater Management

The WMP has been developed by ACOL to manage risks associated with groundwater. The WMP incorporates the Groundwater Management Plan (GMP) which outlines the strategy to manage groundwater at the ACP. The objective of the GMP is to provide baseline data for the area that could possibly be affected by the ACP, nominate groundwater impact assessment criteria for investigating any potentially adverse impacts and provide details of the monitoring program used to monitor the effects of the ACP on surrounding groundwater aquifers (ACOL, b). The monitoring program will assist to detect off-site impacts resulting from ACP operations and trigger the response plan.

3.11 Surface and Groundwater Response Plan

The Surface and Groundwater Response Plan (SGRP) is part of the WMP. The objective of this SGRP is to present a set of protocols to be followed and actions to be implemented should the surface or groundwater impact assessment criteria be exceeded.

In the event of a surface water and groundwater assessment criterion being exceeded the SGRP requires the exceedance to be investigated with appropriate regulatory reporting and remedial/compensatory measures if proven.

3.12 Contaminated Land

There are no currently defined areas of contaminated land within the ACP boundaries.

3.13 Containment of Hazardous Materials

ACOL endeavours to ensure active and efficient management of hazardous materials within its operations. ACOL has a current Dangerous Goods Register for all products stored and handled on the premises as required under the *Work Health and Safety Regulation 2011*. This register lists the Dangerous Goods stored and handled at the site (for Open Cut, CHPP and Underground operations), and ACOL has submitted a Dangerous Goods notification to Work Cover as required by the *Work Health and Safety Regulation 2011*.

Oils, fuels, greases and chemicals are labelled and stored in designated, impermeable bunded areas or approved storage facilities and are only used on a prescribed basis. Appropriate barriers are in place to eliminate the potential for soil contamination. Bunded fuel and oil storage areas are located near the NEOC Workshop, CHPP Store and the Underground Pit Top Workshop.

The storage and use of explosive materials on-site is no longer required since completion of Open Cut Mining. Should these be required in the future they will be addressed in consultation with DRG and DP&E.

Radiation sources are managed in accordance with the *Radiation Control Act 1990* and licences and shown in Table 6.

3.14 Acid Mine Drainage

Acid mine drainage is not considered to be a concern at the ACP. In 2008 ACOL commissioned Environmental Geochemistry International Pty Ltd to conduct an acid rock drainage assessment of the proposed SEOC project. Waste samples from the NEOC, CHPP and underground operations were also geochemically tested. They were found to contain significant amounts of pyrite (an acid forming mineral) but this was offset by an excess buffering capacity so that CHPP waste materials were overall considered Non Acid Forming (NAF) with a high factor of safety.

As an ongoing precautionary measure, groundwater seepage and drainage from emplaced materials will be periodically tested for signs of acid rock drainage.

3.15 Flora and Fauna (Biodiversity) Management Plan

A Flora and Fauna (Biodiversity) Management Plan (FFMP) (ACOL, c) has been prepared to address the management of potential impacts (if any) of the ACP to aquatic and terrestrial flora and fauna. The FFMP was prepared to address Schedule 3, Condition 28 and Schedule 5, Condition 2 of the Development Consent DA 309-11-2001 (as amended), to the satisfaction of the Secretary of DP&E. The FFMP incorporates the Biodiversity Offset Management Plan (BOMP) which was developed to provide consistency with the *Hunter Valley Coal Mines – best Practice Guidelines for Biodiversity Offset Management Plans*, (DPE, 2014).

A detailed flora and fauna impact assessment was conducted for the ACP EIS (HLA, 2001), with subsequent surveys and biannual monitoring reports conducted in accordance with development consent conditions and statutory requirements. A riparian and aquatic ecology assessment report was also prepared for the Bowmans Creek Diversion EA (MPR, 2009). These surveys identify 20 threatened flora and fauna species and populations likely to occur within the ACP (Table 20).

The list of threatened Flora and fauna species is updated following the recording of any new threatened species during the site surveys for monitoring.

Table 20 Threatened Species and Populations likely to occur within the ACP

Population or Species	BC Act	EPBC Act
River Red Gum (<i>Eucalyptus camaldulensis</i>) population in the Hunter Catchment	E	-
Green and Golden Bell Frog <i>Litoria aurea</i>	E1	V
Giant Burrowing Frog <i>Heleioporus australiacus</i>	V	V
Hooded Robin <i>Melanodryas cucullata cucullata</i>	V	-
Grey-crowned Babbler <i>Pomatostomus temporalis temporalis</i>	V	-
Speckled Warbler <i>Pyrrholaemus sagittatus</i>	V	-
Turquoise Parrot <i>Neophema pulchella</i>	V	-
Flame Robin <i>Petroica phoenicea</i>	V	
Diamond Firetail <i>Stagonopleura guttata</i>	V	
Spotted Harrier <i>Circus assimilis</i>	V	
Black-breasted Buzzard <i>Hamirostra melanosternon</i>	V	
Little Eagle <i>Hieraaetus morphnoides</i>	V	
Large-eared Pied Bat <i>Chalinolobus dwyeri</i>	V	V
Spotted-tail Quoll <i>Dasyurus maculates</i>	V	E
Eastern Bentwing-bat <i>Miniopterus schreibersii oceanensis</i>	V	-
Squirrel Glider <i>Petaurus norfolcensis</i>	V	-
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	V	V
Yellow-bellied Sheath-tail Bat <i>Saccolaimus flaviventris</i>	V	-
Southern myotis <i>Myotis macropus</i>	V	-
Eastern freetail-bat <i>Mormopterus norfolkensis</i>	V	-
Scarlet Robin <i>Petroica phoenicea</i>	V	-

Population or Species	BC Act	EPBC Act
Greater broad – nosed bat <i>Scoteanax ruppellii</i>	V	-
Brush-tailed phascogale <i>Phascogale tapatafa</i>	V	-
Masked Owl <i>Tyto novaehollandia</i>	V	-

E = Endangered; V = Vulnerable

3.15.1 River Red Gums

Two narrow bands of *Eucalyptus camaldulensis* (River Red Gum) open woodland occur along the banks of Bowmans Creek near the Hunter River and are confined to the riparian corridor outside of the mining lease area, approximately 1km upstream from the Hunter River confluence. This population is listed as an endangered population under the *Biodiversity Conservation Act 2016* (BC Act). No area of this community will be removed as part of the project.

Bi-annual monitoring of the River Red Gum populations is undertaken, including visual surveys of ground disturbance, tree health and community health.

3.15.2 Riparian and Terrestrial Habitats

Terrestrial habitats across the ACP include riparian corridors, floodplain pasture, flood terraces, upland forest woodland remnants and pasture with scattered trees. Isolated mature hollow-bearing trees and stags provide potential shelter and breeding habitat for a number of bird and arboreal mammal species. Fallen logs and leaf litter provide shelter and breeding habitat for small ground-dwelling mammals and reptiles with the grassy understorey and fallen timber providing suitable foraging substrate for the threatened grey-crowned babbler, speckled warbler and hooded robin.

Riparian habitats along Bowmans and Glennies Creek form part of a fragmented corridor south along the Hunter River and Wollombi Brook. This corridor is likely to be important for fauna movement from the surrounding area into vegetation and habitats of Wollemi National Park on the southern ranges of the Hunter Valley.

The Voluntary Conservation Area (VCA) which encompasses existing habitat within the south east of the ACP, is also referred to as the Southern Woodland. This VCA consists of remnant woodland habitat set aside as a conservation area, in accordance with Development Consent Condition 27 of Schedule 3. In accordance with the Development Consent, active underground mining will be undertaken in this area over the life of the ACP. Where possible, surface disturbance will be kept to a minimum in accordance with the Conservation Agreement and BOMP.

3.15.3 Aquatic Habitats

As described by Marine Pollution Research (MPR, 2009), Bowmans Creek within the ACP provides the following important ecological functions:

- Intermittent fish passage between the Hunter River and other upper catchment tributaries upstream of the New England Highway;
- Off-line fish refuge habitat during extended Hunter River flood events;
- Fish nesting habitat in the form of gravel bars in pools; and

- A complex of aquatic ecological habitats (cobble and sediment pools and riffles, rock bar pools) with varying depths and aquatic/emergent plants to support a complex assemblage of aquatic macro invertebrate fauna.

Glennies Creek within the ACP provides valuable fish habitat and supports permanent flow throughout its length. A number of native fish species and platypus are known to inhabit the area. Aquatic vegetation is present throughout the creek length and there are no significant impediments to fish or platypus migration through the ACP (MPR, 2009).

No species of fish or aquatic invertebrates listed under the NSW Fisheries Management Act 1994 or the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) has been recorded in any of the Bowmans Creek or Glennies Creek monitoring surveys to date. No Groundwater Dependant Ecosystems (GDE) have been reported to date within those parts of the alluvium that are predicted to be impacted during mining activities.

3.15.4 Threatened Species and Habitat Management

Flora and Fauna

Risks to flora and fauna at the ACP are managed through the FFMP (ACOL, c). The main management actions within the plan can be split into three categories, monitoring, management and incident response. The FFMP provides procedures and management methods for the control and minimisation of impacts to any threatened species or populations. Specific habitats on-site are also managed through the FFMP as well as vegetation communities and disturbance protocols.

Screening and Fauna Protection Corridors

A series of wildlife corridors at the ACP have been developed and are maintained as per the Rehabilitation Strategy (Evans & Peck 2009) and Landscape Restoration Report (AECOM 2009). They have been developed to create a mosaic of agricultural land and wildlife habitat that is consistent with reference sites, with linkages extending to neighbouring properties and other approved habitat corridors.

Weeds

Weeds will be controlled in accordance with the requirements of the relevant legislation and weed/land management authorities.

Feral Pests

Predation of the threatened species will be managed through a feral animal control program within the ACP. Due to the low density of feral animals, management activities will be centred on a baiting program supplemented by culling by professional shooters where required. Trapping is also employed for fox, dogs and pigs where either population densities warrant such methods.

3.16 Noise

The Noise Management Plan (NMP) describes the measures to be implemented by ACOL to manage and mitigate impacts on privately owned residences and tenants of mine owned properties due to activities at the ACP. The NMP has been prepared to satisfy relevant conditions of the ACP DA in consultation with the EPA and to the satisfaction of the Secretary of the NSW DP&E.

ACP noise is managed in accordance with the approved Noise Management Plan (NMP) (ACOL, d). Real-time meteorological data is used to make decisions on how mining activities will be modified or suspended based on the criteria outlined in the NMP. Management measures undertaken during adverse weather conditions are also documented in the NMP.

3.17 Visual Amenity and Lighting

Management of visual amenity at the ACP is addressed through a series of key actions which include:

- ACP office facilities have been positioned below the ridge along Glennies Creek Road to be below the visual line of sight;
 - The facility was constructed on the lower side of the hill to provide natural screening from the New England Highway and the village of Camberwell;
 - The CHPP facilities have been positioned at the western extremity of the infrastructure area, remote from the village of Camberwell;
 - Buildings and structures will be designed and built in order to present a neat and orderly appearance and to blend as far as practicable with the surrounding landscape;
 - Use of non-reflective natural colours in all exterior building materials, including neutral browns, beiges, muted greens and greys;
 - Periodic inspection of ACP buildings and facilities to identify any disrepair or degradation of the visual appearance of buildings, structures and facilities.
 - The construction of vegetated environmental bunds to screen infrastructure and emplacement areas from Camberwell residents as well as northbound highway motorists;
 - Progressive rehabilitation of emplacement areas;
 - Shaping of bunds to existing topography so that there are no 'hard' edges;
 - Appropriate site layout to minimise light impacts to Camberwell Village and the New England Highway;
 - Tree screens in strategic locations to diffuse light emanating from the site;
 - Placement of lighting only where it is required (e.g. for operations or security). All lighting will be focused on the subject area and directed downwards as much as possible;
 - Flood lighting is to be faced inward to the ACP area to avoid light spilling on to public roads; and
- Lighting will be of the minimum wattage possible whilst not compromising safety or OH&S requirements.

3.18 Heritage (Aboriginal and European)

The Heritage Management Plan (HMP) (ACOL, e), previously known as the Archaeology and Cultural Heritage Management Plan (ACHMP), has been prepared to address the management and mitigation of potential impacts of the ACP on Aboriginal cultural and historical heritage across the surface area of the underground mine. The HMP combines the management strategies developed in consultation with the Aboriginal and Historical Heritage Community and the requirements of the associated Aboriginal Heritage Impact Permits (AHIP), Development Approval and Extraction Plans into one document.

In 2011, ACOL gained two AHIPs covering the whole of the underground mine. These permits set out conditions for mining related impacts to Aboriginal heritage sites.

Potential impacts to heritage sites may arise from:

- Subsidence cracking resulting from underground mining
- Remediation of subsidence cracks;
- Knick points and rilling caused by changes in slope which modifies erosion patterns;
- The formation of ponds caused by subsidence depressions; and
- The development of surface infrastructure used to facilitate underground mining operations.

Indigenous heritage items located at the ACP are managed in accordance with approved AHIPs. AHIP boundaries are detailed in Map 1C.

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Under the HMP, where required, artefacts at risk of harm will be recovered prior to being impacted. Sites identified for conservation (e.g. Waterhole Site and Glennies Creek Site) will be maintained in accordance with the HMP and relevant AHIP.

Controls are implemented to monitor and manage heritage items and are outlined below.

Monitoring:

- Visual inspections of all in-situ sites subject to potential subsidence will be undertaken by a qualified archaeologist to record the current condition of archaeological sites. Aboriginal Parties can participate in these recordings; and
- Archaeological sites potentially affected by subsidence will be inspected monthly during that subsidence.

Management:

- Fencing around sites identified to be of high scientific and cultural significance will be maintained and monitored for potential subsidence impacts;
- Sites identified for conservation will be maintained;
- Personnel involved in disturbance works will be suitably trained, inducted and aware of the cultural significance of the area;
- The Environment and Community Relations Superintendent will be notified in the event an object believed to be of archaeological or cultural origin is discovered;
- Archaeological due diligence inspections will be undertaken for new impact areas not covered by an AHIP.
- Projects involving ground disturbance require a Ground Disturbance Permit (GDP) to be completed before commencing.

Four European heritage sites have been identified in proximity to the ACP (St Clements Anglican Church, Camberwell Community hall, Camberwell Glennies Creek Underbridge and a Historical Grave). These will not be impacted by underground mining at the ACP and no specific management measures are recommended other than to secure the sites and prevent injury following subsidence as per the Built Features Management Plan and Public Safety Management Plan.

3.19 Spontaneous Combustion

The ACP has not had any issues relating to spontaneous combustion in the past. A 2011 SGS Minerals report found the percentage of combustibles in ACP coal rejects is generally below 27%, and spontaneous combustion is not a great concern. In addition to this the method of rejects emplacement including compaction from dozer tracking reduces the risk of spontaneous combustion further.

Cumnock Colliery, which has been processing the same seams as ACOL for the past 12 years, has had no identified spontaneous combustion events. Visual monitoring has occurred over the life of the mine with no signs of heating to date.

Whilst the risk of spontaneous combustion at the ACP is considered low it has occurred at the Ravensworth Void 4 tailings storage facility which ACOL utilises to deposit tailings from its CHPP operations. ACOL monitors and manages spontaneous combustion at the Void 4 tailings facility in accordance with the TEOP for Ravensworth Void 4 (ACOL, j). There are four main components in the management on spontaneous combustion:

- Prevention;
- Detection
- Control; and
- Incident management.

The primary focus is prevention but the other components are addressed through:

- Recognition of the interaction between spontaneous combustion and ventilation;

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- Standards for the stockpiling of materials with a propensity to spontaneous combustion;
- Procedures to be adopted in changes to mine design or stockpile management techniques;
- Procedures for the inspection and monitoring of materials with a propensity for spontaneous combustion, together with reporting requirements;
- Housekeeping requirements;
- Action response plans where a potential heating is identified;
- Clear definitions of roles, responsibilities and training; and
- Regular audits and reviews to ensure the continued effectiveness of the management measures.

3.20 Bushfire

Bushfire risk is managed at the ACP through ameliorative actions as well as management safeguards.

Ameliorative actions include:

- Ensuring mining activities with potential to cause ignition such as sparks from vehicles, metal grinding, welding (etc.) are managed.
- Ensuring vegetation does not interfere with power lines.
- Creating firebreaks to ensure that bushfire does not spread from surrounding lands.

Management safeguards include:

- The provision of firefighting equipment;
- Fire training for staff and on site fire-fighting team;
- Suppression of any bushfire outbreaks;
- Set up appropriate communication strategies to ensure all employees, contractors and service providers are aware of fire emergency policies and procedures;
- Communication and liaison processes with the Upper Hunter Rural Fire Service (RFS) are in place in relation to preparation of Bushfire Management Procedures; and
- Develop appropriate fire breaks and perimeter trails.

3.21 Mine Subsidence

Mine subsidence impacts are managed through the preparation (and approval) of EPs. The EP's define the monitoring and management of subsidence effects from second workings and guide specific land management outcomes for the lands impacted by the underground mine.

Current approved EPs include the *Upper Liddell Seam Extraction Plan LW 105 - 107* (July 2015) and the *Ashton Coal Mine LW 201 – 204 Extraction Plan* (November 2016) for ULLD Seam. Additional EPs will be prepared as required for the remaining panels to be mined within the ULLD and LB Seams.

The EPs outline revised subsidence predictions, a system of ongoing monitoring and management actions for specific surface and subsurface items. The objectives of the EPs are to ensure adequate protection of natural and built features from direct and indirect subsidence impacts.

Predicted subsidence impacts to built features are addressed through the Built Features Management Plan (BFMP) and supporting Asset Management Plans (AMPs) which together, form part of the EP. The BFMP identifies management objectives and asset owners potentially impacted by subsidence whilst the AMPs detail specific monitoring, management, incident response and reporting actions to mitigate potential subsidence impacts.

Together, the EPs and MOP outline objectives relevant to subsidence impacts, and detail specific monitoring, management, incident response and reporting activities relevant to underground operations during the term of this MOP. These include:

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- Provisions to repair persistent subsidence impacts (e.g. surface cracking) through ripping or filling; and
- Drainage works and rehabilitation of subsidence troughs on areas elevated above the floodplain as necessary to maintain a free draining landscape.

Basic land management practices relating to subsidence include:

- Open areas of pasture impacted by mining subsidence will be deep ripped to a depth of approximately 600 mm for the purposes of repairing surface cracking and/or compaction, where required. The ripping should be undertaken with a bulldozer (or other suitable equipment) and rip lines should closely follow the contour; and
- Wooded areas impacted by mining subsidence will be deep ripped where access is possible, or excavated and compacted using smaller equipment and imported fill where required. Where possible, tree clearing will be minimised providing that effective and safe remediation can be undertaken. Where this is not possible trees will be felled prioritising smaller regrowth over larger trees. Where possible felled timber will be reused on site for habitat improvement or emission control.

Under the EP, surface cracking will be closely monitored and remediated as required to ensure existing drainage lines continue to function. Where required, cracks will be reshaped, scarified and stabilised, topsoil applied if necessary and then direct seeded. Interim erosion control devices such as hay bales and geotextile barriers will be provided as necessary to divert surface runoff away from the remediated area until sufficient ground cover has been established. Nick points in grassland or woodland areas will be reshaped and remediated in a similar manner or may be managed by the use of coir log dams which may be installed at nick points to assist in slowing surface water flows allowing siltation upslope of the log.

Minor ephemeral drainage lines may develop nick points that will require reshaping to ensure velocities and scour characteristics are not altered. Once reshaped, any steepened areas that may remain unstable will be lined with loosely placed rock to dissipate runoff energy. While it is not expected to occur, surface cracking of rock exposures in drainage lines may be sealed by cement or chemical grout as appropriate.

3.21.1 Concepts and Process for Final landform Development

The term of this MOP is limited to extraction of the remainder of the ULD Seam (LW 106B, 107A and 107B) and ULLD Seam (LW 201 – 208), with associated impacts managed under an approved EP. Additional EPs will be required to be prepared and approved prior to extraction of the ULLD Seam western panels (LW 205 – 208) and LB Seam.

The potential for surface ponding exists as a consequence of cumulative subsidence during the extraction of lower coal seams. The potential environmental consequences of subsidence associated with future extraction of the lower seams will be considered in detail through the EP approval process. The EP ensures environmental impacts like surface ponding are assessed and managed based on a continually improved understanding of the site environment and site-specific subsidence behaviour. Monitoring of the environment, geological conditions and the subsequent response to mining has been in place at the ACP since prior to mining.

Ponding Management for LW 105 – 107

Details relating to the management of ponding from subsidence in LW 105 to 107 are outlined in Section 4.1.2 of the Subsidence Report for LW 105-107 (SCT, 2015). While this study has been superseded by SCT (2018), the ponding management strategies are consistent with those outlined in the current assessment. Potential options to improve the free draining characteristics of those sections of the landform that are required to be free draining include:

- Clearing existing drainage lines that have become blocked by vegetation or by construction works associated with the Bowmans Creek Diversion; and

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- Forming drainage lines that allow overflow into existing watercourses that feed into Bowmans Creek or the Hunter River.

ACOL is planning to manage the impacts of ponding using a combination of these approaches via an adaptive management strategy and appropriate approvals.

Ponding Management for LW 201 – 204

Details relating to the management of ponding from subsidence in LW 201 to 204 are provided in the EP for LW 201-204 (SCT, 2016). Changes to the natural landform over LW 201-204 were predicted to cause some ponding in the natural drainage lines that generally flow down to the Bowmans Creek floodplain including increased ponding within a series of farm dams and potentially causing inundation of some infrastructure.

Relocation of this infrastructure, filling, or local regrading of the landform was considered likely to be required to manage these impacts (SCT, 2016). This may include forming drainage lines that allow overflow into existing watercourses that feed into Bowmans Creek or the Hunter River. Further details are provided in the ACOL EP for LW 201-204. While this study has been superseded by SCT (2018), the ponding management strategies are consistent with those outlined in the current study.

Ponding management for future extraction

Several EP ponding studies have been undertaken previously for ULD Seam LW 105 - 107 (SCT, 2015) and ULLD Seam LW 201 – 204 (SCT, 2016). SCT prepared an updated final landform estimate (SCT, 2018) including contour plans of the landform at various stages of mining and estimated areas of ponding at the end of mining within the LB Seam.

The SCT (2018) assessment is consistent with previous ponding studies, but supersedes them as the previous estimates relate to different mining geometries and sequencing of extraction.

At completion of underground mining at the ACP, the following ponds are expected to develop:

- A chain-of-ponds on each of the main drainage lines and several isolated ponds on other minor drainage lines above LW 1-4 and the northern parts of LW 5 and 6A and LW 8.
- A large pond over the southern part of LW 5 and 6A and almost all of LW 7 on the floodplain east of Bowmans Creek.
- Two large ponds and several small ponds over LW 6B and 7B in the area of the natural billabongs to the west of Bowmans Creek.

Ponding management options for each of these areas are detailed within SCT (2018).

The chain-ponds and isolated ponds can be connected together by cuts in the high points above each of the chain pillars. In some locations, the cuts would need to be about 3m deep and may need to extend across half the panel.

The large pond over the southern part of LW 5, 6A and 7A requires a cut to either Bowmans Creek or the Hunter River. A drainage channel would also be required down the centre of LW 7A and the southern half of LW 6A.

The two large ponds located in the natural billabongs to the west of Bowmans Creek above LW 6B and 7B are not able to drain naturally into the Bowmans Creek Diversion. The options available to make this area free draining are to fill it with a minimum of 300,000 m³ of material or have a permanent pumping system installed. A free draining drainage channel has been deemed to not be practical.

Subsequent EPs for the ULLD Seam (LW 205 – 208) or LB Seam will be informed by monitoring data obtained during extraction of the ULD Seam and early panels of the ULLD Seam. Future EPs will detail the ponding management strategies to be implemented to address identified areas of ponding.

3.22 Methane Drainage and Ventilation

Carbon dioxide (CO₂) and methane (CH₄) gas emissions are released during mining of the coal. These are both classified as greenhouse gases (GHG). They also pose a significant safety hazard to underground mine operations. Surface goaf gas drainage bores are proposed to improve the efficiency of mine ventilation and mine atmosphere.

ACOL has approval for development of a gas drainage network to ensure continued safe operation. The gas drainage network will continue to be constructed progressively, with additional goaf gas drainage boreholes being developed throughout the current MOP period, as discussed in Sections 2.3.1 and 3.24.2.

Currently, ACOL is required to report its GHG emissions under the National Pollutant Inventory and *National Greenhouse and Energy Report Act 2007*.

3.23 Public Safety

To prevent the public being involved in unsafe activities or incidents, a number of controls have been put in place, including:

- Access to the mine limited to the main entrance which is locked after normal working hours;
- Operational and maintenance personnel being present on-site 24 hours per day, seven days per week to accompany visitors to the site and to ensure that there are no breaches of security; and
- Ongoing monitoring of the New England Highway via survey control points outside the area of ACOL's operations.

3.24 Operational Issues which affect Rehabilitation

3.24.1 Exploration

No exploration activities are scheduled to occur in the NEOC or underground areas that are likely to affect rehabilitation during the term of this MOP.

3.24.2 Construction

Construction activities at the ACP that may impact upon rehabilitation include construction of the full height Bowmans Creek Diversion block banks, installation of goaf gas boreholes and the gas drainage pipeline network and associated infrastructure. A discussion of each of these is provided in Section 2.3.

Bowmans Creek Diversion

The BCD Rehabilitation Strategy (ACOL, g) presents rehabilitation requirements for the BCD in three phases:

1. Phase 1 – Site stabilisation and enhancement of vegetation in and along the constructed creek channels and remaining active sections of the creek (years 1-3).
2. Phase 2 – Provision of vegetation community structure (years 3-6).
3. Phase 3 – Enrichment of species diversity (year 6 onwards).

Annual rehabilitation monitoring of the BCD revegetation areas indicates that the BCD revegetation program has largely been successful and has now moved into Phase 2 where species diversity is increased (as reported in the ACOL 2017 Annual Review).

Goaf Gas Boreholes

Each goaf gas borehole will be located on a level pad up to approximately 20 x 15m in size. The surface pad contains a 300mm diameter borehole for the gas well and associated infrastructure. Access tracks are also being constructed for each of the wells where tracks do not already exist. Potential impacts from the wells include erosion and sedimentation issues from exposed access tracks and pad, further details of construction are outlined in Section 2.3.1. These areas will not be rehabilitated during the life of this MOP.

Gas Drainage Network

Rehabilitation of the areas disturbed by the gas drainage network will not be conducted during the life of this MOP.

3.24.3 Mining Method and Features

Subsidence associated with long wall mining will require rehabilitation during the MOP period. The relevant EPs highlight which ground surface areas will be impacted by subsidence issues, based on subsidence predictions. Subsidence properties that will impact on rehabilitation requirements include: surface cracking, subsurface cracking, and ponding.

The cumulative subsidence from mining the PG, ULD, ULLD and LB Seams could be up to 6 – 8 m. This will impact upon the rehabilitation objective of maintaining a free draining landform. Effects of subsidence identified in the EP for the ULD Seam LW 105 - 107 (ACOL, k) and the EP for the ULLD Seam LW 201 – 204 (ACOL, l) include:

- altered surface flow and localised changes in water availability;
- redirection of soil moisture and nutrient distribution;
- increased risk of erosion;
- cracks in the soil surface;
- increased surface drainage and altered productivity;
- landslip of surface terrain; and
- decreased productivity of agricultural lands.

Rehabilitation of the ACP includes management of subsidence impacts with measures including:

- monitoring to identify any changes in surface drainage, pasture/soil productivity, ponding, slope stability, cracking;
- repair of permanent subsidence cracking; and
- undertaking drainage works and rehabilitation of subsidence troughs on areas elevated above the floodplain as necessary to maintain a free draining landscape.

3.24.4 Mineral Processing Residues and Tailings

The NEOC void has been designed to allow rejects and tailings emplacement, and efficient dewatering for maximum water recovery. The indicative final landform is provided in Drawing C1002 at Appendix D.

Once capped and trimmed to a gently undulating landform the area will be revegetated with improved pastures. Water will drain from east to west and into the existing process water storage dam. The capping and remediation of the NEOC Void Tailing Emplacement Facility is not scheduled to occur during the term of this MOP.

Tailings are currently disposed of in the Ravensworth Void 4 tailings dam, with management and rehabilitation of the Ravensworth Void dealt with separately to this MOP in accordance with licences and approvals that are external to the ACP operations.

4 Post Mining Landuse

4.1 Regulatory Requirements

The regulatory requirements specific to post mining land-use and rehabilitation outcomes at the ACP are summarised in Appendix B – Regulatory Requirements.

4.2 Post Mining Landuse Goal

4.2.1 Consideration of Final Land Use Options

ACOL has investigated a number of potential land use options based on environmental assessment and consultation with key stakeholders in the community (including ACOL CCC), which included habitat conservation, managed cattle grazing, cropping, viticulture, industrial estates, commercial forestry, and other commercial/community enterprises.

In accordance with the ACOL objectives for mine closure and rehabilitation, potential land uses selected were evaluated based on criteria such as:

- Community and stakeholder acceptance;
- Health and safety considerations;
- Potential environmental impacts;
- Land Use guidelines such as
 - the Upper Hunter Synoptic Plan DMR (1999) and
 - Singleton Land Use Strategy (April 2008);
- Regulatory requirements and legal liability; and
- Contributions to the local economy and employment.

Based on these considerations and consultation with the local community, it was concluded that a combination of habitat conservation and managed cattle grazing was the more appropriate landuse option. Cattle grazing activities may be actively managed in a sustainable manner in the long term within the constraints of the final landform and the environment within and surrounding ACOL holdings. These activities may also be managed in such a way as to allow effective rehabilitation outcomes to be achieved in accordance with the objectives for mine closure. A cattle grazing plan of management will be developed prior to the introduction of livestock into rehabilitation areas and will likely involve cattle trials to determine sustainable stocking rates.

4.2.2 Preferred Post-mining Landuse Goal

ACOL is committed to developing a stable landform that is capable of supporting self-sustaining ecosystems and landuses after the completion of mining operations at the ACP. The final landscape will be returned to the same or higher land capability than prior to mining.

A conceptual final rehabilitation plan detailing the proposed final land use is shown on Map 4.

4.3 Rehabilitation Objectives

The rehabilitation objectives (DA No 309-11-200-I Schedule 3 Table 11) which underpin the final landuse and landscape at the ACP are provided in Table 21.

Table 21 Rehabilitation Objectives

Feature	Objective
DA Area	Safe, stable & non-polluting.
Final Void	Safe, stable & non-polluting Minimise the size and depth of the final void as far as is reasonable and feasible. Minimise the drainage catchment of the final void as far as is reasonable and feasible. minimise public safety risk
Surface infrastructure	To be decommissioned and removed, unless DRG agrees otherwise.
Sections of Bowmans Creek within the underground mining area (except those section of channel made redundant by diversion)	Restore pre-mining surface flow and pool holding capacity as soon as reasonably practicable. Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than existed prior to mining.
Bowmans Creek – Eastern and Western Diversions	Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than existing in the adjacent channel prior to mining.
Land rehabilitated for agricultural purposes	Restored and maintained to the same or higher land capability than prior to mining.
Land rehabilitated for non-agricultural purposes	Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of: <ul style="list-style-type: none"> - local native plant species (unless the DRG agrees otherwise); and - a landform consistent with the surrounding environment.
Built features affected by subsidence	Repair to pre-mining condition or equivalent unless: <ul style="list-style-type: none"> - the owner agrees otherwise; or - the damage is fully restored, repaired or compensated under the <i>Coal Mine Subsidence Compensation Act 2017</i>.
Community	Ensure public safety. Minimise the adverse socio-economic effects associated with mine closure.

Notes to Table: ¹ These rehabilitation objectives apply to all subsidence impacts and environmental consequences caused by mining undertaken following the date of approval of Modification 6 to this consent on 24 December 2010, and to all surface infrastructure that forms part of the development, whether constructed prior to or following the approval of Modification 6.

² Rehabilitation of subsidence impacts and environmental consequences caused by mining which took place prior to the approval of Modification 6 may be subject to the requirements of other approvals (e.g. under a mining lease or a Subsidence Management Plan approval) or the Applicant's commitments.

5 Rehabilitation Planning and Management

5.1 Domain Selection

In accordance with the MOP Guidelines (DRE, September 2013), the Primary Domains have been defined on the premise of land management units within the mine site, usually with unique operational and functional purpose and therefore similar geophysical characteristics. Secondary Domains are defined as land management units characterised by a similar post mining land use objective.

The Primary and Secondary domains are to be defined together with the codes which have been allocated for each domain as shown in Table 22 and Table 23.

Table 22 Primary Domains

Primary Domain	Code
Infrastructure Areas	1
Tailings Emplacement Facility	2
Water Management Area	3
Pasture - Open Cut	4
Trees over Grass - Open Cut	5
Bowmans Creek Riparian Zone	6
Bowmans Creek Diversion	7
Trees over Grass - Southern Woodland Conservation Area	8
Pasture - Underground Mining Area	9
Trees over Grass - Underground	10

Table 23 Secondary Domains

Secondary Domain	Code
Water Management Area	A
Pasture	B
Trees over Grass	C
Southern Woodland Conservation Area	D
Bowmans Creek	E
Remaining Infrastructure	F

5.2 Domain Rehabilitation Objectives

The following are the common objectives of all domains:

- Safety risks are eliminated as far as reasonably practicable;
- The final landform will be stable and fit for purpose;
- A stable landform, capable of supporting pasture and/or sustainable ecosystems of native trees and shrubs;
- Disturbed land will be rehabilitated to a land capability equal to or better than the original landscape;
- The site will not be a source of pollutants;
- Ecological diversity will be maintained or enhanced by promoting biodiversity through weed and feral animal control programs;
- The agricultural value of the lands will be sustained or enhanced in a manner consistent with adjacent non-mined land; and
- Limit soil compaction and the spread of weeds by minimising site access by vehicles.

5.3 Rehabilitation Phases

The ultimate final rehabilitation objective for the ACP (i.e. post-mining) is the development of self-sustaining ecosystems across the site that is representative of the surrounding landscape. This will be achieved through a series of conceptual phases which are described as:

- Phase 1 – Decommissioning – removal of hard stand areas, buildings, contaminated materials, hazardous materials;
- Phase 2 – Landform Establishment – incorporates gradient, slope, aspect, drainage, substrate material characterisation and morphology;
- Phase 3 – Growing Media Development – incorporates physical, chemical and biological components of the growing media and ameliorants that are used to optimise the potential of the media in terms of the preferred vegetative cover;
- Phase 4 – Ecosystem and Landuse Establishment – incorporates revegetated lands and habitat augmentation; species selection, species presence and growth together with weed and pest animal control / management and establishment of flora;
- Phase 5 – Ecosystem and Landuse Sustainability – incorporates components of floristic structure, nutrient cycling recruitment and recovery, community structure and function which are the key elements of a sustainable landscape; and
- Phase 6 - Rehabilitation Complete – Landuse and landscape is deemed as suitable to be relinquished from the Mining Lease.

Table 24 shows the relevant rehabilitation phases for each domain, based on the post mining land use and landscape.

Table 24 Rehabilitation Phases - Primary Domain based on Post Mining Land Use

x	Active rehabilitation phases during the term of this MOP
X	Inactive rehabilitation phases during the term of this MOP
c	Phase completed during previous MOP term

Domain \ Rehabilitation Phase	Bowmans Creek Riparian Zone	Bowmans Creek Diversion	Infrastructure Areas	Water Management Areas	Pasture – Underground Mining Area	Trees over grass - Southern Woodland Conservation Area	Pasture - NEOC	Trees over Grass – NEOC	Trees over Grass – Underground	Void – Tailings Emplacement Facility
Phase 1 – Decommissioning	c	c	X	X	c	c	c	c	c	X
Phase 2 – Landform Establishment	c	c	X	X	c	c	c	c	c	X
Phase 3 – Growing Media Development	c	c	X	X	c	c	c	c	c	X
Phase 4 – Ecosystem and Landuse Establishment	X	X	X	X	c	X	c	c	X	X
Phase 5 – Ecosystem and Landuse Sustainability	X	X	X	X	X	X	X	X	X	X
Phase 6 – Rehabilitation Complete	X	X	X	X	X	X	X	X	X	X

5.4 Phase 1 - Decommissioning

In the context of this MOP, Phase 1 provides the processes for the removal of hard stand areas, buildings, contaminated materials and hazardous materials. No decommissioning activities are scheduled to occur during the term of this MOP.

Should site operations necessitate the decommissioning of infrastructure during the term of this MOP, appropriate performance indicators, measures and criteria will be established and reported in the Annual Review.

5.5 Phase 2 - Landform Establishment

In the context of this MOP, Landform Establishment is the process involved to achieve initial stable landforms including slopes, initial erosion controls, and drainage lines with integrated landscape features, which are compatible with surrounding landforms, whilst ensuring that the rehabilitated areas of native vegetation link with undisturbed native vegetation. No landform establishment activities are scheduled to occur during the term of this MOP.

5.6 Phase 3 - Growing Media Development

In the context of this MOP, Growing Media Development incorporates the processes involved to achieve a soil which is capable of supporting a sustainable plant community. It includes consideration of the chemical, physical and biological properties of the media and takes into account issues such as the specialist requirements (e.g. soil ameliorants) aligned to the revegetation of the disturbed areas, whilst also incorporating consideration of landuse both for grazing and biodiversity that may deviate from the traditional post mining landuse. No activities related to the development of growing media are scheduled to occur during the term of this MOP.

5.7 Phase 4 - Ecosystem and Landuse Establishment

In the context of this MOP, the Ecosystem and Landuse Establishment phase incorporates the requirements for:

- The management and control of weed and vertebrate pest species;
- Establishment of correct flora species selection in terms of the derived revegetation communities;
- The development of systems to enhance opportunities for nutrient cycling;
- The optimal use of onsite resources e.g. woody debris (logs and tree hollows), rock, mulch in terms of habitat creation and / or final landuse; and
- Establishment of measures to prevent unnecessary access and rehabilitation of redundant tracks

Rehabilitation at the ACP is generally divided into areas focused on biodiversity outcomes and areas of pasture. The criteria, performance measures and indicators for ecosystem and landuse establishment are provided for relevant domains in Table 25.

5.8 Phase 5 - Ecosystem and Landuse Sustainability

In the context of this MOP, Ecosystem and Landuse Sustainability incorporates the:

- Development of landuse and land capability which is consistent with the surrounding areas;
- Nutrient Cycling;
- Development of landuse options that provide optimal and sustainable social and economic benefit to the local community;
- Species diversity and abundance for both flora and fauna;
- Development of profiles in the growing media; and
- Vegetation communities capable of withstanding catastrophic events e.g. bushfire and extensive drought.

The criteria, performance measures and indicators for ecosystem and landuse sustainability are provided for relevant domains in Table 26.

The domains and rehabilitation phases identified for the ACP during the life of the MOP are shown on Maps 3A – 3G inclusive. The conceptual final landform and indicative landuse post mine closure is shown in Map 4.

5.9 Performance Criteria, Measures and Indicators

In accordance with the MOP Guidelines (DRE, September, 2013) the performance criteria, measure and indicators have been defined for each domain in context of the phase of the rehabilitation program. This includes the following:

- Indicator – particular aspect, property or feature of the rehabilitation program/process used to assess progress
- Measure – Method of assessment /measurement for selected indicators
- Criteria – Standard of quantitative value against which each Indicator will be assessed to demonstrate “completion” or “success”.

The criteria, measures and indicators which provide the framework for this MOP are underpinned by a range of documents which relate to land management and site rehabilitation. These include industry standards, Yancoal/ACOL Standards and Procedures and development consent conditions for the ACP. The ongoing development of these documents will provide the basis for the review of this MOP with resultant amendments being recorded in the Annual Review.

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6 Rehabilitation Tables

The performance indicators and criteria in the MOP are designed to form the basis of the performance measure and provide the ability to track the development of sustainable ecosystems through a series of conceptual stages. This information is provided in Table format in Table 25 through to Table 26 and aligned to the Rehabilitation Maps 3A-3G.

Table 25 Phase 4 Ecosystem and Landuse Establishment - Performance Criteria, Measures and Indicators

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Status
Bowmans Creek Riparian Zone					
Limit soil compaction and the spread of weeds by minimising site access by vehicles and stock.	Fencing	Adequate fencing is installed and maintained.	Vehicle access is restricted to nominated site access roads as far as practical.	FFMP (ACOL, c) <i>Biosecurity Act 2015</i> Australian and NSW Weed Strategies BC Act – Key Threatening Processes	Achieved – Fencing is satisfactory and stock access restricted.
			Stock is excluded.		
Invasive species, weeds and feral animals are effectively controlled or eliminated from site.	Distribution and density of weeds.	Annual Weed Inspection and findings reported in Annual Review	Weeds and pest animal species, and abundance are comparable to analogue sites.	FFMP (ACOL, c) <i>Biosecurity Act 2015</i> <i>Local Land Services Act 2013</i>	Not Achieved – Weeds control activity apparent but requires ongoing works to control key invasive species
	Distribution and number of feral animals.	Annual vertebrate pest survey and findings reported in Annual Review			
	Damage caused by feral animals.				
The rehabilitated landscape is enhanced using best available practices and materials.	Provision of nest boxes.	Installation of nest boxes reported in Annual Review.	Nest boxes established at a ratio of 1:3 in accordance with the FFMP.	FFMP (ACOL, c)	No nest boxes observed. Nest boxes will be installed progressively during the MOP period.
		Nest boxes monitored annually and results reported in Annual Review.	Nest boxes established are monitored and maintained.		

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Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Status
Safety risks are eliminated as far as reasonably practicable.	Bushfire hazard.	Bushfire hazard reduction activities reported in Annual Review	<p>Fire breaks and perimeter trails are maintained.</p> <p>The bushfire hazard is managed in accordance with the ACOL EMS.</p>	<i>Rural Fires Act 1997</i>	Ongoing maintenance in accordance with the EMS.
Establish vegetation profile consistent with the planned final landuse.	Revegetation species mix applied in accordance with Table 21 of this MOP.	Reporting and monitoring protocol as per the Bowmans Creek Diversion Rehabilitation Strategy (ACOL, g) employing a modified vegetation complexity assessment method (Newsome & Catling 1979).	Species mix used aligns to the intended final land use.	<i>Florabank Guidelines (1999)</i>	<p>Natural regeneration is occurring, some midstorey and shrub species observed.</p> <p>Planted River Red Gums surviving.</p> <p>River Oak Forest areas are regenerating.</p>
	Structural complexity scores.		Groundcover includes tussock grass clumps, areas of open ground and fallen timber.	Bowmans Creek Diversion Rehabilitation Strategy (ACOL, g)	
			Mid-stratum is very open to sparse, > 2 metres in height.		
		Over-storey structure ranges from forest (i.e. riparian corridor) to woodland (i.e. floodplain areas), with a diverse yet clumped species composition that is consistent with reference sites.			

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Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Status
Bowmans Creek Diversion					
Limit soil compaction and the spread of weeds by minimising site access by vehicles and stock.	Fencing	Adequate fencing is installed and maintained.	Vehicle access is restricted to nominated site access roads as far as practical.	FFMP (ACOL, c) <i>Biosecurity Act 2015</i> Australian and NSW Weed Strategies BC Act – Key Threatening Processes	Fencing is intact and in good condition restricting access to designated tracks. Tracks are well delineated and maintained.
			Stock is excluded.		Stock have been successfully excluded.
Invasive species, weeds and feral animals are effectively controlled or eliminated from site.	Distribution and density of weeds.	Annual Weed Inspection and findings reported in Annual Review	Weeds and pest animal species, and abundance are comparable to analogue sites.		FFMP (ACOL, c) <i>Biosecurity Act 2015</i> <i>Local Land Services Act 2013</i>
	Distribution and number of feral animals.	Annual vertebrate pest survey and findings reported in Annual Review		Feral animal control undertaken on an ongoing basis.	
	Damage caused by feral animals.			No evidence of feral animal damage in the planted areas	
Safety risks are eliminated as far as reasonably practicable.	Bushfire hazard.	Bushfire hazard reduction activities reported in Annual Review	Fire breaks and perimeter trails are maintained. The bushfire hazard is managed in accordance with the ACOL EMS.	<i>Rural Fires Act 1997</i>	Ongoing maintenance in accordance with the EMS.

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Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Status
Establish vegetation profile consistent with the planned final landuse.	Revegetation species mix applied in accordance with Table 21.	Rehabilitation/planting activities reported in Annual Review including date of seeding and species mix used.	Species mix used aligns to the intended final land use.	<i>Florabank Guidelines (1999)</i>	Species that have been planted to date are in accordance with prior MOPs and final land use.
	Structural complexity scores.	Reporting and monitoring protocol as per the Bowmans Creek Diversion Rehabilitation Strategy (ACOL, g) employing a modified vegetation complexity assessment method (Newsome & Catling 1979).	Groundcover includes tussock grass clumps, areas of open ground and fallen timber.	Bowmans Creek Diversion Rehabilitation Strategy (ACOL, g)	Groundcover still predominantly composed of exotic grasses and herbs.
			Mid-stratum is very open to sparse, > 2 metres in height.		Established mid-storey species are very sparse. Many are now > 2 m tall at this stage, and are mature. Requires more diversity
			Over-storey structure ranges from forest (i.e. riparian corridor) to woodland (i.e. floodplain areas), with a diverse yet clumped species composition that is consistent with reference sites.		Overstorey establishment has been largely successful. Community is still young and requires time to mature.
		Structural complexity scores are broadly comparable to reference sites.			Vegetation is still too young to be compared to mature reference sites.

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Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Status
Infrastructure Areas					
This phase is not applicable to this domain during the term of the MOP.					
Water Management Areas					
This phase is not applicable to this domain during the term of the MOP.					
Pasture – Underground Mining Area					
This phase was completed for this domain during the previous MOP term..					
Trees over Grass - Southern Woodland Conservation Area					
Manage the southern woodland conservation area in accordance with the Conservation Agreement.	Conservation Agreement.	Baseline information and data included in Annexure B of the conservation agreement.	Southern woodland conservation area managed in accordance with the Conservation Agreement.	FFMP (ACOL, c), Conservation Agreement	Completed as necessary on an ongoing basis post subsidence impacts.
Limit soil compaction and the spread of weeds by minimising site access by vehicles.	Site accessibility.	Access roads are appropriately designated.	Vehicle access is restricted to nominated site access roads.		
		Stock movements are controlled and fencing is maintained. Activities reported in Annual Review	Stock is excluded from areas undergoing revegetation in accordance with the FFMP and conservation agreement.		

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Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Status
		Reported in Annual Review	Any access tracks no longer required are closed to allow natural regeneration.		
Invasive species, weeds and feral animals are effectively controlled or eliminated from site.	Distribution and density of weeds.	Annual Weed Inspection and findings reported in Annual Review	Weeds and pest animal species, and abundance are comparable to analogue sites.	FFMP, Conservation Agreement	
	Distribution and number of feral animals.	Annual vertebrate pest survey and findings reported in Annual Review		FFMP (ACOL, c) <i>Biosecurity Act 2015</i> <i>Local Land Services Act 2013</i>	
	Damage caused by feral animals.				
	Appropriate management activities.	Management activities reported in Annual Review	All activities undertaken in accordance with FFMP and conservation agreement.	FFMP(ACOL, c), Conservation Agreement	
The rehabilitated landscape is enhanced using best available practices and materials.	Provision of nest boxes.	Installation of nest boxes reported in Annual Review	Nest boxes established at a ratio of 1:3 in accordance with the conservation agreement, FFMP and vegetation clearance protocol.	FFMP(ACOL, c), Conservation Agreement	
		Nest boxes monitored annually and results reported in Annual Review	Nest boxes established are monitored and maintained.		

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Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Status
	Tree hollows.	Tree hollows relocated during clearing activities where practical and reported in Annual Review	Tree hollows relocated to southern woodland conservation area during vegetation clearing in accordance with FFMP.		
	Bushfire hazard reduction works.	Bushfire hazard reduction activities reported in Annual Review	Bushfire management activities undertaken in accordance with the conservation agreement.	<i>Rural Fires Act 1997</i>	
Disturbed land is rehabilitated as soon as is practicable to a level equal to or better than the original landscape.	Revegetation species mix applied in accordance with Table 21 of this MOP.	Rehabilitation/planting activities reported in Annual Review including date of seeding and species mix used.	Species mix used aligns to the intended final land use.	DA Schedule 3, Condition 42	
Pasture – NEOC					
This phase was completed for this domain during the previous MOP term..					
Trees over Grass – NEOC					
This phase was completed for this domain during the previous MOP term.					
Trees over Grass – Underground					
Invasive species, weeds and feral animals are effectively controlled or eliminated from site.	Distribution and density of weeds.	Annual Weed Inspection and findings reported in Annual Review	Weeds and pest animal species, and abundance are comparable to analogue sites.	ACOL <i>Weed Management Plan</i> <i>Biosecurity Act 2015</i> Australian and NSW Weed Strategies BC Act – Key Threatening Processes	
	Distribution and number of feral animals.	Annual vertebrate pest survey and findings			

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Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Status
	Damage caused by feral animals.	reported in Annual Review		<i>Local Land Services Act 2013</i> FFMP (ACOL, c)	
Safety risks are eliminated as far as reasonably practicable.	Bushfire hazard reduction works.	Bushfire hazard reduction activities reported in Annual Review	Bushfire management activities undertaken in accordance with the conservation agreement.	<i>Rural Fires Act 1997</i>	
Establish a vegetation profile consistent with the planned final landuse.	Revegetation species mix to be broadly comparable to reference sites.	Rehabilitation/planting activities reported in Annual Review including date of seeding and species mix used.	Species mix used aligns to the intended final land use.	DA Schedule 3, Condition 41	
Void – Coarse Rejects Emplacement Facility					
This phase is not applicable to this domain during the term of the MOP.					

Table 26 Phase 5 Ecosystem and Landuse Sustainability - Performance Criteria, Measures and Indicators

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/ Source	Status
Bowmans Creek Riparian Zone					
The riparian zone is self-sustaining and ecologically diverse.	Landscape Function Analysis (LFA) Landscape Organisation Index, Stability Index and Infiltration Index.	Ecosystem Function Analysis (EFA) monitoring program.	LOI of 50 in rehabilitated areas.	DA Schedule 3, Condition 41 CSIRO Methodology for Ecosystem Function Analysis (Tongway, 2004)	Ongoing revegetation activities are planned during the term of this MOP.
	Weed species abundance and diversity	Records of weed control activities. Ecosystem resilience reported in Annual Review	Weeds and pest animal species, and abundance are comparable to analogue sites.	Bowmans Creek Diversion Rehabilitation Strategy (ACOL, g)	
	Groundcover		Areas of bare ground are broadly comparable to analogue site.		
	Natural regeneration	Riparian vegetation monitoring.	Evidence of natural regeneration through new growth and recruitment.		
	Vegetation structure & composition		Vegetation structure and complexity is broadly comparable to that of the local remnant vegetation.		
	Vegetation health/condition		Vegetation condition is broadly comparable to that of the local remnant vegetation.		

MOP - 2018 to 2024

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/ Source	Status
Vegetation is of the same or better quality than existed pre-mining.	Health of established River Red Gum individuals.	Reporting and monitoring protocol as per the Bowmans Creek Diversion Rehabilitation Strategy (ACOL, g).	Results of monitoring or pilot study demonstrate River Red Gum health is maintained or improved.		
	Comparative health assessments using reference sites as indicators of health.				
Habitat for native fauna is maintained or enhanced.	Total number of threatened species observed.	Annual Ecological Monitoring Report.	Monitoring results indicate key performance indicators are maintained or recording a positive trend.		
	Species diversity				
Bowmans Creek Diversion					
This phase is not applicable to this domain during the term of the MOP.					
Infrastructure Areas					
This phase is not applicable to this domain during the term of the MOP.					

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/ Source	Status
Water Management Areas					
Safe, stable & non-polluting.	Condition assessment	Condition is assessed during annual monitoring activities (NEOC) or following subsidence impacts (underground).	No evidence of cracking, structural failure or uncontrolled water loss.	DA Schedule 3, Condition 29	Water structures above underground workings are monitored and maintained in accordance with an approved Extraction Plan.

MOP - 2018 to 2024

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/ Source	Status
Pasture – Underground Mining Area					
Restored and maintained to the same or higher land capability and agricultural suitability than prior to mining.	LFA Organisation Index	Annual Farmland Report.	Performance indicator is broadly comparable to that of analogue sites.	DA Schedule 3, Condition 29 CSIRO Methodology for Ecosystem Function Analysis (Tongway, 2004)	Ongoing monitoring and maintenance activities are planned following subsidence impacts during the current MOP period.
	LFA Stability Index				
	LFA Infiltration Index				
Land Capability Class	Field data results are used to define land capability and include; - Climate - Soil texture - Position - Slope - Erosion - pH - Drainage - Rock.				
Final landform is sustainable and resilient to environmental pressures.	Weed species abundance and diversity.		Performance indicator is broadly comparable to that of analogue sites.		
	Groundcover				

MOP - 2018 to 2024

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/ Source	Status
Trees over Grass - Southern Woodland Conservation Area					
Manage the southern woodland conservation area in accordance with the Conservation Agreement.	Conservation Agreement.	Baseline information and data included in Annexure B of the conservation agreement.	Southern woodland conservation area managed in accordance with the Conservation Agreement.	FFMP, MOP	Ongoing monitoring and maintenance activities are planned during the current MOP period.
Ecological diversity and ecosystem function will be maintained or enhanced.	Total number of threatened species observed.	Annual Ecological Monitoring Report.	Monitoring results indicate key performance indicators are maintained or recording a positive trend.	CSIRO Methodology for Ecosystem Function Analysis (Tongway, 2004)	
	Species diversity.				
	LFA Organisation Index.	Annual Rehabilitation Monitoring Report.			
	LFA Stability Index.				
LFA Infiltration Index.					
Pasture – NEOC					
Restored and maintained to the same or higher land capability and agricultural suitability than prior to mining.	LFA Organisation Index.	Annual Rehabilitation Monitoring Report.	Performance indicator is broadly comparable to that of analogue sites:	DA Schedule 3, Condition 41 CSIRO Methodology for Ecosystem Function Analysis (Tongway, 2004)	Ongoing monitoring and maintenance activities are planned during the current MOP period.

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/ Source	Status
Final landform is sustainable and resilient to environmental pressures.	LFA Stability Index.		Field data results are used to define land capability and include; <ul style="list-style-type: none"> - Climate - Soil texture - Position - Slope - Erosion - pH - Drainage - Rock. 		
	LFA Infiltration Index.				
	Land Capability Class.				
	Weed species abundance and diversity.				
Groundcover.		Performance indicator is broadly comparable to that of analogue sites. Weed species abundance to be consistent or lower than benchmark value of the average of the analogue sites.			
Trees over Grass – NEOC					
Ecological diversity will be maintained or enhanced.	Foliage cover.	Annual Rehabilitation Monitoring Report.	Vegetation structure and complexity is broadly comparable to that of analogue sites.	DA Schedule 3, Condition 41 CSIRO Methodology for Ecosystem Function Analysis (Tongway, 2004)	Ongoing monitoring and maintenance activities are planned during the current MOP period.
	Tree diversity.		Diversity of maturing tree and shrub species is broadly comparable to that of analogue sites.		
	Tree density.		Density of maturing tree and shrub species is broadly comparable to that of analogue sites.		
	Tree health/condition.		Vegetation condition is broadly comparable to that of analogue sites.		

MOP - 2018 to 2024

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/ Source	Status
Ecosystem function is restored.	Flowers, fruit, new growth.		Index is broadly comparable to that of local remnant vegetation:		
	LFA Organisation Index.				
	LFA Stability Index.				
	LFA Infiltration Index.				
Trees over Grass – Underground					
Ecological diversity will be maintained or enhanced.	Foliage cover.	Annual Farmland Report	Vegetation structure and complexity is broadly comparable to that of analogue sites.	DA Schedule 3, Condition 41. CSIRO Methodology for Ecosystem Function Analysis (Tongway, 2004).	Ongoing monitoring and maintenance activities are planned following subsidence impacts during the current MOP period.
	Tree diversity.		Diversity of maturing tree and shrub species is broadly comparable to that of analogue sites.		
	Tree density.		Density of maturing tree and shrub species is broadly comparable to that of analogue sites.		
	Tree health/condition.		Vegetation condition is broadly comparable to that of analogue sites.		
	Flowers, fruit, new growth.				
Ecosystem function is restored.	LFA Organisation Index.		Index is broadly comparable to that of analogue sites.		
	LFA Stability Index.				
	LFA Infiltration Index.				
Void – Coarse Rejects Emplacement Facility					
This phase is not applicable to this domain during the term of the MOP.					

7 Rehabilitation Implementation

7.1 Status at MOP Commencement

This information is presented graphically in Map 2. Information pertaining to the status of the domains is shown in Table 27 and Table 28.

Table 27 Primary Domains

Primary Domain	Code	Status
Infrastructure Areas	1	Inactive Rehabilitation Phase
Tailings Emplacement Facility	2	Inactive Rehabilitation Phase
Water Management Areas	3	Ecosystem and Landuse Sustainability
Pasture – Open Cut	4	Ecosystem and Landuse Sustainability
Trees over Grass – Open Cut	5	Ecosystem and Landuse Sustainability
Bowmans Creek Riparian Zone	6	Ecosystem and Landuse Establishment
Bowmans Creek Diversion	7	Ecosystem and Landuse Establishment
Trees over Grass - Southern Woodland Conservation Area	8	Ecosystem and Landuse Establishment
Pasture – Underground Mining Area	9	Ecosystem and Landuse Sustainability
Trees over Grass – Underground	10	Ecosystem and Landuse Establishment

Table 28 Secondary Domains

Secondary Domain	Code	Status
Water Management Area	A	Ecosystem and Landuse Sustainability
Pasture	B	Ecosystem and Landuse Sustainability
Trees over Grass	C	Ecosystem and Landuse Establishment
Southern Woodland Conservation Area	D	Ecosystem and Landuse Establishment
Bowmans Creek	E	Ecosystem and Landuse Establishment
Remaining Infrastructure	F	Inactive Rehabilitation Phase

7.2 Proposed Rehabilitation Activities this MOP Term

Details on the rehabilitation and disturbance rates during the life of the MOP are shown in Table 29.

Table 29 Rehabilitation and Disturbance Rates during the life of the MOP

Year	Ashton Coal Project	
	Total Disturbance Area (ha) ¹	Total Rehabilitation Area* (ha) ²
2018 (at start of MOP)	127.7	737.4
2019	127.7	737.4
2020	127.7	737.4
2021	127.7	737.4
2022	127.7	737.4
2023	127.7	737.4
2024 (at end of MOP)	127.7	737.4

1. Total Disturbance Area includes all active areas ultimately requiring rehabilitation, such as: on-lease exploration areas, stripped areas ahead of mining, infrastructure areas, water management infrastructure, sewage treatment facilities, topsoil stockpile areas, access tracks and haul roads, active mining areas, waste emplacements (active/unshaped/ in or out of pit), and tailings dams (active/unshaped/uncapped).

2. Total Rehabilitation Area includes areas under rehabilitation and being managed to achieve relinquishment – includes the following rehabilitation phases as described in the DRE MOP/RMP guidelines – ‘ecosystem and land use establishment’ (area seeded or surface developed in accordance with final use) and ‘ecosystem and land use sustainability’ (revegetation assessed as showing signs of trending towards relinquishment or infrastructure development).

7.3 Summary of Rehabilitation Areas during the MOP

The change in areas of each domain during the MOP period is summarised in Table 30.

Table 30 Summary of Proposed Rehabilitation during the MOP Period

Domain	Area Affected / Rehabilitated (ha)	
	Total Area at MOP Start (Map 3A)	Total Area at MOP End (Map 3G)
Mine Lease Area		
Mine Lease 1529, 1533 & 1623	909.6	909.6
Active Mining Area		
Active (Underground)	43.5	3.6
Infrastructure Area		
Active	89.6	89.6
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	0	0

Domain	Area Affected / Rehabilitated (ha)	
	Total Area at MOP Start (Map 3A)	Total Area at MOP End (Map 3G)
Ecosystem and Landuse Sustainability	0	0
Tailings Emplacement Facility		
Active	34	34
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	0	0
Ecosystem and Landuse Sustainability	0	0
Water Management Area		
Active	4.1	4.1
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	0	0
Ecosystem and Landuse Sustainability	14.7	14.7
Pasture - Underground		
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	0	0
Ecosystem and Landuse Sustainability	391.1	391.1
Southern Woodland Conservation Area²		
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	0	0
Ecosystem and Landuse Sustainability	44.1	44.1
Pasture NEOC		
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0

MOP - 2018 to 2024

Domain	Area Affected / Rehabilitated (ha)	
	Total Area at MOP Start (Map 3A)	Total Area at MOP End (Map 3G)
Ecosystem and Landuse Establishment	0	0
Ecosystem and Landuse Sustainability	67.8	67.8
Bowmans Creek Riparian Zone²		
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	30.2	30.2
Ecosystem and Landuse Sustainability	24.9	24.9
Bowmans Creek Diversion		
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	13.5	13.5
Ecosystem and Landuse Sustainability	0	0
Trees over Grass – NEOC		
Decommissioning	0	0
Landform Establishment	0	0
Growth Medium Development	0	0
Ecosystem Establishment	0	0
Ecosystem Development	70.5	70.5
Trees over Grass – Underground²		
Decommissioning	0	0
Landform Establishment	0	0
Growth Medium Development	0	0
Ecosystem Establishment	60.3	60.3
Ecosystem Development	20.3	20.3

 Notes: ² Excludes areas outside of the Mining Lease

7.4 Relinquishment Phase achieved during MOP Period

No lands are to be relinquished from the Mining Lease during the life of the MOP.

8 Rehabilitation Monitoring, Research and Reporting

8.1 Rehabilitation Monitoring

The ongoing annual rehabilitation monitoring program which commenced in 2008 will continue throughout the MOP period. The program will assess the recovery of rehabilitation areas across the site. The program will be based on the performance indicators outlined in Rehabilitation Tables in Section 6 and will utilise methodologies that can provide quantitative data to assess changes occurring over time.

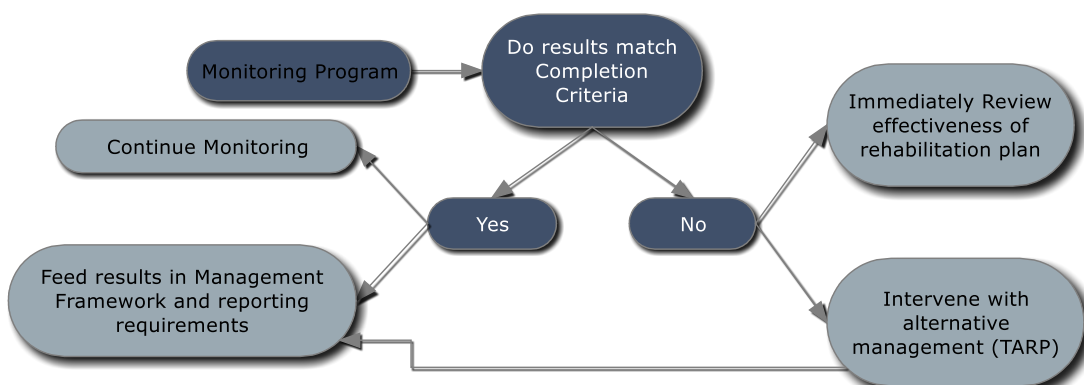
The program compares the progress of a number of rehabilitation sites, against a set of completion criteria obtained from measurement made in areas of remnant woodland and grassland communities in the local area. The monitoring program aims to be consistent with the conditions specified in the approval documents and relevant approved Management Plans.

8.1.1 Measuring Rehabilitation Success

Measurement of rehabilitation success will follow the monitoring process shown in Figure 1. The monitoring proposed relates directly to the indicators in the table of domains in Section 5 in the following ways:

- The demonstration of success is measured by the measures, indicators and completion criteria;
- The determination of the completion criteria is based on peer reviewed papers or on guidelines for management, and where appropriate is measured against analogue sites;
- All monitoring will produce data that shows the attainment of completion criteria. It will also indicate where shortcomings are in the results and assist in preventative or corrective strategies.

Figure 1 Monitoring Process



8.2 Monitoring Methodology

The monitoring methodology adopted is a standard and simple procedure that can be replicated over any vegetation community or rehabilitation area and allows results to compare similar communities.

The monitoring methodologies utilise a combination of the following:

- Landscape Function Analysis (LFA);
- Soil Analysis;
- Assessment of Ecosystem Characteristics;
- Pasture Productivity Assessment;
- Land Capability Assessment;
- Photographic monitoring; and
- Subsidence Monitoring.

8.2.1 Landscape Function Analysis

LFA is a methodology used to assess key indicators of ecosystem function including landscape organisation and soil surface condition as measure of how well the landscape retains and uses vital resources. The indicators used quantify the utilisation of the vital landscape resources of water, topsoil, organic matter and perennial vegetation in space and time.

LFA is undertaken within the NEOC rehabilitation monitoring program. LFA is used to assess attributes that relate to pasture productivity and soil nutrient status, in line with the existing and future site-wide agriculture area surveys.

8.2.2 Soil Analysis

Soil samples are taken five yearly using standard soil sampling techniques (core sampler). Soil parameters assessed include pH, electrical conductivity (EC), available calcium, magnesium, potassium, ammonia, sulphur, organic matter, exchangeable sodium, calcium, magnesium, hydrogen, aluminium, cation exchange capacity, available and extractable phosphorus, micronutrients (zinc, manganese, iron, copper, boron), total carbon and nitrogen.

8.2.3 Ecosystem Characteristics

An assessment of ecosystem characteristics will be conducted which provides quantitative data that measures changes in:

- Floristic diversity including species area curves and growth forms;
- Ground cover diversity and abundance;
- Fire;
- Vegetation structure and habitat characteristics (including ground cover, cryptogams, logs, rocks, litter, projected foliage cover at various height increments);
- Understorey density and growth (including established shrubs, direct seeding and tubestock plantings and tree regeneration);
- Overstorey characteristics including tree density, health and survival; and
- Other habitat attributes such as the presence of hollows, mistletoe and the production of buds, flowers and fruit.

8.2.3.1 Pasture Productivity Assessment

In areas with a post mining landuse aligned to pasture, soil testing or pasture assessments will be undertaken in accordance with accepted methods to guide the appropriate stocking rates for the post mining pasture landuse. Based on these results and other further studies as required, sustainable carrying capacities will be determined for pastures at ACOL

8.2.3.2 Land Capability Assessment

The land capability system is applied to the survey area in accordance with the relevant land classification and/or land capability guidelines (e.g. called *Systems used to classify rural lands in New South Wales* (Cunningham *et al.* 1986), Land and Soil Capability Assessment Scheme; Second Approximation, Office of Environment and Heritage (OEH, 2012)).

Data will be collected on a range of factors and assessed to determine land capability based on guideline requirements. These factors may include climate, soils, geology, geomorphology, soil erosion, topography and the effects of past land-uses.

8.2.4 Photographic Monitoring

Opportunistic and permanent photo-points or transects may be utilised to record changes in attributes over time. Generally the location and orientation of photo-points and transects will be recorded using GPS.

Photo transects may be established by laying a length of tape (e.g. 50m) between two star pickets. A consistent ground to sky ratio should be maintained (e.g. 5:1) where possible. Once established, the transect will allow for the capture of three digital photographs at each star picket; taken in the direction of the transect line:

- to the left of the tape (with the tape just in the frame in the far right);
 - with the tape (and star picket) in the centre of the frame; and
 - to the right of the tape (with the tape just in the frame in the far left).
- Alternatively, a panoramic shot can be taken centred around the star picket.

8.2.5 Subsidence Monitoring

8.2.5.1 Surface Cracking and Ponding

Monitoring of surface cracking will be undertaken during and post-mining. Monitoring of surface cracking will be conducted in accordance with the Subsidence Effects Monitoring Program incorporated into the relevant EP.

Visual inspections of low lying areas and ponding will be undertaken as part of the Subsidence Effects Monitoring Program. Section 3.21 of the MOP refers to the potential use of drainage cuttings to improve drainage in areas of subsidence, with monitoring of the effectiveness of cuttings to be undertaken as part of the Subsidence Effects Monitoring Program.

8.2.5.2 Remote Sensing

In accordance with the approved EP and Subsidence Effects Monitoring Program, remote sensing data will be utilised to provide for quantitative comparison of key land surface condition parameters. Light Detection and Ranging (LiDAR) data will be captured across the entire underground mining area.

The baseline data and all subsequent LiDAR captures will be processed into a land surface digital elevation model (DEM). Each new dataset will be subtracted from those produced from earlier captures creating a series of DEM change images. These datasets will document any changes in creek slope, width and depth. The datasets will also assist in the monitoring of steep slopes.

The best results will be derived from repeat data capture and image to image comparison. These comparisons may provide accurate assessment of erosion and deposition. Each dataset produced will be used to create a map for visual interpretation and analysis and for communication of results.

8.3 Bowmans Creek Diversion Monitoring

Monitoring of the BCD will extend to include the LFA methodology and the program of rehabilitation and farmland monitoring undertaken at sites that will provide reference sites for some aspects of the program for Bowmans Creek.

In addition to the above, ACOL previously had in place four aquatic ecology monitoring sites that have been sampled bi-annually since autumn 2007. Following the BCD a new site layout for stream health monitoring on Bowmans Creek was adopted. This design has been in place since spring 2009 and includes 13 monitoring sites located on the Bowmans Creek, with four sites on the diversion channels.

8.4 Research and Rehabilitation Trials

ACOL has embarked on several experimental trials and are planning to undertake several long term rehabilitation and ecological studies within its operations.

8.4.1 Previous Research

8.4.1.1 Soil Ameliorants

Two rehabilitation trials have been conducted at the ACP to date to identify potential soil treatments that improve rehabilitation outcomes for the conceptual final land use. These treatment trials include the use of:

- Organic Growth Medium (OGM); and
- Biosolids.

OGM is a municipal solid waste compost. The trial involved the application of OGM at varying rates (0, 60 and 100 t/ha) to topsoil or overburden and seeded with either improved pastures or native trees and shrubs. The results of the trial indicated that an application rate of 60 t/ha OGM directly to overburden significantly increased tree and shrub growth and density when compared with other application rates and/or topsoil used. Improved pasture groundcover and above ground herbage mass was significantly higher with an OGM application rate of 100 t / ha to topsoil when compared to other application rates to topsoil or overburden. These application rates also decreased the prevalence of weeds, specifically *Galinea pubescens*. These findings have been adopted in ACOL's rehabilitation procedure.

The biosolids trial compared the use of a stabilised biosolids product against OGM. The preliminary observations from this trial have indicated that there is no difference in plant growth between the two soil treatments.

8.4.1.2 Galenia – Herbicide Trials

DRG in conjunction with ACOL conducted a Galenia treatment trial program. The trial was conducted in ACOLs woodland rehabilitation areas. The trial aimed to identify alternative herbicides and spray rates for eradicating Galenia around native saplings. Grazon^(R), the chemical traditionally used to treat Galenia on mine site rehabilitation is highly aggressive against Eucalypt and Acacia saplings. The trial addressed the effects on both young saplings (<18 months and < 1 m height) and adolescent saplings (three years old and 2 to 3 m height). The results of these trials, when aligned to the legislative requirements of herbicide usage, provide the opportunity for the use of a greater range of herbicides to use on Galenia in woodland areas.

8.4.2 Proposed

ACOL is participating in an ACARP research project: C25031 Closure Criteria for River Diversions: An Alternative to Reference Sites. Fieldwork and sampling along the Bowmans Creek Diversion was undertaken by researchers during 2016. This research project is ongoing and expected to complete in 2018.

The broad aim of this research is to move from the use of reference sites in environmental assessment to a more pragmatic and robust methodology through designing realistic closure criteria based around the use of microbial communities as indicators of environmental condition.

8.5 Reporting

8.5.1 Incident Reporting

ACOL has developed and implemented procedures for relevant and timely reporting of environmental performance, including incidents and non-conformances. Reporting of incidents and non-conformances will be undertaken in accordance with the procedures detailed in ACOL's Environmental Management Strategy, within the timeframes specified in the EPL, Development Consent or Mining Lease.

8.5.2 Stakeholder Reporting

ACOL prepare a fortnightly update to asset owners which are affected by subsidence impacts. Reporting to other stakeholders is completed in accordance with regulatory requirements and the EP Guidelines. This includes bi-monthly (every two months) subsidence impact reporting to DRG and DP&E if new subsidence impacts are identified, and six-monthly reporting of all impacts and environmental monitoring results to DRG and DP&E.

8.5.3 Annual Review

ACOL prepare an Annual Review as part of the DRG's Mining, Rehabilitation and Environmental Management Process framework.

This review will:

- describe the works (including any rehabilitation) that were carried out during the previous calendar year, and the works that are proposed to be carried out over the current calendar year;
- include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against:
 - relevant statutory requirements, limits or performance measures/criteria;
 - monitoring results of previous years; and
 - relevant predictions in the EA;
- identify any non-compliance over the previous calendar year, and describe what actions were (or are being) taken to ensure compliance;
- identify any trends in the monitoring data over the life of the project;
- identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and
- describe what measures will be implemented over the current calendar year to improve the environmental performance of the project.

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9 Intervention and Adaptive Management

9.1 Trigger Action Response Plan

The following Trigger Action Response Plan (TARP) identifies the proposed contingencies strategies in the event of negative variations or impacts to rehabilitation outcomes. Table 31 outlines the key identified risks, their trigger and proposed mitigation measures to reduce the identified risks.

Table 31 Proposed Mitigation Measures to reduce Key Risks

Risk	Trigger	Proposed Mitigation Measure
Surface subsidence is greater than that modelled.	Data obtained from the subsidence monitoring program indicates exceedance.	<p>Assess public safety and where applicable, implement safety measures in accordance with the <i>Public Safety Subsidence Management Plan</i> (ACOL, i) or as otherwise necessary to prevent injury or harm to any person.</p> <p>Assess impacts on known Aboriginal heritage sites and where appropriate implement measures in accordance with the Archaeology and Cultural Heritage Management Plan (ACHMP) and relevant Aboriginal Heritage Impact Permit (AHIP).</p> <p>Investigate, in consultation with affected stakeholders (where appropriate) to evaluate the contributing factors to the exceedance. The investigation may include (where applicable):</p> <ul style="list-style-type: none"> • Re-survey of the relevant subsidence monitoring lines; • Re-sampling or re-surveying of the applicable environmental monitoring locations (i.e. groundwater bores, surface water monitoring sites); • Review measured subsidence parameters against the observed impact, and latest subsidence predictions. <p>Implement remedial action and/or adaptive management measures, dependent on the outcomes of the above investigation. Any such measures will be undertaken in consultation with the relevant stakeholder and/or to the satisfaction of the appropriate government agency and DP&E.</p>

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Risk	Trigger	Proposed Mitigation Measure
Off-site release of contaminants from mined materials requiring long term management or treatment.	Data obtained from compliance monitoring program indicates exceedance.	Ongoing monitoring of runoff and seepage waters during operations to validate predictions. Mitigation measures as proposed in the WMP.
Inadequate or insufficient landform shaping to achieve a free draining surface.	Identification of ponding areas during daily inspections of surface positioning.	Conduct works, in accordance with the MOP. Undertake earthworks to reshape the land, and/or provide a drainage path to the nearest watercourse where practical.
Inadequate or insufficient topsoil to create/enhance the desired ecological communities.	Monitoring and vegetation assessments highlight inadequate ground cover and or paucity in species diversity / distribution. Soil analysis indicates soil parameters are not compatible to post mining vegetation community.	Manage topsoil, overburden and substrate management procedures and soil testing. Assess soil for weed contamination and treat affected soil. Apply ameliorants as appropriate.
Wind and water erosion.	Monitoring or vegetation assessments indicate poor vegetation cover or soil instability and potential for wind and water erosion.	Review adequacy of erosion and sedimentation controls which will be employed during rehabilitation activities, including rehabilitation of the creek diversion and the repair of subsidence areas, in accordance with the WMP. Annual monitoring detailed above will be designed to determine the type, source, degree, and location of potential erosion sites, source of sediment and potential methods of treatment.
Impact of weeds and /or vertebrate pest animal leading to widespread failure of revegetation ecosystems.	Monitoring and vegetation assessments identify increased weed competition or degradation by pest animal species.	Review and ensure topsoil management practices prevent the spread of weeds. Review management practices and ensure rapid establishment of ground cover. Review adequacy of weed control activities and ensure activities are undertaken in accordance with the requirements of the Biosecurity Act 2015. Review Weed Action Plan (WAP). Review and if necessary, increase control of pest animal species in accordance with industry guidelines.

Risk	Trigger	Proposed Mitigation Measure
<p>Poor vegetation establishment success.</p>	<p>Monitoring data indicates non-compliance with performance criteria in terms of landscape function, biodiversity and pasture productivity.</p>	<p>The species mix used in enhancement/rehabilitation programs is reviewed to ensure these align to the floristic structure of the plant community of the site and the physical and chemical properties of the growing media.</p> <p>Physical and chemical properties of the growing media reviewed against completion criteria and appropriate treatment determined (e.g. soil ameliorants).</p> <p>Replanting activities to be scheduled and undertaken during favourable conditions with adequate follow up maintenance post planting.</p>
<p>Asset Protection Zone (APZ) is not maintained in context of bushfire risk.</p>	<p>Site assessment of APZ shows unacceptable fuel levels.</p>	<p>Control and maintain a suitable APZ surrounding rehabilitation areas by slashing and controlled grazing in accordance with ACOL's EMS (ACOL, h).</p>
<p>Major storm event resulting in flooding, geotechnical instability, major erosion and/or widespread damage to rehabilitated areas.</p>	<p>Weather warnings relate to severe storms and localised flooding.</p> <p>Monitoring program indicates lack of adequate ground cover.</p>	<p>Design final landforms, structures and revegetation to cope with major storm events.</p> <p>Implement maintenance program on sediment structures.</p>
<p>Severe and/or prolonged drought leading to widespread failure of revegetation.</p>	<p>Monitoring and vegetation assessments highlight inadequate ground cover and or paucity in species diversity / distribution.</p>	<p>Selection of drought-tolerant species for revegetation.</p> <p>Selection of species aligned to desired vegetation community.</p> <p>Time plantings to take advantage of ideal weather conditions.</p> <p>Use of compost materials and mulched to increase organic carbon levels and improve soil structure with resultant increase in infiltration and water holding capacity irrigation.</p>
<p>Changing climate leading to failure of rehabilitation, failure of environmental management controls and/or inability to attain completion criteria.</p>	<p>Monitoring and vegetation assessments highlight inadequate ground cover and or paucity in species diversity / distribution.</p> <p>Soil analysis indicates soil parameters are not compatible to post mining vegetation community.</p>	<p>Assess climate change risks and implement appropriate measures where required.</p> <p>Irrigate rehabilitated areas in response to changed climate conditions.</p>

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Risk	Trigger	Proposed Mitigation Measure
New regulatory requirements or evolving community expectations leading to difficulties negotiating or attaining completion criteria.	Changes in relevant legislation.	Monitor trends and developments in legislation and changes to community expectations. Review completion criteria and consult with stakeholders to gain acceptance of completion criteria.

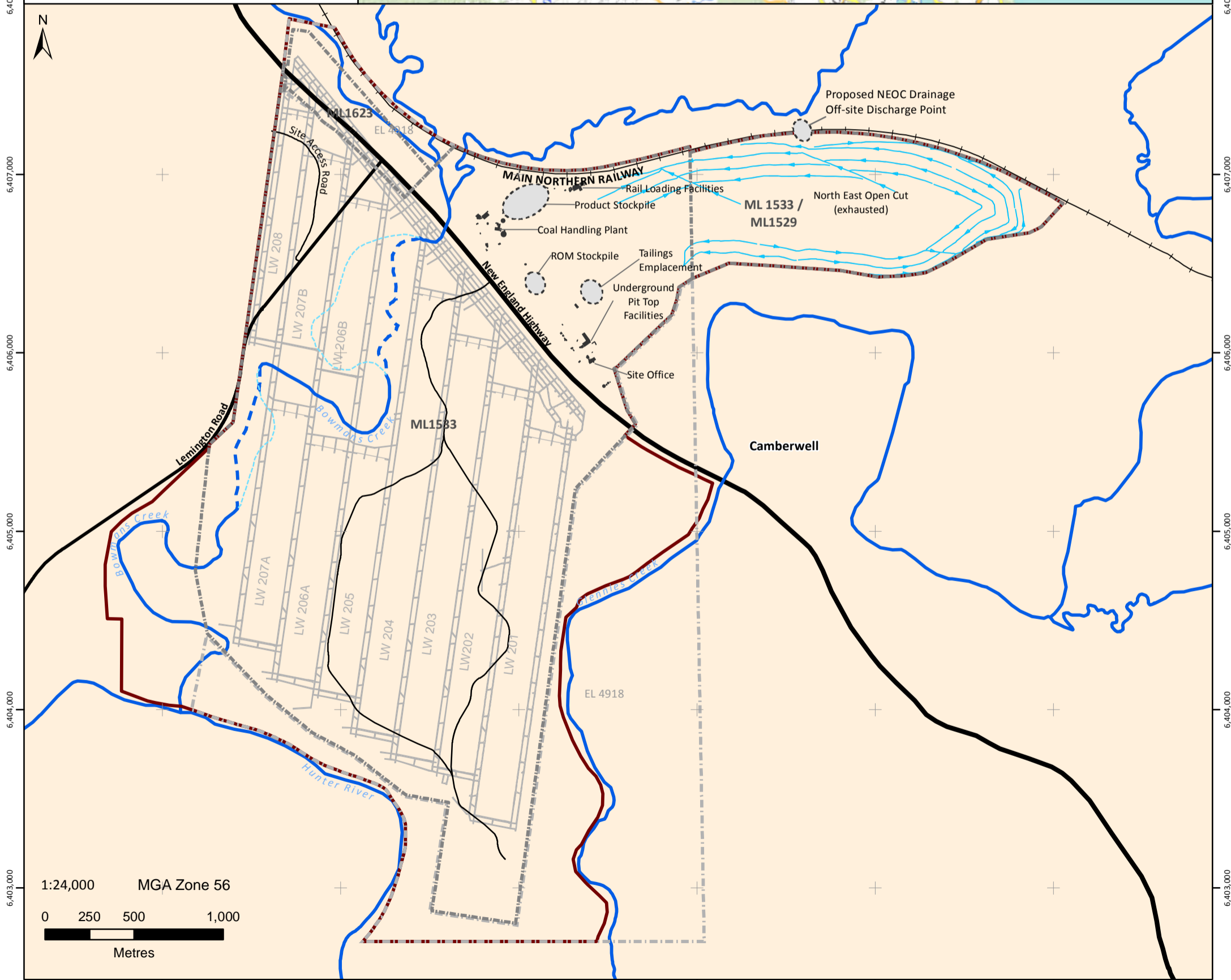
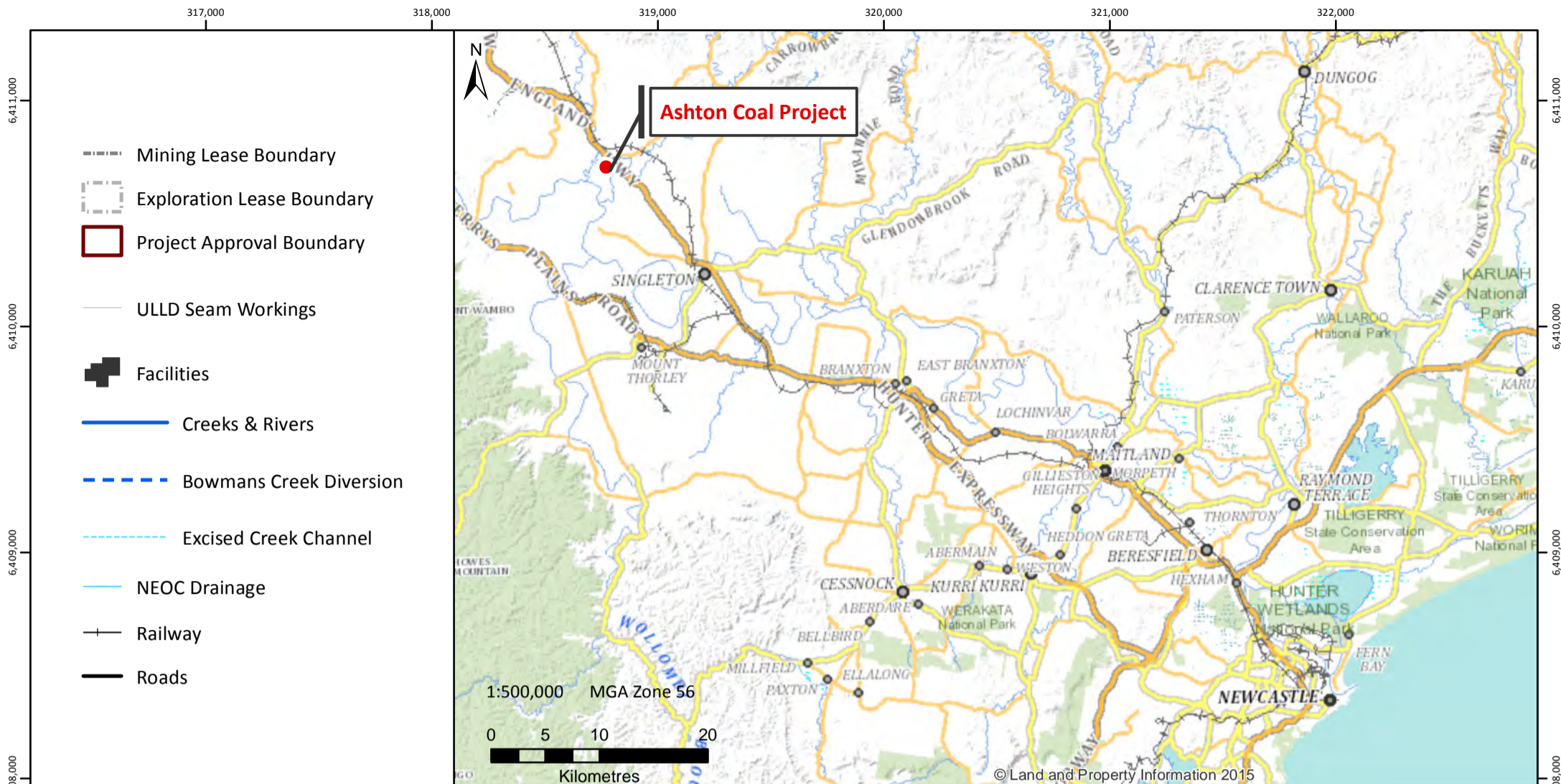
10 Maps

- Map 1A, 1B and 1C show the landuse prior to the commencement of the operations, whilst also showing current land ownership and relevant cadastre information;
- Map 2 shows the mine domains and the mining features at commencement of the MOP;
- Maps 3A – 3G are a series of maps which show the annual sequence of proposed mining and rehabilitation activities over the term of the MOP;
- Map 4 shows the proposed post mining land use and conceptual landform at the completion of the project; and
- Maps 5A and 5B show cross and longitudinal sections of geology at the ACP.

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Map 1A – Pre Mining Environment – Project Locality

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I, Aaron McGuigan, Holder of Mine Managers Certificate of Competency, certify that the information on this plan is a true indication of the proposed development.

I, Jeff Peck, Registered Mine Surveyor, Certify that to the best of my knowledge and belief this plan conforms to the accuracy & standards required by NSW Trade & Investment - Division of Resources and Energy.

Operations Manager Date

Registered Mining Surveyor Date

MAP 1B Pre Mining Environment – Natural Environment

To be inserted into final PDF

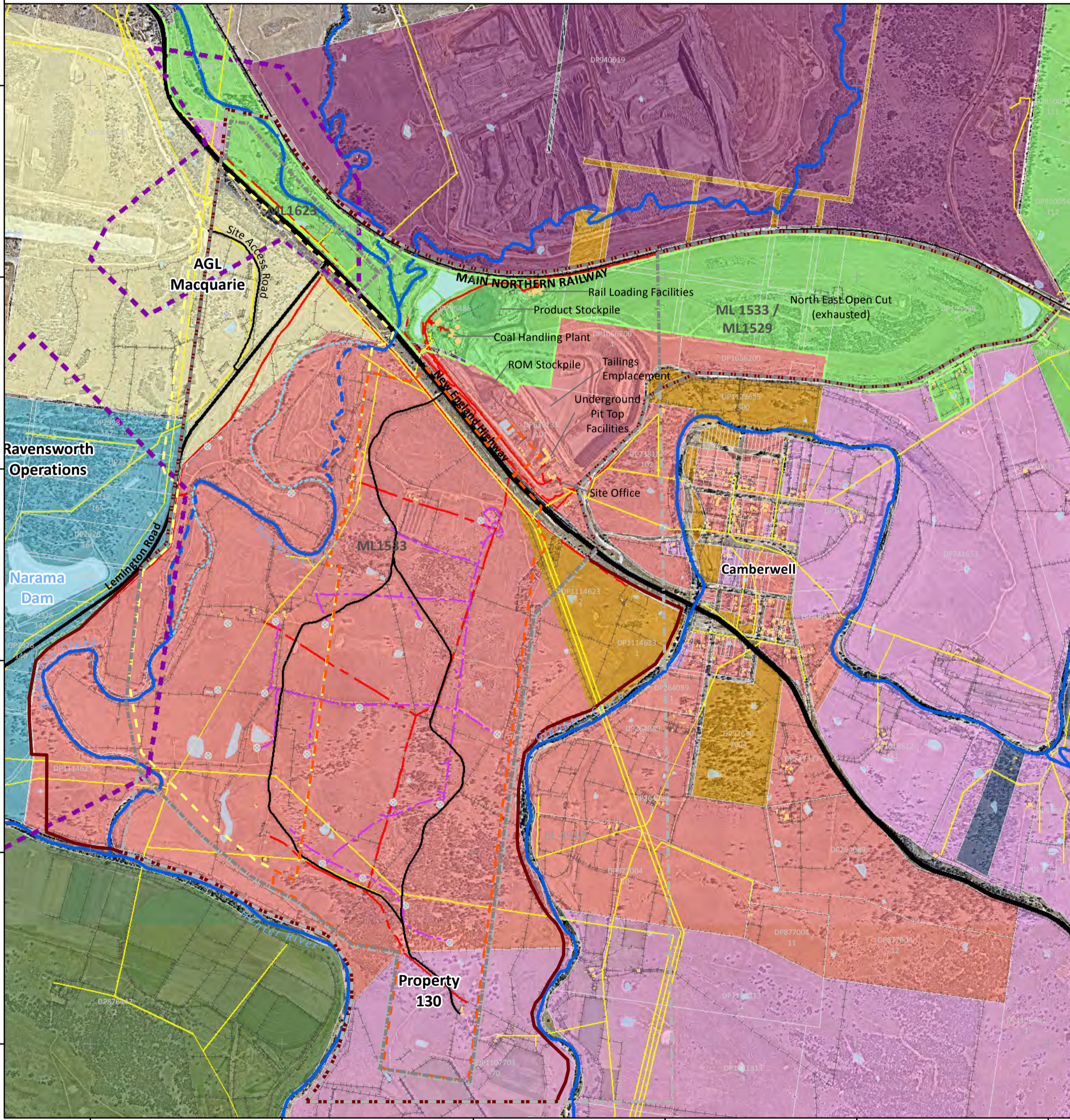
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|--------------------------------|---------------------------------------|---|---|
| Ashton Coal Operations Pty Ltd | Savage Mineral Ltd & Enex Foydell Ltd | Cadastre Boundary | Electricity |
| Coal and Allied Pty Ltd | Singleton Council | Creeks & Rivers | Telecommunications |
| Crown Land | Wanaruah Land Council | Existing Infrastructure & Developments | Buildings |
| Freehold Land | Glendell Land Leased | Dams & Water Storage | Fences |
| Glendell Tenements Pty Ltd | Project Approval Boundary | Bowmans Creek Diversion | Goaf Gas Drainage Pipelines |
| AGL Macquarie | Mining Lease Boundary | Excised Creek Channel | Goaf Gas Drainage Boreholes |
| RHA Pastoral Company Pty Ltd | Exploration Lease Boundary | Railway | Aboriginal Heritage Impact Permit Boundaries |
| Renison Limited | Dam Notification Areas | Roads | 1131017 |
| Ravensworth Operations Pty Ltd | | | 1130976 |

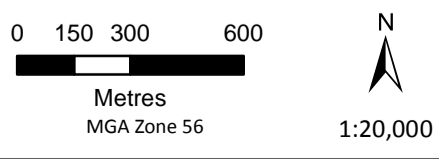
The ACP is located entirely within the Singleton Local Government Area.

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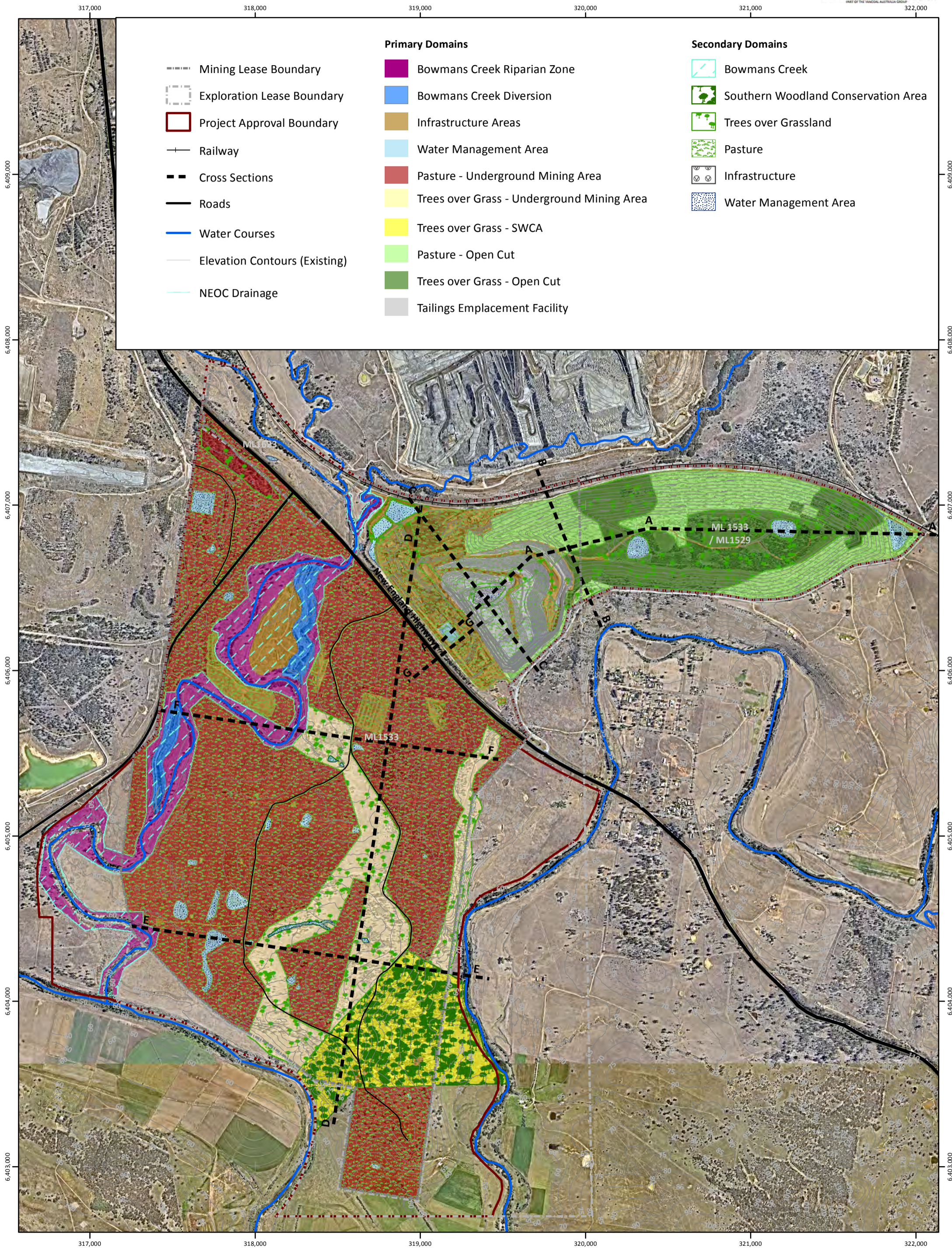
Existing Mining Environment - Built Environment
Mining Operations Plan, Ashton Coal Project
Source: ACOL 2018

Drawn: GW
24/05/2018
Map **1C**

Operations Manager Date

Registered Mining Surveyor Date

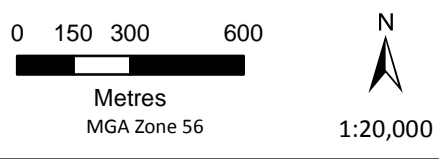
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Primary Domains		Secondary Domains
Mining Lease Boundary	Bowmans Creek Riparian Zone	Bowmans Creek
Exploration Lease Boundary	Bowmans Creek Diversion	Southern Woodland Conservation Area
Project Approval Boundary	Infrastructure Areas	Trees over Grassland
Railway	Water Management Area	Pasture
Cross Sections	Pasture - Underground Mining Area	Infrastructure
Roads	Trees over Grass - Underground Mining Area	Water Management Area
Water Courses	Trees over Grass - SWCA	
Elevation Contours (Existing)	Pasture - Open Cut	
NEOC Drainage	Trees over Grass - Open Cut	
	Tailings Emplacement Facility	

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Operations Manager Date Registered Mining Surveyor Date

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- Mining Lease Boundary
- Exploration Lease Boundary
- Project Approval Boundary
- Railway
- Roads
- Water Courses
- Active Mining Area (ULLD Seam)
- First Workings ULLD Seam
- Trees over Grass - SWCA
- Pasture - Open Cut
- Trees over Grass - Open Cut
- Tailings Emplacement Facility

Rehabilitation Phases

- Phase 1 - Decommissioning
- Phase 2 - Landform Establishment
- Phase 3 - Growing Media Development
- Phase 4 - Ecosystem and Landuse Establishment
- Phase 5 - Ecosystem and Landuse Sustainability
- Phase 6 - Rehabilitation Complete

Primary Domains

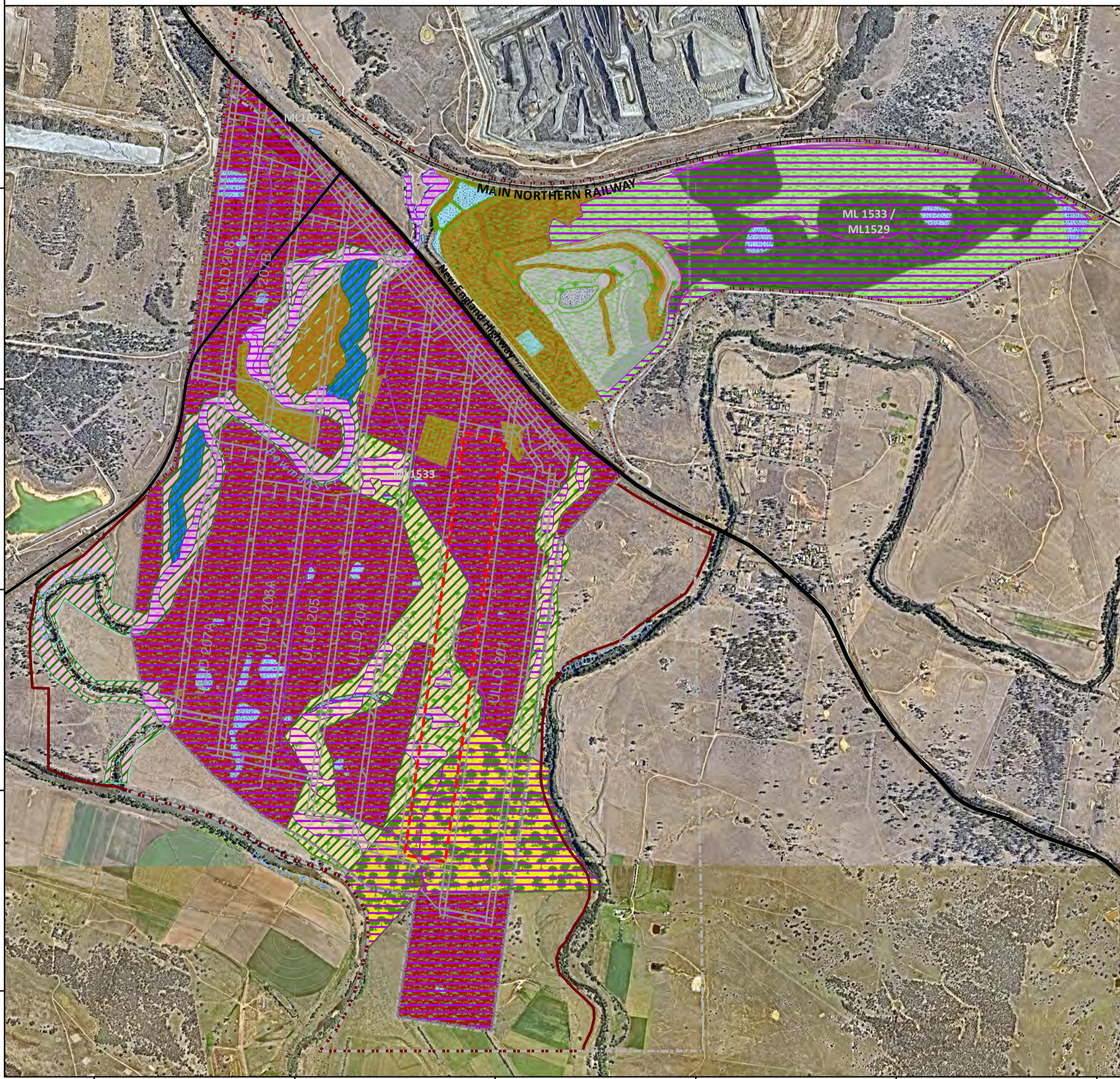
- Bowmans Creek Riparian Zone
- Bowmans Creek Diversion
- Infrastructure Areas
- Water Management Area
- Pasture - Underground Mining Area
- Trees over Grass - Underground Mining Area

Secondary Domains

- Bowmans Creek
- Southern Woodland Conservation Area
- Trees over Grassland
- Pasture
- Infrastructure
- Water Management Area

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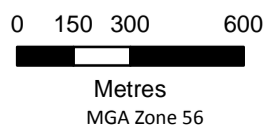
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Mining and Rehabilitation - 2018
Mining Operations Plan, Ashton Coal Project
Aerial Imagery Source: NearMap 2018






Drawn: GW
24/05/2018
Map **3A**

Operations Manager Date

Registered Mining Surveyor Date

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




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-  Mining Lease Boundary
-  Exploration Lease Boundary
-  Project Approval Boundary
-  Railway
-  Roads
-  Water Courses
-  Active Mining Area (ULLD Seam)
-  First Workings ULLD Seam
-  Trees over Grass - SWCA
-  Pasture - Open Cut
-  Trees over Grass - Open Cut
-  Tailings Emplacement Facility







Rehabilitation Phases

-  Phase 1 - Decommissioning
-  Phase 2 - Landform Establishment
-  Phase 3 - Growing Media Development
-  Phase 4 - Ecosystem and Landuse Establishment
-  Phase 5 - Ecosystem and Landuse Sustainability
-  Phase 6 - Rehabilitation Complete

Primary Domains

-  Bowmans Creek Riparian Zone
-  Bowmans Creek Diversion
-  Infrastructure Areas
-  Water Management Area
-  Pasture - Underground Mining Area
-  Trees over Grass - Underground Mining Area

Secondary Domains

-  Bowmans Creek
-  Southern Woodland Conservation Area
-  Trees over Grassland
-  Pasture
-  Infrastructure
-  Water Management Area

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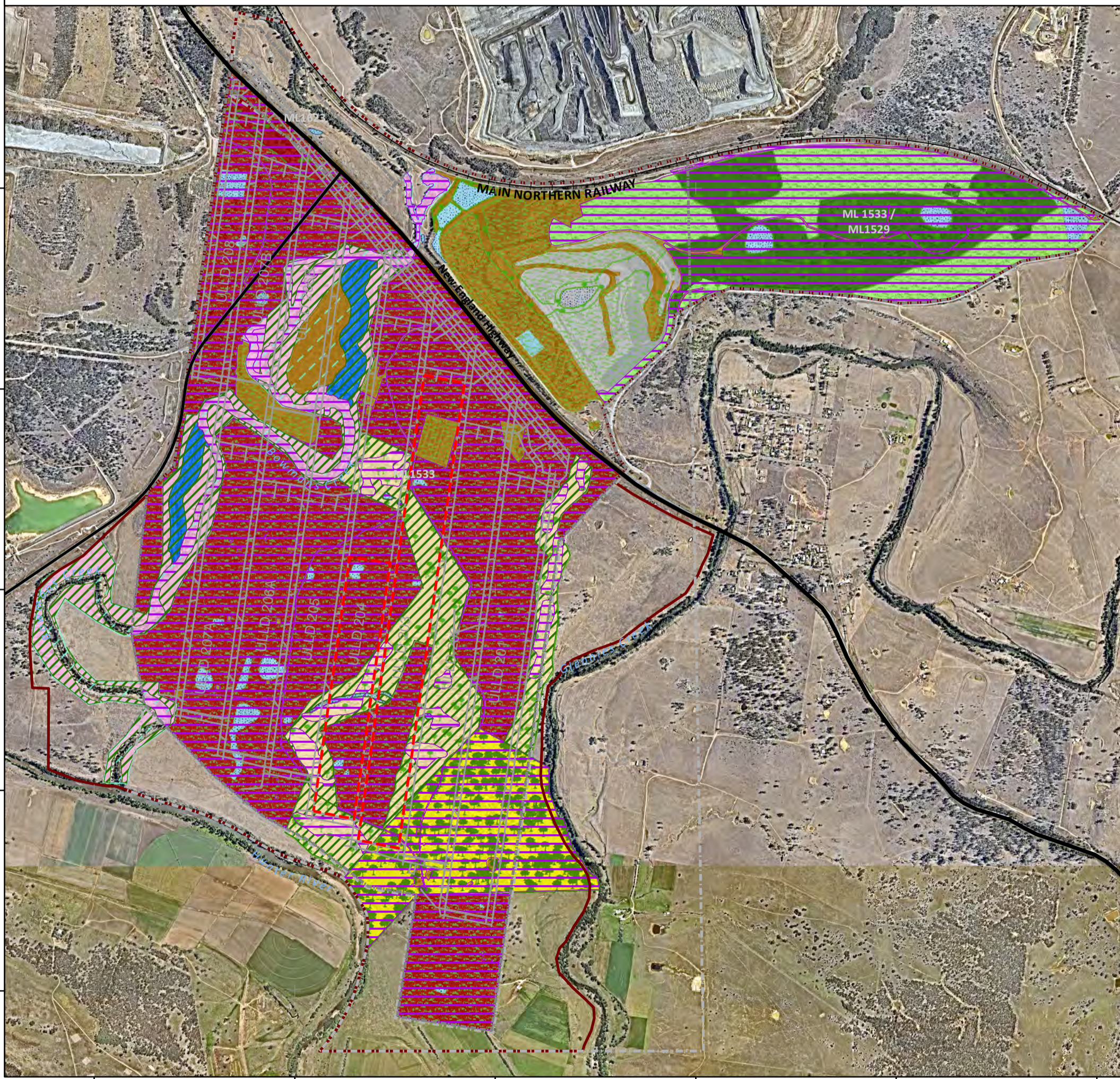
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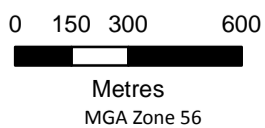
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Mining and Rehabilitation - 2019
Mining Operations Plan, Ashton Coal Project
Aerial Imagery Source: NearMap 2018

Drawn: GW
24/05/2018
Map **3B**

Operations Manager Date

Registered Mining Surveyor Date

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- Mining Lease Boundary
- Exploration Lease Boundary
- Project Approval Boundary
- Railway
- Roads
- Water Courses
- Active Mining Area (ULLD Seam)
- First Workings ULLD Seam
- Trees over Grass - SWCA
- Pasture - Open Cut
- Trees over Grass - Open Cut
- Tailings Emplacement Facility

Rehabilitation Phases

- Phase 1 - Decommissioning
- Phase 2 - Landform Establishment
- Phase 3 - Growing Media Development
- Phase 4 - Ecosystem and Landuse Establishment
- Phase 5 - Ecosystem and Landuse Sustainability
- Phase 6 - Rehabilitation Complete

Primary Domains

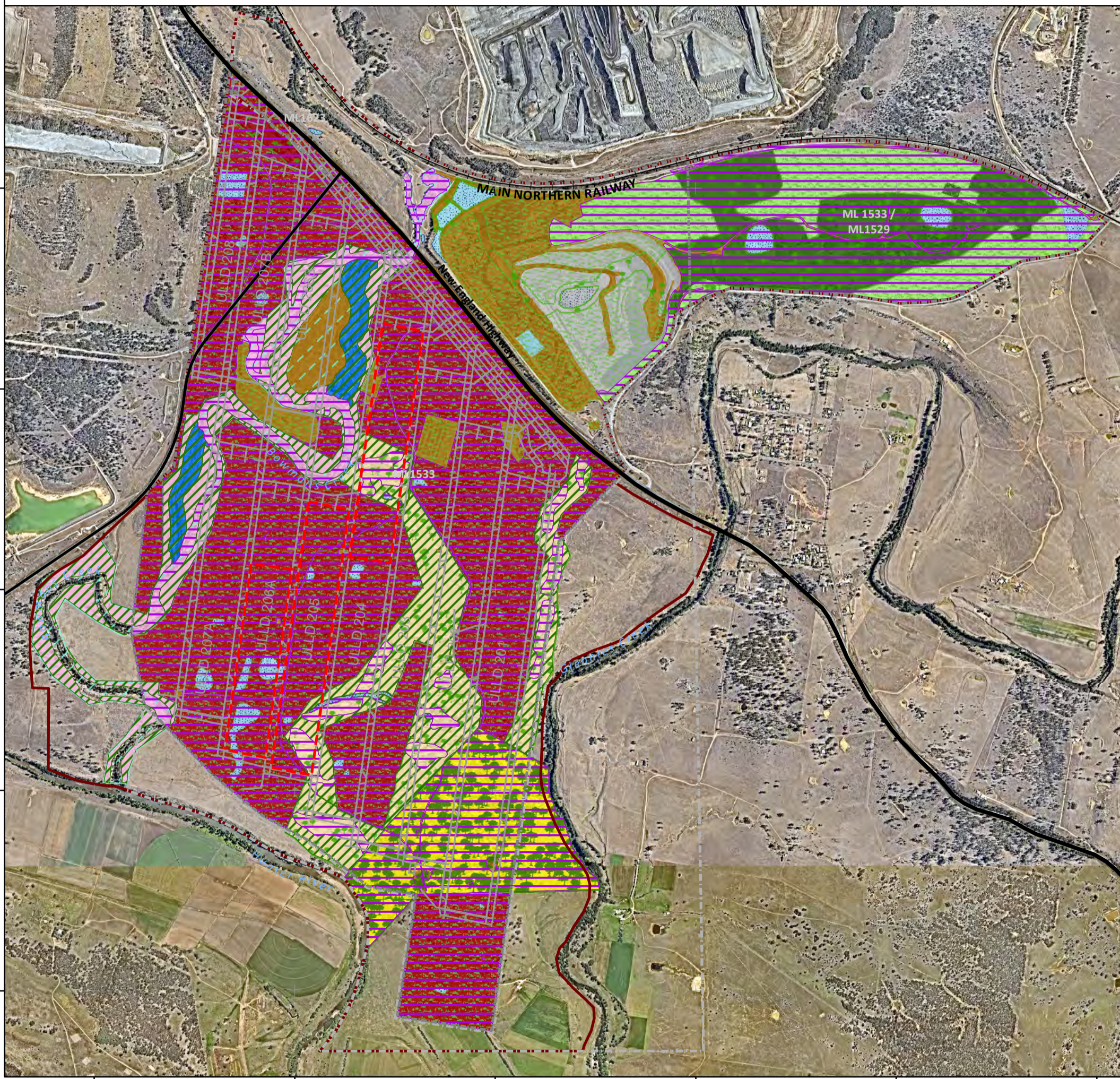
- Bowmans Creek Riparian Zone
- Bowmans Creek Diversion
- Infrastructure Areas
- Water Management Area
- Pasture - Underground Mining Area
- Trees over Grass - Underground Mining Area

Secondary Domains

- Bowmans Creek
- Southern Woodland Conservation Area
- Trees over Grassland
- Pasture
- Infrastructure
- Water Management Area

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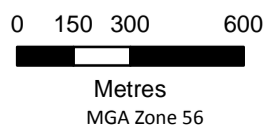
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Mining and Rehabilitation - 2020
Mining Operations Plan, Ashton Coal Project
Aerial Imagery Source: NearMap 2018

Drawn: GW
24/05/2018
Map **3C**

Operations Manager Date

Registered Mining Surveyor Date

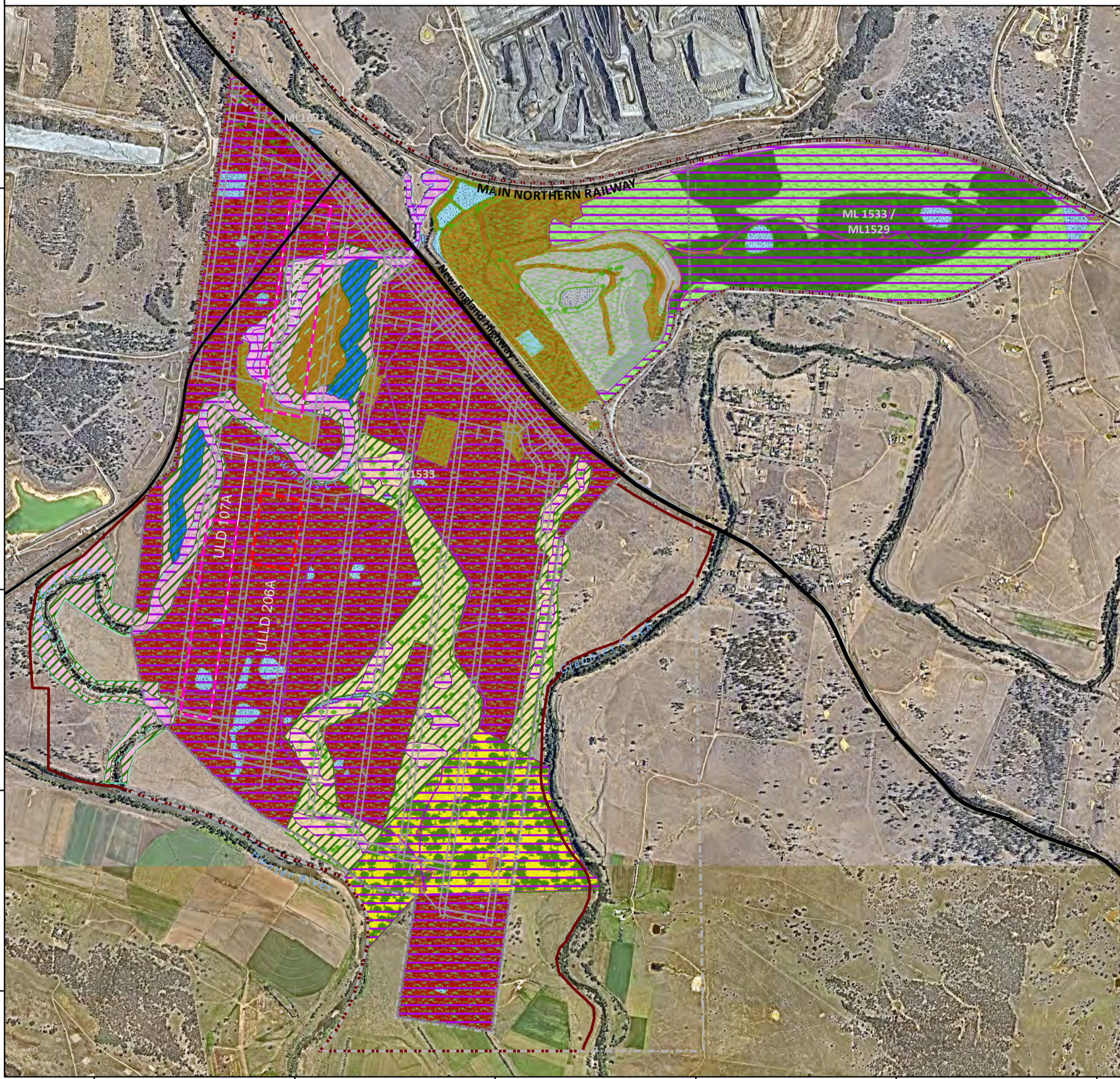
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|----------------------------|---------------|--------------------------------|-------------------------------|
| Mining Lease Boundary | Railway | Active Mining Area (ULD Seam) | Trees over Grass - SWCA |
| Exploration Lease Boundary | Roads | Active Mining Area (ULLD Seam) | Pasture - Open Cut |
| Project Approval Boundary | Water Courses | Goaf ULD Seam | Trees over Grass - Open Cut |
| | | First Workings ULLD Seam | Tailings Emplacement Facility |
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|--|---|-----------------------------------|--|--------------------------|-------------------------------------|
| Rehabilitation Phases | | Primary Domains | | Secondary Domains | |
| Phase 1 - Decommissioning | Phase 2 - Landform Establishment | Bowmans Creek Riparian Zone | Bowmans Creek Diversion | Bowmans Creek | Southern Woodland Conservation Area |
| Phase 3 - Growing Media Development | Phase 4 - Ecosystem and Landuse Establishment | Infrastructure Areas | Water Management Area | Trees over Grassland | Pasture |
| Phase 5 - Ecosystem and Landuse Sustainability | Phase 6 - Rehabilitation Complete | Pasture - Underground Mining Area | Trees over Grass - Underground Mining Area | Infrastructure | Water Management Area |

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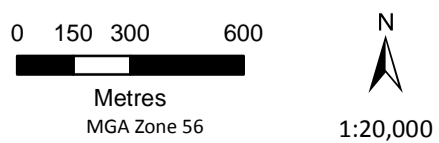
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Mining and Rehabilitation - 2021
Mining Operations Plan, Ashton Coal Project
Aerial Imagery Source: NearMap 2018

Drawn: GW
24/05/2018
Map **3D**

Operations Manager Date

Registered Mining Surveyor Date

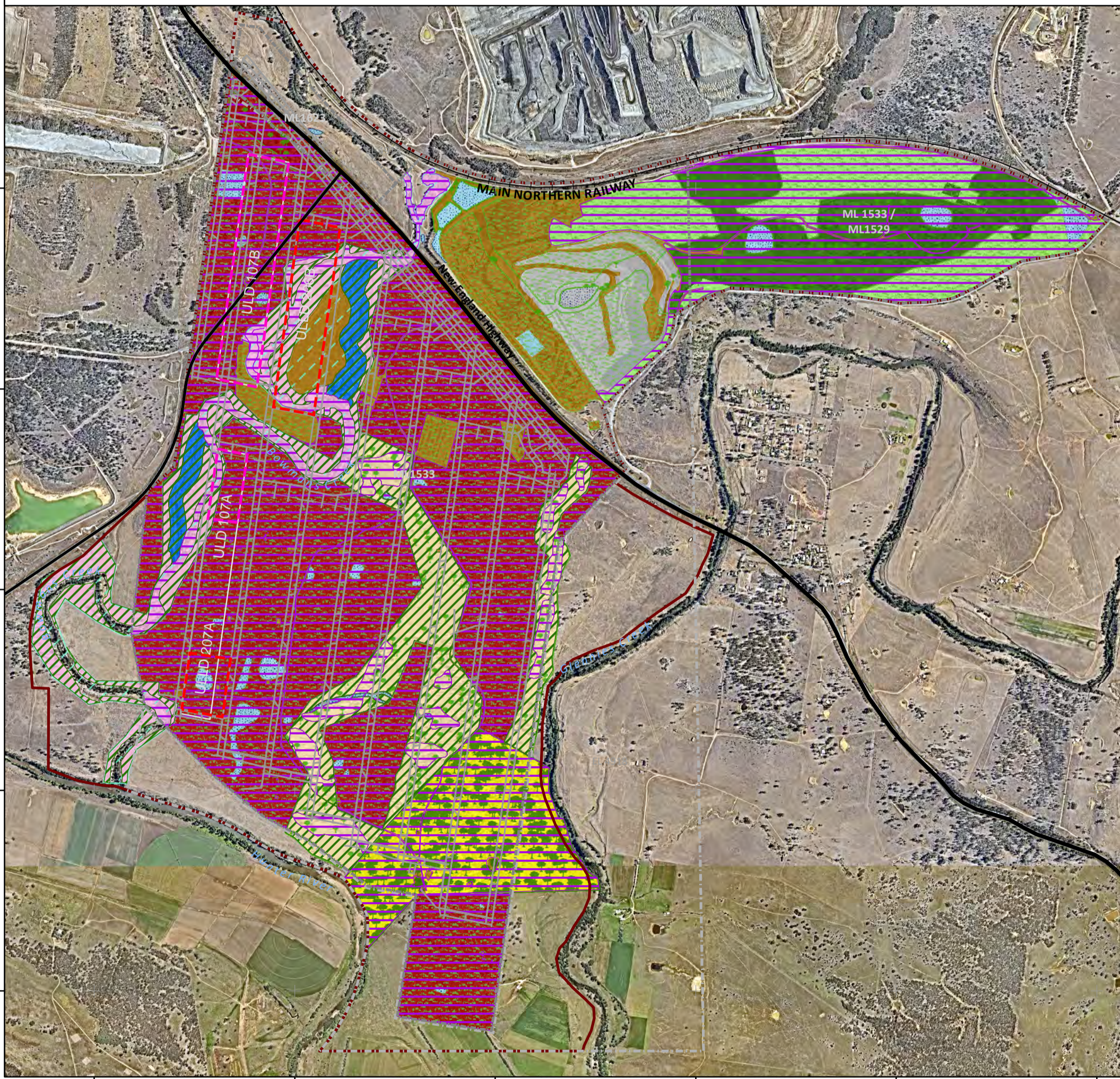
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|----------------------------|---------------|--------------------------------|-------------------------------|
| Mining Lease Boundary | Railway | Active Mining Area (ULD Seam) | Trees over Grass - SWCA |
| Exploration Lease Boundary | Roads | Active Mining Area (ULLD Seam) | Pasture - Open Cut |
| Project Approval Boundary | Water Courses | Goaf ULD Seam | Trees over Grass - Open Cut |
| | | First Workings ULLD Seam | Tailings Emplacement Facility |
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|--|--|-------------------------------------|
| Rehabilitation Phases | Primary Domains | Secondary Domains |
| Phase 1 - Decommissioning | Bowmans Creek Riparian Zone | Bowmans Creek |
| Phase 2 - Landform Establishment | Bowmans Creek Diversion | Southern Woodland Conservation Area |
| Phase 3 - Growing Media Development | Infrastructure Areas | Trees over Grassland |
| Phase 4 - Ecosystem and Landuse Establishment | Water Management Area | Pasture |
| Phase 5 - Ecosystem and Landuse Sustainability | Pasture - Underground Mining Area | Infrastructure |
| Phase 6 - Rehabilitation Complete | Trees over Grass - Underground Mining Area | Water Management Area |

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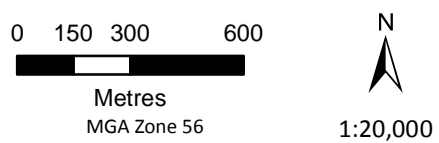
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Mining and Rehabilitation - 2022
Mining Operations Plan, Ashton Coal Project
Aerial Imagery Source: NearMap 2018

Drawn: GW
24/05/2018
Map **3E**

Operations Manager Date

Registered Mining Surveyor Date

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- Mining Lease Boundary
- Exploration Lease Boundary
- Project Approval Boundary
- Railway
- Roads
- Water Courses
- Active Mining Area (ULLD Seam)
- First Workings ULLD Seam
- Trees over Grass - SWCA
- Pasture - Open Cut
- Trees over Grass - Open Cut
- Tailings Emplacement Facility

Rehabilitation Phases

- Phase 1 - Decommissioning
- Phase 2 - Landform Establishment
- Phase 3 - Growing Media Development
- Phase 4 - Ecosystem and Landuse Establishment
- Phase 5 - Ecosystem and Landuse Sustainability
- Phase 6 - Rehabilitation Complete

Primary Domains

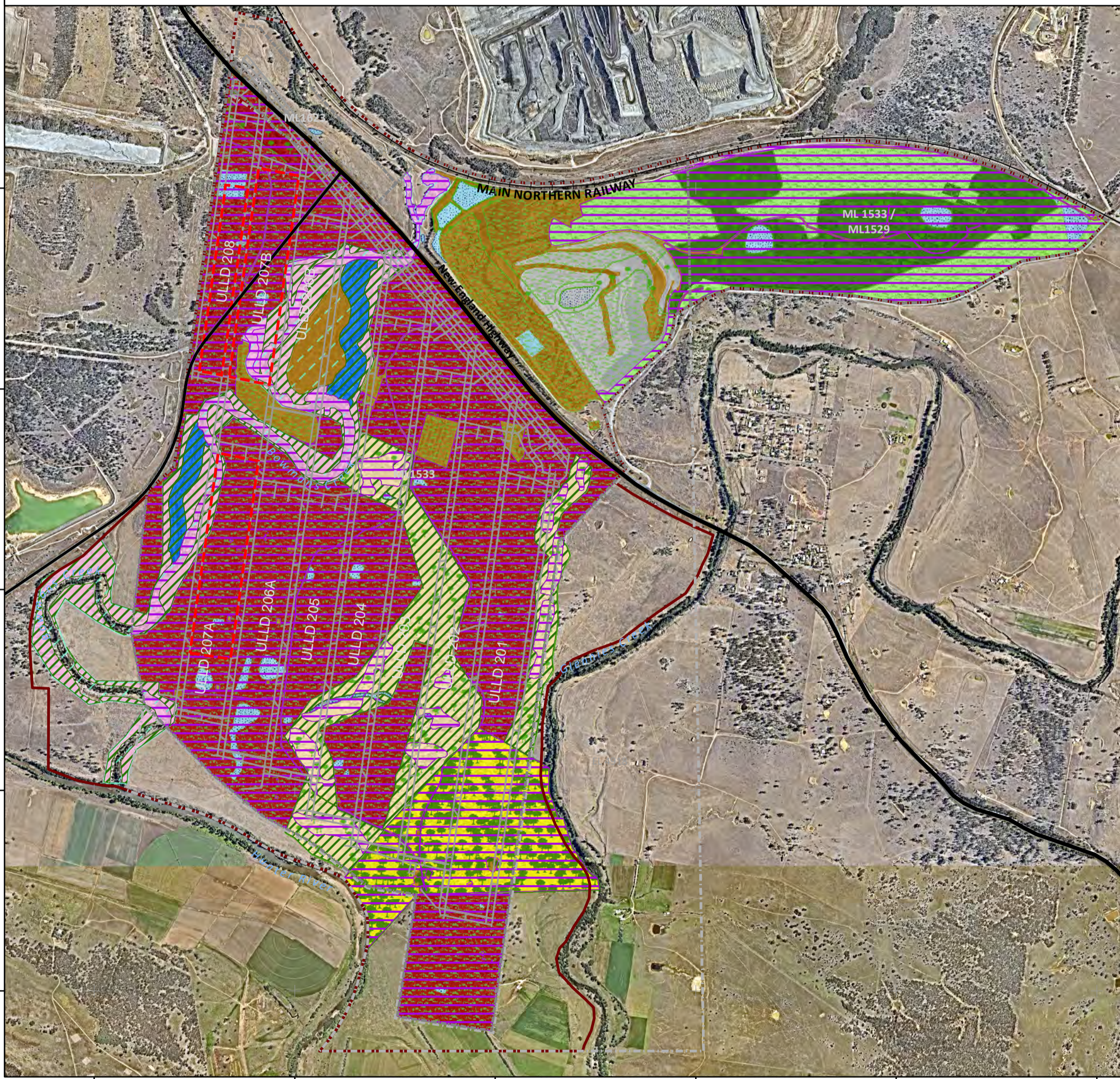
- Bowmans Creek Riparian Zone
- Bowmans Creek Diversion
- Infrastructure Areas
- Water Management Area
- Pasture - Underground Mining Area
- Trees over Grass - Underground Mining Area

Secondary Domains

- Bowmans Creek
- Southern Woodland Conservation Area
- Trees over Grassland
- Pasture
- Infrastructure
- Water Management Area

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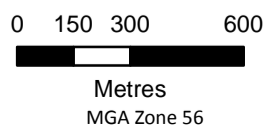
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Mining and Rehabilitation - 2023
Mining Operations Plan, Ashton Coal Project
Aerial Imagery Source: NearMap 2018

Drawn: GW
24/05/2018
Map **3F**

Operations Manager Date

Registered Mining Surveyor Date

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- Mining Lease Boundary
- Exploration Lease Boundary
- Project Approval Boundary
- Railway
- Roads
- Water Courses
- Active Mining Area (ULLD Seam)
- First Workings ULLD Seam
- Trees over Grass - SWCA
- Pasture - Open Cut
- Trees over Grass - Open Cut
- Tailings Emplacement Facility

Rehabilitation Phases

- Phase 1 - Decommissioning
- Phase 2 - Landform Establishment
- Phase 3 - Growing Media Development
- Phase 4 - Ecosystem and Landuse Establishment
- Phase 5 - Ecosystem and Landuse Sustainability
- Phase 6 - Rehabilitation Complete

Primary Domains

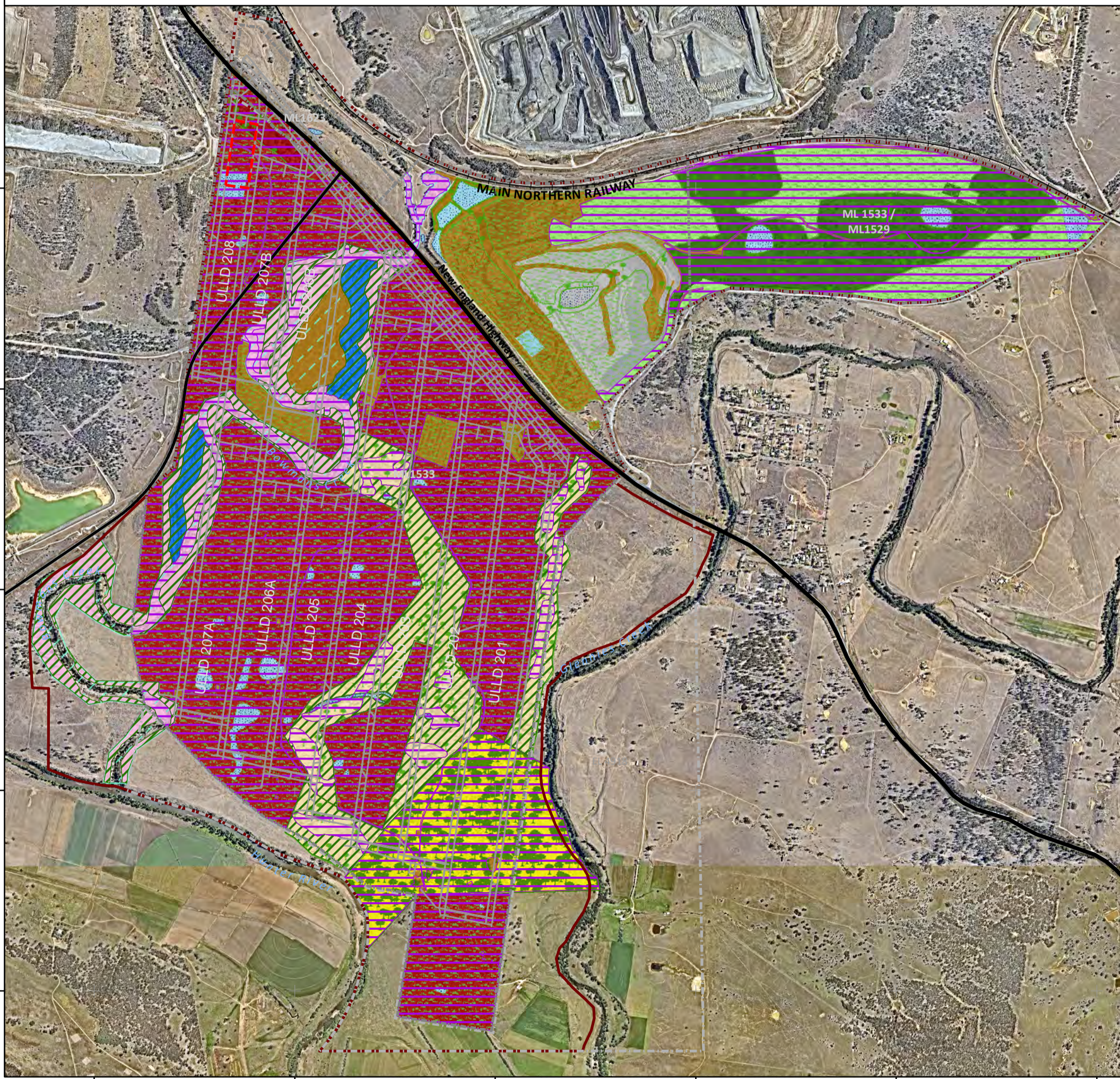
- Bowmans Creek Riparian Zone
- Bowmans Creek Diversion
- Infrastructure Areas
- Water Management Area
- Pasture - Underground Mining Area
- Trees over Grass - Underground Mining Area

Secondary Domains

- Bowmans Creek
- Southern Woodland Conservation Area
- Trees over Grassland
- Pasture
- Infrastructure
- Water Management Area

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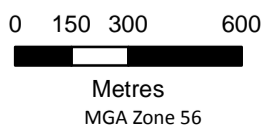
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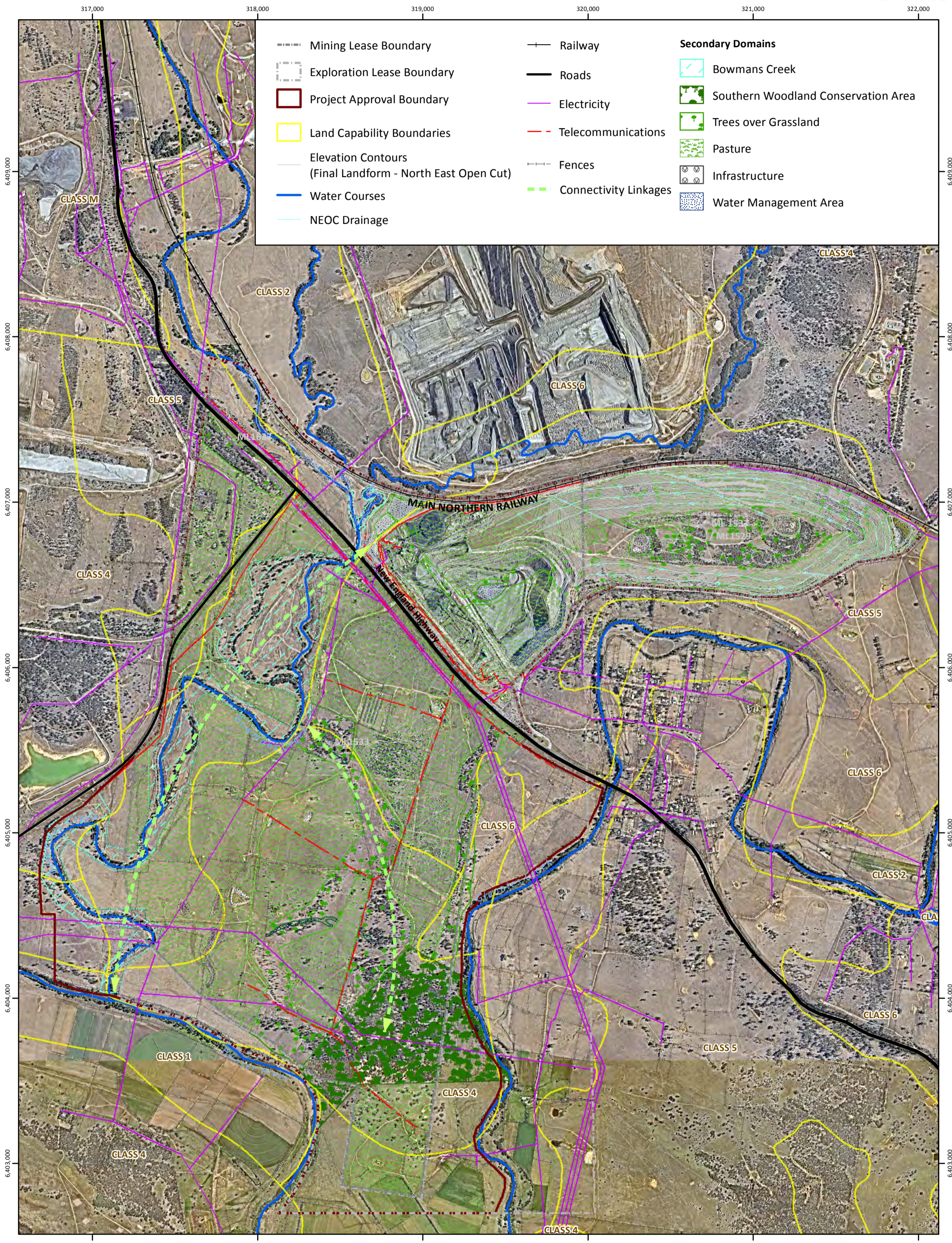
Mining and Rehabilitation - 2024
Mining Operations Plan, Ashton Coal Project
Aerial Imagery Source: NearMap 2018

Drawn: GW
24/05/2018
Map **3G**

Operations Manager Date

Registered Mining Surveyor Date

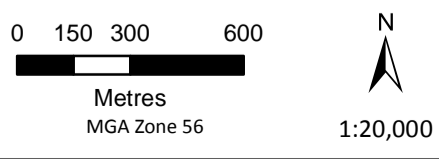
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| ----- Mining Lease Boundary | —+— Railway | Secondary Domains |
| Exploration Lease Boundary | — Roads | Bowmans Creek |
| ▭ Project Approval Boundary | — Electricity | Southern Woodland Conservation Area |
| ▭ Land Capability Boundaries | --- Telecommunications | Trees over Grassland |
| — Elevation Contours
(Final Landform - North East Open Cut) | --- Fences | Pasture |
| — Water Courses | --- Connectivity Linkages | Infrastructure |
| — NEOC Drainage | | Water Management Area |

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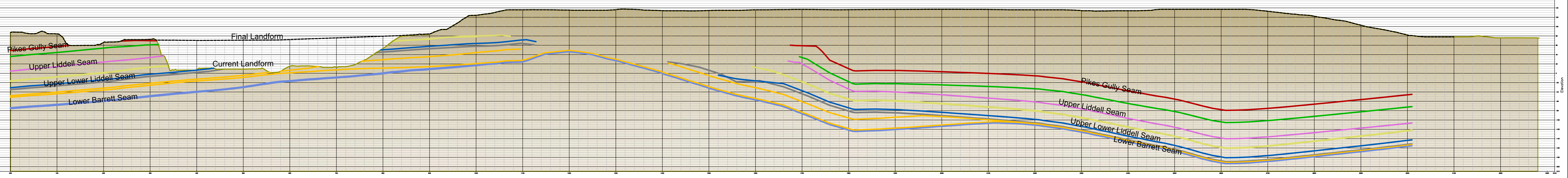


Operations Manager Date

Registered Mining Surveyor Date

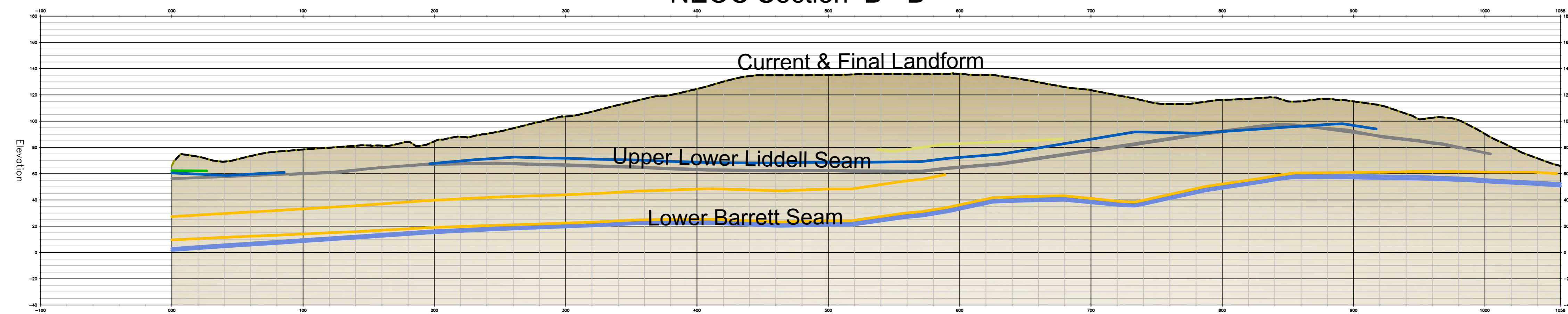
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NEOC Section A - A'



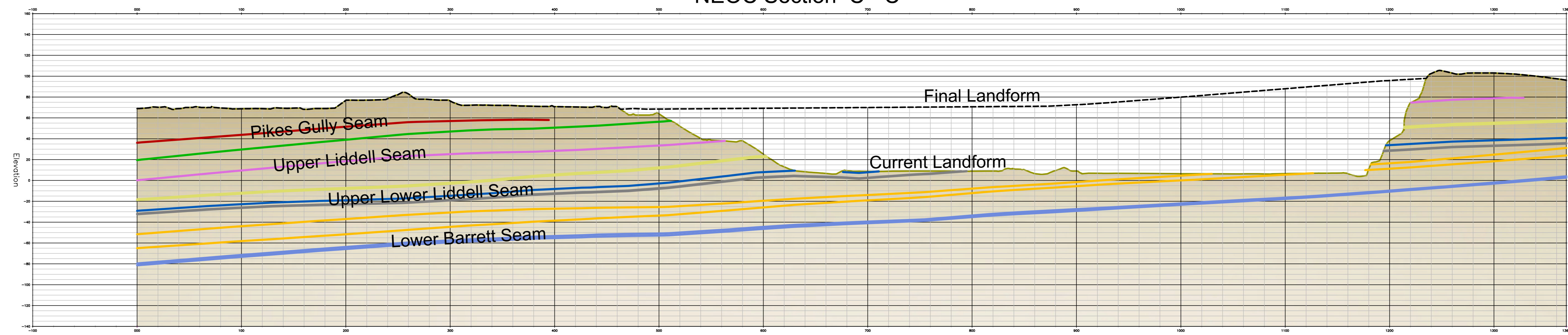
Scale 1:3000

NEOC Section B - B'



Scale 1:2000

NEOC Section C - C'



Scale 1:2000

I, _____, Holder of Mine Managers Certificate of Competency, certify that the information shown on this plan is a true indication of the proposed development.

Operations Manager _____ Date _____

I, _____, Registered Mining Surveyor, Certify that to the best of my knowledge and belief this plan conforms to the accuracy and standards required by NSW Planning & Environment Resources & Energy.

Registered Mining Surveyor _____ Date _____

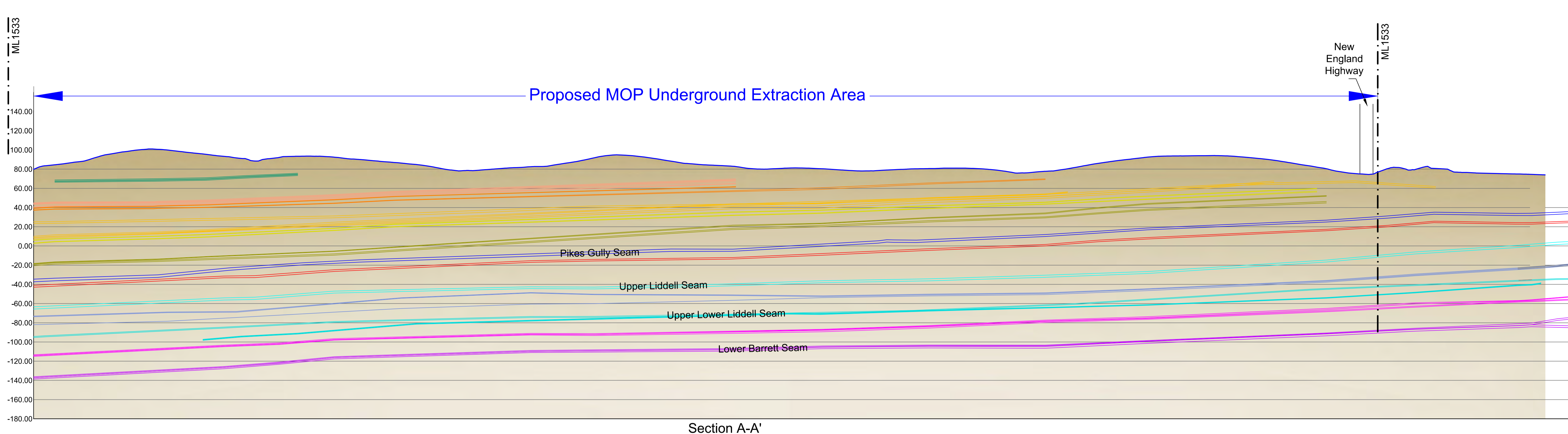


ASHTON COAL PROJECT
Mining Operations Plan - MAP 5A
North East Open Cut Sections A - C

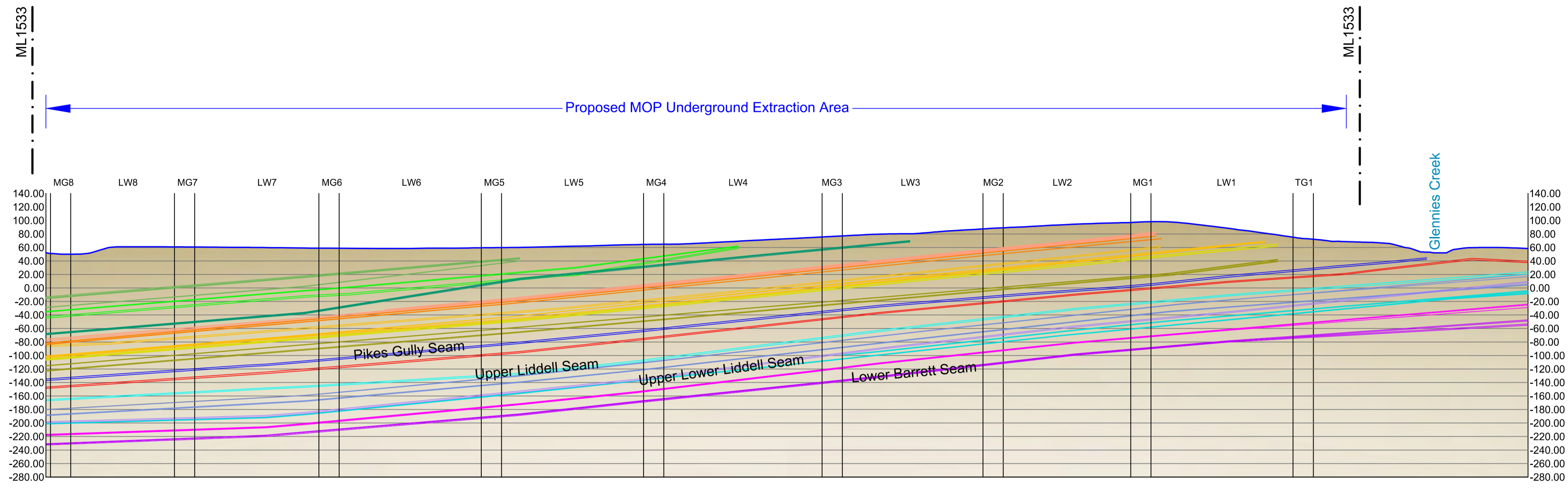
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Revision No. 1

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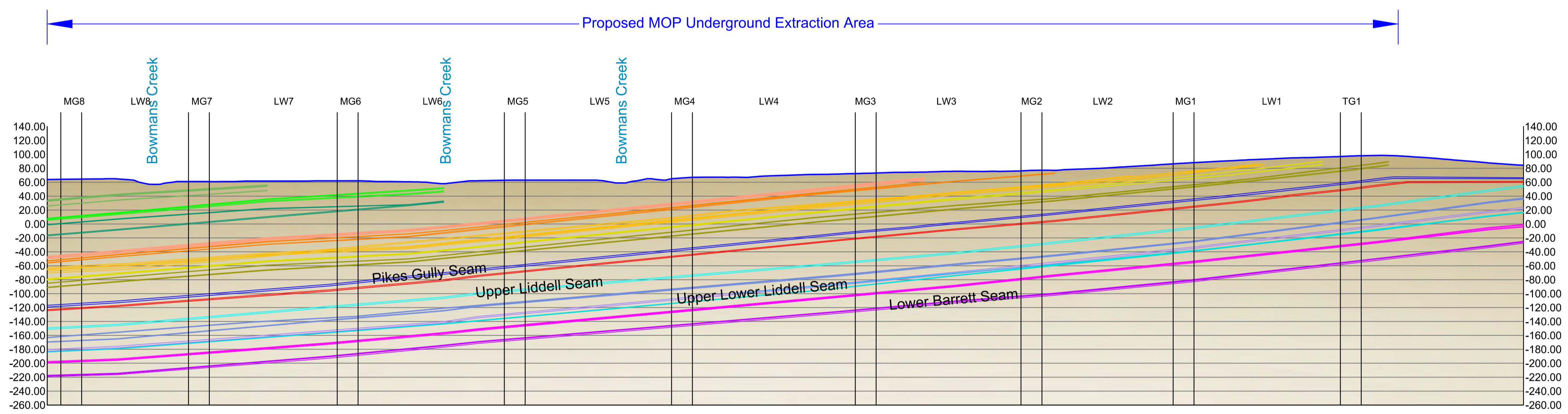
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Section A-A'
Scale 2:1 (VER:HOR)



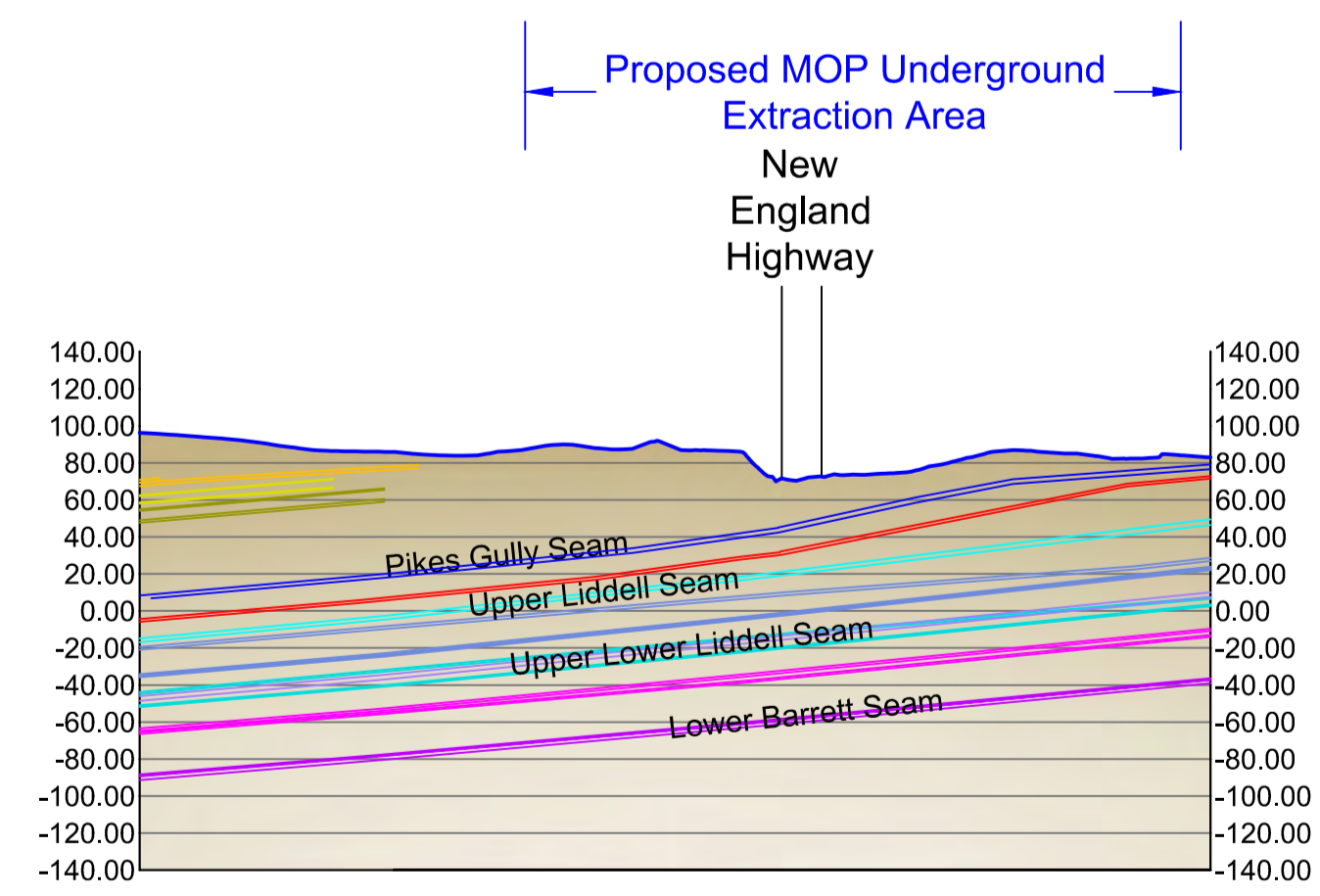
Section B-B'
Scale 1:1 (VER:HOR)



Section C-C'
Scale 1:1 (VER:HOR)

KEY:

- Mining Leases
 - Existing surface
 - Lemington Seams 3, 4 & 5
 - Lemington Seams 6 & 7
 - Lemington Seams 8 & 9
 - Lemington Seams 10, 11 & 12
 - Lemington Seams 13 & 14
 - Lemington Seam 15
 - Lemington Seams 16 & 17
 - Lemington Seams 18 & 19
 - Pikes Gully Seam
 - Arties Seam
 - Upper Liddell Seam
 - Middle Liddell Seam
 - Upper Lower Liddell Seam
 - Lower Lower Liddell Seam
 - Upper Barrett Seam
 - Lower Barrett Seam
- Target Seams to be mined



Section D-D'
Scale 1:1 (VER:HOR)

I, _____, Holder of Mine Managers Certificate of Competency, certify that the information shown on this plan is a true indication of the proposed development.

Operations Manager _____ Date _____

I, _____, Registered Mining Surveyor, Certify that to the best of my knowledge and belief this plan conforms to the accuracy and standards required by NSW Planning & Environment Resources & Energy.

Registered Mine Surveyor _____ Date _____



ASHTON COAL PROJECT
Mining Operations Plan - MAP 5B
Underground Mining Sections A - D

Date	Scale	Drawn	Checked	Approved	Drawing No.
01/05/2018	1:4000	JIP	PB	A. McG	A-5115-UG
					Revision No.
					1
					Sheet Size
					A0

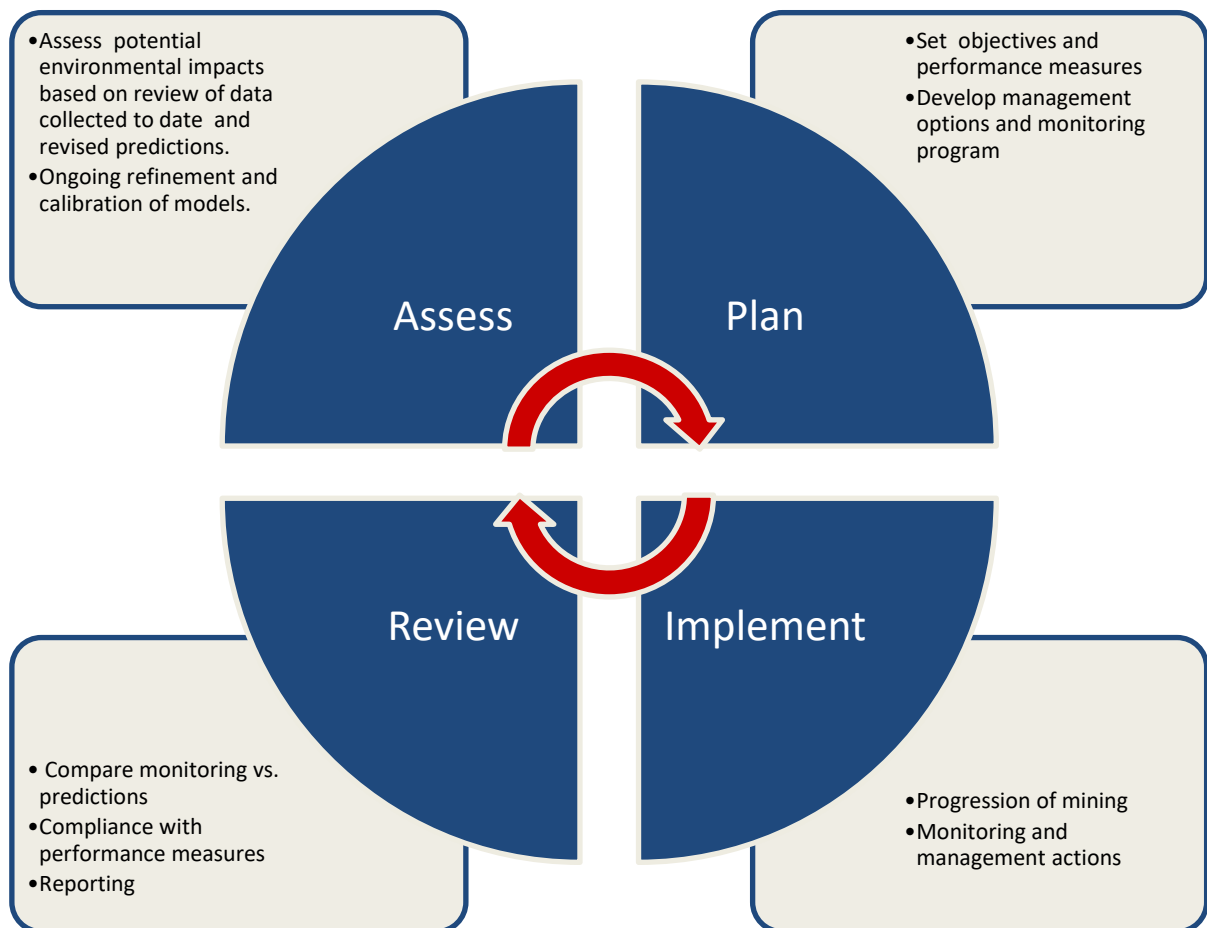
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11 Review and Implementation of the MOP

ACOL's approach to managing the rehabilitation program in terms of subsidence and environmental impacts at the ACP includes using past performance to guide and improve future monitoring and management actions. ACOL utilises monitoring records of environmental conditions and the subsequent response to monitoring to gain an improved understanding of the environmental and site-specific behaviour. Updated information is then incorporated into ACOL's management plans through each phase of mine planning and reviewed when requested. Review of the MOP may also occur under the items listed in Section 11.1.

This adaptive management approach is illustrated in Figure 2.

Figure 2 Adaptive Management Loop



11.1 Review of the MOP

This section provides the protocol for periodic review of this MOP. Reviews are conducted to assess the effectiveness of the procedures against the objectives of the MOP.

The MOP may be reviewed, and if necessary revised, due to:

- Submissions pertaining to the Annual Review;
- Submission pertaining to an incident report;
- Submissions pertaining to an audit;

MOP - 2018 to 2024

- Any modification to the conditions of the project approval
- Deficiencies being identified and recorded during implementation;
- Results from the monitoring and rehabilitation activities;
- Recommendations resulting from the monitoring and review process;
- Changing environmental requirements;
- Improved knowledge or technology becomes available;
- Changes in legislation;
- Changes in the activities or operations associated with the ACP Mine operation;
- Research and trials producing data which can be used to establish, modify and monitor the rehabilitated area; and
- Where a risk assessment identifies the requirement to alter the MOP.

Any major amendments to this MOP which affect the fundamentals of the plan will be undertaken in consultation with the appropriate regulatory authorities.

11.2 Implementation of the MOP

Table 32 defines personnel who are responsible for the monitoring, review and implementation of this MOP.

Table 32 Responsibilities for Implementation of the MOP

Title	Responsibility
Operations Manager	<ul style="list-style-type: none"> - Implement the procedures referenced in this MOP. - Undertake training in relevant Management Plans and procedures as required. - Provide resources required and support to implement these procedures. - Allow for forward planning to prepare rehabilitation areas.
Technical Service Manager	<ul style="list-style-type: none"> - Implement the procedures referenced in this MOP. - Undertake training in relevant Management Plans and procedures as required. - Provide resources required to implement these procedures. - Allow for forward planning to prepare rehabilitation areas. - Ensure mine planning is compliant with the requirements of the MOP. - Allow for forward planning to allow for any possible reviews of the MOP required by future mine planning. - Ensure all personnel undertaking works in relation to this MOP are trained and competent.

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Title	Responsibility
Environmental and Community Relations Superintendent	<ul style="list-style-type: none"> - Prepare the relevant Management Plans. - Implement, monitor and review the programmes and procedures linked to this MOP. - Consult with regulatory authorities as required. - Undertake monitoring as required. - Undertake maintenance as required. - Provide measures for continual improvement to this MOP and procedures. - Ensure all personnel undertaking works in relation to this MOP are trained and competent. - Report the progress of any rehabilitation and monitoring of biodiversity in the Annual Review.
Environment and Community Coordinator	<ul style="list-style-type: none"> - Provide support for the implementation of the Environmental and Community Relations Manager responsibilities.

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12 References

A list of references is provided in Appendix A - References.

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13 Acronyms

ACHMP	Aboriginal and Cultural Heritage Management Plan
ACOL	Ashton Coal Operations Pty Limited
ACP	Ashton Coal Project
AHIMS	Aboriginal Heritage Information System
AHIP	Aboriginal Heritage Impact Permit
AMD	Acid Mine Drainage
APZ	Asset Protection Zone
AQMP	Air Quality Management Plan
BC Act	Biodiversity Conservation Act 2016
BCD	Bowmans Creek Diversion
BCDRS	Bowmans Creek Diversion Rehabilitation Strategy
BVMP	Blasting and Vibration Management Plan
CCC	Community Consultative Committee
CHPP	Coal Handling Preparation Plant
CPP	Coal Preparation Plant
DA	Development Application
DG	Director-General
DP&E	Department of Planning and Environment
DRE	Division of Resources and Energy (now the Division of Resources and Geosciences (DRG))
DRG	Division of Resources and Geosciences, within the Department of Planning and Environment
EC	Electrical Conductivity
EEA	Eastern Emplacement Area
EL	Exploration Licence
EMS	Environmental Management System
EPA	Environmental Protection Authority
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>

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EPL	Environmental Protection Licence
GCL	Geosynthetic Clay Layer
GHG	Greenhouse Gas
LB	Lower Barrett
LW	Longwall
ML	Mining Lease
MOP	Mining Operations Plan
Mtpa	Million tonnes per annum
NEOC	North East Open Cut
NMP	Noise Management Plan
NOW	New South Wales Office of Water
N/A	Not Applicable
OGM	Organic Growth Medium
OEH	Office of Environment and Heritage
OHS	Occupational Health and Safety
PG	Pikes Gully
PWD	Process Water Dam
QR	Queensland Rail (now Aurizon Holdings)
RL	Radiation Licence
RLPB	Rural Lands Protection Board
ROM	Run Of Mine
SC	Singleton Council
SHECMS	Safety Health Environment and Community Management System
SMP (LW 1-4)	Subsidence Management Plan (Longwalls (105-107)
SMP (LW 5-9)	Subsidence Management Plan (Longwalls 201-204)
SSMP	Soil Stripping Management Plan
TDS	Total Dissolved Solids
TEOP	Tailings Emplacement Operations Plan
TSC Act	<i>Threatened Species and Conservation Act 1995 (repealed by BC Act)</i>

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TSS	Total Suspended Solids
ULD	Upper Liddell
ULLD	Upper Lower Liddell
VCA	Voluntary Conservation Agreement
WEA	Western Emplacement Area
WMP	Water Management Plan

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Appendix A – References

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ACOL (2009) ACOL Bowmans Creek Diversion Environmental Assessment, Ashton Coal Operations Pty Limited, December 2009.

Andrews, N, (1999). *Synoptic Plan – Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales*, Prepared for the NSW Department of Mineral Resources.

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FloraBank (1999) Guidelines 6 Native Seed Collection methods, FloraBank, [<http://www.florabank.org.au/>]

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Nichols, O.G. (2005) Integrated Landscapes for Minesite Rehabilitation Development of rehabilitation completion criteria for native ecosystem establishment on mineral mines in the Hunter Valley, Australian Centre for Minerals Extension and Research. ACARP Project No. C13048, Queensland.

Strata Control Technology (SCT) (2009), Multi-Seam Subsidence Assessment for Ashton Coal Mine Longwalls 5 to 8, October 2009.

Strata Control Technology (SCT) (2012), Subsidence and Hydraulic Conductivity Effects of Longwall 1 in the Pikes Gully Seam, June 2012.

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Tongway, D.J., and Hindley, N.L. (2004), Landscape function analysis. Procedures for monitoring and assessing landscapes. CSIRO Sustainable ecosystems, Canberra.

Wells Environmental Services (2009) *South East Open Cut Project and Modification to the Existing ACP Consent: Environmental Assessment Report*, November 2009.

Management Plans

ACOL (a), Ashton Coal Air Quality and Greenhouse Gas Management Plan, Version F1, YanCoal Australia LTD, October 2017.

ACOL (b) Ashton Coal Water Management Plan, Version 10, YanCoal Australia LTD, October 2017.

ACOL (c) Ashton Coal Flora and Fauna (Biodiversity) Management Plan, Version H, YanCoal Australia LTD, October 2017.

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ACOL (d) Ashton Coal Noise Management Plan, Version D10, YanCoal Australia LTD, October 2017.

ACOL (e) Ashton Coal Heritage Management Plan, YanCoal Australia LTD, October 2017.

ACOL (f) Bowmans Creek Diversion Construction Mining Operations Plan, Ashton Coal Operations Pty Limited, March 2011.

ACOL (g) ACOL Bowmans Creek Diversion Rehabilitation Strategy, Ashton Coal Operations Pty Limited, April 2010.

ACOL (h) ACOL Environmental Management Strategy, Ashton Coal Operations Pty Limited, September 2003.

ACOL (i) ACOL Public Safety Subsidence Management Plan, Ashton Coal Operations Pty Limited, October 2008.

ACOL (j) Ravensworth Void No. 4 Tailings Storage Facility Tailings Emplacement Operations Plan (TEOP), Ashton Coal Operations Pty Limited, January 2014.

ACOL (k) Ashton Coal Project Upper Liddell Seam Extraction Plan LW 105 - 107, Ashton Coal Operations Pty Limited, December 2015.

ACOL (l) Ashton Coal Mine Longwalls 201 to 204 Extraction Plan, Ashton Coal Operations Pty Limited, November 2016.

Legislation

Biodiversity Conservation Act 2016

Biosecurity Act 2015

Coal Mine Subsidence Compensation Act 2017

Coal Mines Health and Safety Act 2002 (repealed)

Coal Mines Regulation Act 1982 (repealed)

Environment Protection and Biodiversity Conservation Act 1999

Local Land Services Act 2013

National Parks and Wildlife Act 1974

Radiation Control Act 1990

Rural Fires Act 1997

Threatened Species and Conservation Act 1995 (repealed)

Water Act 1912

Water Management Act 2000

Appendix B – Regulatory Requirements

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Table 33 Regulatory Requirements Specific to Post Mining Land-use and Rehabilitation Outcomes at the ACP

Subject	DA (309-11-2001-i) Condition	Rehabilitation / Management Requirement	Timing															
Flora and Fauna Management monitoring	27	<p>The Applicant must implement the biodiversity offset strategy as outlined in Table 9 and as generally described in the EA (and shown conceptually in Appendix 7), to the satisfaction of the Secretary.</p> <p><i>Table 9 - Biodiversity Offset Strategy</i></p> <table border="1" data-bbox="607 635 1778 892"> <thead> <tr> <th>Area</th> <th>Offset Type</th> <th>Minimum Size (hectares)</th> </tr> </thead> <tbody> <tr> <td>Southern Conservation Area</td> <td>Existing vegetation and vegetation to be established</td> <td>190</td> </tr> <tr> <td>Bowmans Creek Riparian Area</td> <td>Riparian and woodland vegetation</td> <td>60</td> </tr> <tr> <td>North East Open Cut Rehabilitation Area</td> <td>Woodland vegetation to be established</td> <td>100</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td>350</td> </tr> </tbody> </table>	Area	Offset Type	Minimum Size (hectares)	Southern Conservation Area	Existing vegetation and vegetation to be established	190	Bowmans Creek Riparian Area	Riparian and woodland vegetation	60	North East Open Cut Rehabilitation Area	Woodland vegetation to be established	100	Total		350	Throughout Life of Mine
Area	Offset Type	Minimum Size (hectares)																
Southern Conservation Area	Existing vegetation and vegetation to be established	190																
Bowmans Creek Riparian Area	Riparian and woodland vegetation	60																
North East Open Cut Rehabilitation Area	Woodland vegetation to be established	100																
Total		350																

Subject	DA (309-11-2001-i) Condition	Rehabilitation / Management Requirement	Timing																				
Rehabilitation Objectives	41	<p>Rehabilitation Objectives</p> <p>41. The Applicant must rehabilitate the site in a manner that is consistent with the rehabilitation objectives in the EA and Table 11, to the satisfaction of DRE.</p> <p><i>Table 11: Rehabilitation Objectives</i></p> <table border="1"> <thead> <tr> <th data-bbox="667 517 958 539">Feature</th> <th data-bbox="958 517 1357 539">Objective</th> </tr> </thead> <tbody> <tr> <td data-bbox="667 539 958 561">DA Area</td> <td data-bbox="958 539 1357 561">Safe, stable & non-polluting</td> </tr> <tr> <td data-bbox="667 561 958 695">Final Void</td> <td data-bbox="958 561 1357 695">Safe, stable & non-polluting Minimise the size and depth of the final void as far as is reasonable and feasible. Minimise the drainage catchment of the final void as far as is reasonable and feasible. Negligible high wall instability risk.</td> </tr> <tr> <td data-bbox="667 695 958 730">Surface infrastructure</td> <td data-bbox="958 695 1357 730">To be decommissioned and removed, unless DRE agrees otherwise.</td> </tr> <tr> <td data-bbox="667 730 958 826">Sections of Bowmans Creek within the underground mining area (except those sections of channel made redundant by diversion)</td> <td data-bbox="958 730 1357 826">Restore pre-mining surface flow and pool holding capacity as soon as reasonably practicable. Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than existed prior to mining.</td> </tr> <tr> <td data-bbox="667 826 958 884">Bowmans Creek – Eastem and Western Diversions</td> <td data-bbox="958 826 1357 884">Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than existing in the adjacent channel prior to mining.</td> </tr> <tr> <td data-bbox="667 884 958 938">Land to be restored or maintained for agricultural purposes</td> <td data-bbox="958 884 1357 938">Restored and maintained to the same or higher land capability and agricultural suitability than prior to mining.</td> </tr> <tr> <td data-bbox="667 938 958 1072">Other land affected by the development</td> <td data-bbox="958 938 1357 1072">Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of: <ul style="list-style-type: none"> local native plant species (unless DRE agrees otherwise); and a landform consistent with the surrounding environment. </td> </tr> <tr> <td data-bbox="667 1072 958 1168">Built features affected by subsidence</td> <td data-bbox="958 1072 1357 1168">Repair to pre-mining condition or equivalent unless: <ul style="list-style-type: none"> the owner agrees otherwise; or the damage is fully restored, repaired or compensated under the <i>Mine Subsidence Compensation Act 1961</i>. </td> </tr> <tr> <td data-bbox="667 1168 958 1225">Community</td> <td data-bbox="958 1168 1357 1225">Ensure public safety. Minimise the adverse socio-economic effects associated with mine closure.</td> </tr> </tbody> </table> <p><i>Notes:</i></p> <ol style="list-style-type: none"> <i>These rehabilitation objectives apply to all subsidence impacts and environmental consequences caused by mining undertaken following the date of approval of Modification 6 to this consent on 24 December 2010; and to all surface infrastructure that forms part of the development, whether constructed prior to or following the approval of Modification 6.</i> <i>Rehabilitation of subsidence impacts and environmental consequences caused by mining which took place prior to the approval of Modification 6 may be subject to the requirements of other approvals (eg under a mining lease or an Subsidence Management Plan approval) or the Applicant's commitments.</i> 	Feature	Objective	DA Area	Safe, stable & non-polluting	Final Void	Safe, stable & non-polluting Minimise the size and depth of the final void as far as is reasonable and feasible. Minimise the drainage catchment of the final void as far as is reasonable and feasible. Negligible high wall instability risk.	Surface infrastructure	To be decommissioned and removed, unless DRE agrees otherwise.	Sections of Bowmans Creek within the underground mining area (except those sections of channel made redundant by diversion)	Restore pre-mining surface flow and pool holding capacity as soon as reasonably practicable. Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than existed prior to mining.	Bowmans Creek – Eastem and Western Diversions	Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than existing in the adjacent channel prior to mining.	Land to be restored or maintained for agricultural purposes	Restored and maintained to the same or higher land capability and agricultural suitability than prior to mining.	Other land affected by the development	Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of: <ul style="list-style-type: none"> local native plant species (unless DRE agrees otherwise); and a landform consistent with the surrounding environment. 	Built features affected by subsidence	Repair to pre-mining condition or equivalent unless: <ul style="list-style-type: none"> the owner agrees otherwise; or the damage is fully restored, repaired or compensated under the <i>Mine Subsidence Compensation Act 1961</i>. 	Community	Ensure public safety. Minimise the adverse socio-economic effects associated with mine closure.	Ongoing throughout mine life
Feature	Objective																						
DA Area	Safe, stable & non-polluting																						
Final Void	Safe, stable & non-polluting Minimise the size and depth of the final void as far as is reasonable and feasible. Minimise the drainage catchment of the final void as far as is reasonable and feasible. Negligible high wall instability risk.																						
Surface infrastructure	To be decommissioned and removed, unless DRE agrees otherwise.																						
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Built features affected by subsidence	Repair to pre-mining condition or equivalent unless: <ul style="list-style-type: none"> the owner agrees otherwise; or the damage is fully restored, repaired or compensated under the <i>Mine Subsidence Compensation Act 1961</i>. 																						
Community	Ensure public safety. Minimise the adverse socio-economic effects associated with mine closure.																						

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Subject	DA (309-11-2001-i) Condition	Rehabilitation / Management Requirement	Timing
	42 of Schedule 3	The Applicant must carry out rehabilitation progressively, that is, as soon as practicable following disturbance, to the satisfaction of DRE.	Ongoing throughout mine life
Rehabilitation Management Plan	43 of Schedule 3	<p>The Applicant shall prepare a Rehabilitation Management Plan for the Ashton Mine Complex, to the satisfaction of the Director-General of DRE, to manage the potential impacts of the development. This plan must:</p> <ol style="list-style-type: none"> a) be prepared in consultation with the Department, OEH, EPA, DPI Water, Council and the CCC; b) be prepared in accordance with any relevant DRE guideline, and be consistent with the rehabilitation objectives in Table 11 and in the EA and the previous EIAs; c) build, to the maximum extent practicable, on the other management plans required under this consent; and d) address all aspects of rehabilitation and mine closure, including final land use assessment, rehabilitation objectives, domain objectives, completion criteria and rehabilitation monitoring, and include: <ul style="list-style-type: none"> • an evaluation of end land use options for the final void; and • a life of mine tailings strategy, including an environmental risk assessment demonstrating that the emplacements can be designed, managed and rehabilitated appropriately. <p>The Applicant must implement the approved management plan as approved from time to time by DRE.</p>	This MOP

<p>Biodiversity Management Plan</p>	<p>28 of Schedule 3</p>	<p>Biodiversity Management Plan</p> <p>28. The Applicant must prepare a Biodiversity Management Plan for the Ashton Mine Complex to manage potential impacts of the development. This plan must:</p> <p>(a) be prepared in consultation with OEH and Council, and be submitted to the Secretary for approval;</p> <p>(b) describe how the implementation of the offset strategy would be integrated with the overall rehabilitation of the site (see below);</p> <p>(c) include:</p> <p>(i) a description of the short, medium, and long term measures that would be implemented to:</p> <ul style="list-style-type: none"> • implement the offset strategy; and • manage the remnant vegetation and habitat on the site and in the offset areas; <p>(ii) detailed performance and completion criteria for implementation of the offset strategy;</p> <p>(iii) a detailed description of the measures that would be implemented over the next 3 years, including the procedures to be implemented for:</p> <ul style="list-style-type: none"> • implementing revegetation and regeneration within the disturbance areas and offset areas, including establishment of canopy, sub-canopy (if relevant), understorey and ground strata; • maximising salvage and beneficial use of resources in areas that are to be impacted, including vegetative, soil and cultural heritage resources; • protecting vegetation and soil outside the disturbance areas; • rehabilitating creeks and drainage lines on the site (both inside and outside the disturbance areas), to minimise net loss of stream length and aquatic habitat; • managing salinity; • conserving and reusing topsoil; • undertaking pre-clearance surveys; • managing impacts on fauna; • landscaping the site and along public roads to minimise visual and lighting impacts, particularly along the New England Highway; • collecting and propagating seed; • salvaging and reusing material from the site for habitat enhancement; • salvaging, transplanting and/or propagating threatened flora and native grassland; • controlling weeds and feral pests; • managing grazing and agriculture on site and in the offset areas; • controlling access; and • bushfire management; <p>(iv) a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;</p> <p>(v) a description of the potential risks to successful revegetation, and a description of the contingency measures that would be implemented to mitigate these risks; and</p> <p>(vi) details of who would be responsible for monitoring, reviewing, and implementing the plan.</p> <p>The Applicant must implement the approved management plan as approved from time to time by the Secretary.</p>	<p>Ongoing throughout mine life</p>
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Subject	DA (309-11-2001-i) Condition	Rehabilitation / Management Requirement	Timing
Extraction Plan	32 of Schedule 3	<p>Extraction Plan</p> <p>32. The Applicant must prepare an Extraction Plan for all second workings on site. This plan must:</p> <ul style="list-style-type: none"> (a) be prepared a team of suitably qualified and experienced persons whose appointment has been endorsed by the Secretary; (b) be approved by the Secretary; (c) include detailed plans of the proposed second workings and any associated surface development; (d) include detailed performance indicators for each of the performance measures in Table 10; (e) provide revised predictions of the conventional and non-conventional subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since this consent, that specifically addresses the incremental and cumulative subsidence effects and impacts of multi-seam mining; (f) describe the measures that would be implemented to ensure compliance with the performance measures in Table 10, and remediate any predicted subsidence impacts and/or environmental consequences; (g) include the following, which have been prepared in consultation with DRE: <ul style="list-style-type: none"> • a coal resource recovery plan that demonstrates effective recovery of the available resource; • a subsidence monitoring program to: <ul style="list-style-type: none"> - provide data to assist in the management of the risks associated with subsidence; - validate the subsidence predictions; and - analyse the relationship between the subsidence effects and impacts under the Extraction Plan and any ensuing environmental consequences; 	Ongoing throughout mine life

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		<ul style="list-style-type: none"> • a Built Features Management Plan, which has been prepared in consultation with the owners of such features, to manage the potential impacts and consequences of subsidence on any built features; • a Public Safety Management Plan to ensure public safety in the underground mining area; and • a revised Rehabilitation Management Plan; <p>(h) include a:</p> <ul style="list-style-type: none"> • Water Management Plan, which has been prepared in consultation with EPA and DPI Water, to manage the potential impacts and consequences of subsidence on surface water and groundwater resources, flooding and existing and proposed creek diversions, and which includes: <ul style="list-style-type: none"> - surface and groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse impacts on water resources or water quality; - a program to monitor and report groundwater inflows to underground workings; - a program to manage and monitor impacts on groundwater bores on privately-owned land; • Biodiversity Management Plan, which has been prepared in consultation with OEHL, to manage the potential impacts and consequences of subsidence on biodiversity, and which includes: <ul style="list-style-type: none"> - a program of works to ensure that overall terrestrial and aquatic biodiversity values are the same or better than existing in Bowmans Creek prior to longwall mining; - measures to manage potential impacts and/or environmental consequences of the proposed second workings on aquatic and terrestrial flora and fauna; • Land Management Plan, which has been prepared in consultation with relevant landowners, to manage the potential impacts and consequences of subsidence on land in general; • Heritage Management Plan, which has been prepared in consultation with OEHL and relevant stakeholders for Aboriginal heritage, to manage the potential impacts and consequences of subsidence on heritage sites or values; <p>(i) include Trigger Action Response Plans, or equivalent, to address potential subsidence impacts and environmental consequences that may result from mining subsidence;</p> <p>(j) include a contingency plan that expressly provides for adaptive management where monitoring indicates that there has been an exceedance of any performance measures in Table 10, or where any such exceedance appears likely; and</p> <p>(k) include a program to collect sufficient baseline data for future Extraction Plans.</p> <p><i>Note: A Subsidence Management Plan approved by DRE or an Extraction Plan approved by the Secretary, prior to the date of approval of MOD 5, is taken to satisfy the requirements of this condition.</i></p> <p>The Applicant must implement the approved management plans as approved from time to time by the Secretary.</p>	
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MOP - 2018 to 2024

Subject	DA (309-11-2001-i) Condition	Rehabilitation / Management Requirement	Timing
ACOL statement of commitments Bowmans Creek Diversion DA 309-11-2001 MOD-6 Appendix 3	General 2.1	Subsidence troughs will be reshaped and fill will be used where practicable to create a free draining landform. This approach is expected to reduce the potential for surface pooling and inflow into the mine.	Ongoing throughout mine life
	Construction of Diversion Channels 8.3	Topsoil will be separately stockpiled within designated stockpile areas and used for rehabilitating disturbed areas, post construction, where required.	Ongoing throughout mine life
	Rehabilitation and Land Management 9.1	Subsidence troughs will be rehabilitated to provide a free draining surface.	Ongoing throughout mine life
	Rehabilitation and Land Management 9.2	Landscape restoration will generally be consistent with the: <ul style="list-style-type: none"> - The Rehabilitation Strategy described in the Response to Submissions Report. Conceptual landscape design drawings presented in the EA. - Existing ACP Landscape and Revegetation Management Plan. - Existing ACP weed management protocols. 	This MOP
	9.3	Flood damage to the constructed channels will be remediated to restore hydraulic and geomorphic function.	Ongoing throughout mine life
	9.4	Stock proof fencing (at least 5 m from the alignment of any riparian trees) will be installed along both sides of the functioning diverted creek for its full length between the New England Highway and the Hunter River.	During construction
	9.5	Stock watering troughs will be installed at strategic locations on pasture areas adjacent to the creek in the post-mine landscape, where required.	During construction
ACOL statement of commitments Underground Mine Interim Gas Drainage	Flora and Fauna 6a	Locations of gas drainage well pads and access tracks will be developed to avoid clearing native vegetation.	During construction
	Flora and Fauna 6b	Ground disturbance will be minimised as far as practicable.	During construction and operation

MOP - 2018 to 2024

Subject	DA (309-11-2001-i) Condition	Rehabilitation / Management Requirement	Timing
and Open Cut Hebden Seam Recovery DA 309-11-2001 MOD-7 Appendix 3	Flora and Fauna 6c	Site inductions will include identification of native vegetation exclusion areas and designated site access routes.	During construction and operation
	Soils and Erosion Control 8a	Industry standard sediment control measures will be implemented prior to ground disturbance, including use of clean water diversions, where required.	During construction and operation
	DA, Schedule E, Item 8b	Long-term stockpiles will be stabilised with jute mesh or grass cover.	During construction and operation
Mining Lease Conditions	ML1533, & ML1623 Condition 2	<p>Environmental Harm</p> <p>(a) The lease holder must implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation or rehabilitation of any activities under this lease.</p> <p>(b) For the purposes of this condition:</p> <p>(i) environment means components of the earth, including:</p> <p>(A) land, air and water, and</p> <p>(B) any layer of the atmosphere, and</p> <p>(C) any organic or inorganic matter and any living organism, and</p> <p>(D) human-made or modified structures and areas, and includes any interacting natural ecosystems that include components referred to in paragraphs (A) – (C).</p> <p>(ii) harm to the environment includes any direct or indirect alteration of the environment that has the effect of degrading the environment and, without limiting the generality of the above, includes any act or omission that results in pollution, contributes to the extinction or degradation of any threatened species, populations or ecological communities and their habitats and causes impacts to places, objects and features of significance to Aboriginal people.</p>	Ongoing throughout mine life
	ML 1533, ML 1529, & ML 1623 Condition 3	<p>Mining Operations Plan</p> <p>(a) The lease holder must comply with an approved Mining Operations Plan (MOP) in carrying out any significant disturbing activities, including mining operations, mining purposes and prospecting. The lease holder must apply to the Minister for approval of a MOP. An approved MOP must be in</p>	Ongoing throughout mine life

MOP - 2018 to 2024

Subject	DA (309-11-2001-i) Condition	Rehabilitation / Management Requirement	Timing
		<p>place prior to commencing any significant surface disturbing activities, including mining operations, mining purposes and prospecting.</p> <p>(b) The MOP must identify the post mining land use and set out a detailed rehabilitation strategy which:</p> <ul style="list-style-type: none"> (i) identifies areas that will be disturbed by mining operations; (ii) details the staging of specific mining operations; (iii) identifies how the mine will be managed to allow mine closure; (iv) identifies how mining operations will be carried out in order to prevent and or minimise harm to the environment; (v) reflects the conditions of approval under: <ul style="list-style-type: none"> • the <i>Environmental Planning and Assessment Act 1979</i> • the <i>Protection of the Environment Operations Act 1997</i> • and any other approvals relevant to the development including the conditions of this lease; and • have regard to any relevant guidelines adopted by the Director-General. <p>(c) The MOP must be prepared in accordance with the <i>ESG3: Mining Operations Plan (MOP) Guidelines September 2013</i> published on the Departments website at www.resources.nsw.gov.au/environment.</p> <p>(d) The leaseholder may apply to the Minister to amend an approved MOP at any time.</p> <p>(e) It is not a breach of this condition if:</p> <ul style="list-style-type: none"> (i) the operations which, but for this condition 3(e) would be a breach of condition 3(a), were necessary to comply with a lawful order or direction given under the <i>Environmental Planning and Assessment Act 1979</i>, the <i>Protection of the Environment Operations Act 1997</i>, the <i>Mine Health and Safety Act 2004 / Coal Mine Health and Safety Act 2002</i> and <i>Mine Health and Safety Regulation 2007 / Coal Mine Health and Safety Regulation 2006</i> or the <i>Work Health and Safety Act 2011</i>; and (ii) the Minister had been notified in writing of the terms of the order or direction prior to the operations constituting the breach being carried out. <p>(f) The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must:</p> <ul style="list-style-type: none"> (i) provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP; 	

MOP - 2018 to 2024

Subject	DA (309-11-2001-i) Condition	Rehabilitation / Management Requirement	Timing
		<p>(ii) be submitted annually on the gran anniversary date (or at such other times as agreed by the Minister); and (iii) be prepared in accordance with any relevant annual reporting guidelines published on the Department's website at www.resources.nsw.gov.au/environment.</p> <p>A MOP ceases to have effect 7 years after date of approval or other such period as identified by the Director-General.</p>	
	ML 1533, ML 1529 & ML 1623 Condition 4	<p>Non-Compliance Reporting (a) The lease holder must notify the Department upon becoming aware of any breaches of the conditions of this mining lease or breaches of the Mining Act or Regulations; (b) Notifications under condition 4(A) must be provided in the form specified on the Department's website within seven (7) days of the mining lease holder becoming aware of the breach.</p>	Ongoing throughout mine life
	ML 1533, ML 1529 & ML 1623 Condition 5	<p>Environmental Incident Report The lease holder must provide environmental incident notifications and reports to the Secretary no later than seven (7) days after those environmental incident notifications and reports are provided to the relevant authorities under the <i>Protection of the Environment Operations Act 1997</i>.</p>	Ongoing throughout mine life
	ML 1533, & ML 1623 Condition 6	<p>Additional Environmental Reports Additional environmental reports may be required from time to time as directed in writing by the Director-General and must be lodged as instructed.</p>	Ongoing throughout mine life
	ML 1533, & ML 1623 Condition 7 ML 1529 Condition 2	<p>Rehabilitation Any disturbance as a result of activities under this lease must be rehabilitated to the satisfaction of the Director-General.</p>	Ongoing throughout mine life
	ML 1533, & ML 1623 Condition 8	<p>Extraction Plan Condition (a) In this condition: (i) approved Extraction Plan means a plan, being:</p>	Ongoing throughout mine life

MOP - 2018 to 2024

Subject	DA (309-11-2001-i) Condition	Rehabilitation / Management Requirement	Timing
	ML 1529 Condition 6	<p>A. an extraction plan or subsidence management plan approved in accordance with the conditions of a relevant development consent and provided to the Secretary; or</p> <p>B. a subsidence management plan relating to the mining operations subject to this lease:</p> <p style="padding-left: 20px;">I. submitted to the Secretary on or before 31 December 2014; and</p> <p style="padding-left: 20px;">II. approved by the Secretary.</p> <p>(ii) relevant development consent means a development consent or project approval issued under the <i>Environmental Planning and Assessment Act 1979</i> relating to the mining operations subject to this lease.</p> <p>(b) The lease holder must not undertake any underground mining operations that may cause subsidence except in accordance with an approved Extraction Plan.</p> <p>(c) The lease holder must ensure that the approved Extraction Plan provides for the effective management of risks associated with any subsidence resulting from mining operations carried out under this lease.</p> <p>(d) The lease holder must notify the Secretary within 48 hours of any:</p> <p style="padding-left: 20px;">(i) incident caused by subsidence which has a potential to expose any person to health and safety risks;</p> <p style="padding-left: 20px;">(ii) significant deviation from the predicted nature, magnitude, distribution, timing and duration of subsidence effects, and of the potential impacts and consequences of those deviations on built features and the health and safety of any person, or</p> <p style="padding-left: 20px;">(iii) significant failure or malfunction of a monitoring device or risk control measures set out in the approved Extraction Plan addressing:</p> <p style="padding-left: 40px;">A. built features;</p> <p style="padding-left: 40px;">B public safety; or</p> <p>C subsidence monitoring.</p>	
	ML 1533, & ML1623 Condition 14	<p>Roads and Tracks</p> <p>(d) Temporary access tracks must be rehabilitated and revegetated to the satisfaction of the Director-General as soon as reasonably practicable after they are no longer required under this lease.</p>	Ongoing throughout mine life

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Appendix C – Consultation Letters

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WEBSITE: www.ashtoncoal.com.au
ABN 22 078 556 500

Michael Frankcombe
Senior Compliance Officer
Department of Planning and Environment
PO Box 3145
Singleton NSW 2330

12/04/2018

Dear Michael,

Ashton Coal Operations Pty Limited - Mining Operations Plan 2018 - 2024

Ashton Coal Operations Limited (ACOL) mining activities are currently undertaken in accordance with the ACOL Mining Operations Plan (MOP). The MOP outlines the proposed operational and environmental management activities to be undertaken by ACOL for the period from 28 March 2013 to 1 July 2018. This MOP is due to expire and hence an updated MOP is required to cover the period from 1 July 2018 to 26 February 2024.

In June 2016 ACOL received a modification to its development consent DA 309-11-2001-i (Mod 5) which resulted in a change to a number of conditions in the DA. Schedule 3, Condition 43 of the current DA requires ACOL to prepare a Rehabilitation Management Plan (RMP). To avoid duplication, ACOL will incorporate the requirements of the RMP into the 2018 – 2024 MOP.

The existing Environmental Management Plans (EMPs) have been reviewed and updated to address the requirements of Mod 5. There are currently two extraction plans approved for secondary extraction, including the Upper Liddell Seam Extraction plan Longwalls 105 – 107 (July 2015) and the Ashton Coal Mine Longwalls 201 to 204 Extraction Plan (November 2016). The new MOP will incorporate the updated EMPs, approved Extraction Plans and current mine plans, and will be prepared in accordance with the requirements of DA 309-11-2001-i (as modified) and the DRE guidelines, ESG3: Mining Operations Plan (MOP) Guidelines, September 2013.

ACOL is currently undertaking consultation with relevant stakeholders to inform the preparation of the updated MOP. ACOL invites the Department of Planning and Environment to provide any comments or feedback that would assist in the preparation of the MOP. To assist in the timely preparation of the MOP, any feedback would be appreciated within 21 days of receipt of this letter.

If further information or clarification is required on this matter, please contact me via the below details.

Yours sincerely,

Phillip Brown
Environment and Community Relations Superintendent
Ashton Coal

Phone: 6570 9219
Mobile: 0439 909 952
Email: phillip.brown@yancoal.com.au

WEBSITE: www.ashtoncoal.com.au

ABN 22 078 556 500

Hemantha De Silva
Senior Water Regulation Officer
Department of Industry – Water
PO Box 2213
DANGAR NSW 2309

12/04/2018

Dear Hemantha,

Ashton Coal Operations Pty Limited - Mining Operations Plan 2018 - 2024

Ashton Coal Operations Limited (ACOL) mining activities are currently undertaken in accordance with the ACOL Mining Operations Plan (MOP). The MOP outlines the proposed operational and environmental management activities to be undertaken by ACOL for the period from 28 March 2013 to 1 July 2018. This MOP is due to expire and hence an updated MOP is required to cover the period from 1 July 2018 to 26 February 2024.

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ACOL is currently undertaking consultation with relevant stakeholders to inform the preparation of the updated MOP. ACOL invites the Department of Industry - Water to provide any comments or feedback that would assist in the preparation of the MOP. To assist in the timely preparation of the MOP, any feedback would be appreciated within 21 days of receipt of this letter.

If further information or clarification is required on this matter, please contact me via the below details.

Yours sincerely,

Phillip Brown
Environment and Community Relations Superintendent
Ashton Coal

Phone: 6570 9219
Mobile: 0439 909 952
Email: phillip.brown@yancoal.com.au



WEBSITE: www.ashtoncoal.com.au
ABN 22 078 556 500

Kate Walsh
Division of Resources and Energy
GPO Box 344
Hunter Regional Mail Centre NSW 2310

12/04/2018

Dear Kate,

Ashton Coal Operations Pty Limited - Mining Operations Plan 2018 - 2024

Ashton Coal Operations Limited (ACOL) mining activities are currently undertaken in accordance with the ACOL Mining Operations Plan (MOP). The MOP outlines the proposed operational and environmental management activities to be undertaken by ACOL for the period from 28 March 2013 to 1 July 2018. This MOP is due to expire and hence an updated MOP is required to cover the period from 1 July 2018 to 26 February 2024.

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The existing Environmental Management Plans (EMPs) have been reviewed and updated to address the requirements of Mod 5. There are currently two extraction plans approved for secondary extraction, including the Upper Liddell Seam Extraction plan Longwalls 105 – 107 (July 2015) and the Ashton Coal Mine Longwalls 201 to 204 Extraction Plan (November 2016). The new MOP will incorporate the updated EMPs, approved Extraction Plans and current mine plans, and will be prepared in accordance with the requirements of DA 309-11-2001-i (as modified) and the DRE guidelines, ESG3: Mining Operations Plan (MOP) Guidelines, September 2013.

ACOL is currently undertaking consultation with relevant stakeholders to inform the preparation of the updated MOP. ACOL invites the Division of Resources and Energy to provide any comments or feedback that would assist in the preparation of the MOP. To assist in the timely preparation of the MOP, any feedback would be appreciated within 21 days of receipt of this letter.

If further information or clarification is required on this matter, please contact me via the below details.

Yours sincerely,

Phillip Brown
Environment and Community Relations Superintendent
Ashton Coal

Phone: 6570 9219
Mobile: 0439 909 952
Email: phillip.brown@yancoal.com.au



WEBSITE: www.ashtoncoal.com.au
ABN 22 078 556 500

Michael Howat
Environment Protection Authority
PO Box 488G
NEWCASTLE NSW 2300

12/04/2018

Dear Michael,

Ashton Coal Operations Pty Limited - Mining Operations Plan 2018 - 2024

Ashton Coal Operations Limited (ACOL) mining activities are currently undertaken in accordance with the ACOL Mining Operations Plan (MOP). The MOP outlines the proposed operational and environmental management activities to be undertaken by ACOL for the period from 28 March 2013 to 1 July 2018. This MOP is due to expire and hence an updated MOP is required to cover the period from 1 July 2018 to 26 February 2024.

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The existing Environmental Management Plans (EMPs) have been reviewed and updated to address the requirements of Mod 5. There are currently two extraction plans approved for secondary extraction, including the Upper Liddell Seam Extraction plan Longwalls 105 – 107 (July 2015) and the Ashton Coal Mine Longwalls 201 to 204 Extraction Plan (November 2016). The new MOP will incorporate the updated EMPs, approved Extraction Plans and current mine plans, and will be prepared in accordance with the requirements of DA 309-11-2001-i (as modified) and the DRE guidelines, ESG3: Mining Operations Plan (MOP) Guidelines, September 2013.

ACOL is currently undertaking consultation with relevant stakeholders to inform the preparation of the updated MOP. ACOL invites the Environment Protection Authority to provide any comments or feedback that would assist in the preparation of the MOP. To assist in the timely preparation of the MOP, any feedback would be appreciated within 21 days of receipt of this letter.

If further information or clarification is required on this matter, please contact me via the below details.

Yours sincerely,

Phillip Brown
Environment and Community Relations Superintendent
Ashton Coal

Phone: 6570 9219
Mobile: 0439 909 952
Email: phillip.brown@yancoal.com.au



WEBSITE: www.ashtoncoal.com.au
ABN 22 078 556 500

Richard Bath
Office of Environment and Heritage
Locked Bag 1002
DANGAR NSW 2309

12/04/2018

Dear Richard,

Ashton Coal Operations Pty Limited - Mining Operations Plan 2018 - 2024

Ashton Coal Operations Limited (ACOL) mining activities are currently undertaken in accordance with the ACOL Mining Operations Plan (MOP). The MOP outlines the proposed operational and environmental management activities to be undertaken by ACOL for the period from 28 March 2013 to 1 July 2018. This MOP is due to expire and hence an updated MOP is required to cover the period from 1 July 2018 to 26 February 2024.

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ACOL is currently undertaking consultation with relevant stakeholders to inform the preparation of the updated MOP. ACOL invites the Office of Environment and Heritage to provide any comments or feedback that would assist in the preparation of the MOP. To assist in the timely preparation of the MOP, any feedback would be appreciated within 21 days of receipt of this letter.

If further information or clarification is required on this matter, please contact me via the below details.

Yours sincerely,

Phillip Brown
Environment and Community Relations Superintendent
Ashton Coal

Phone: 6570 9219
Mobile: 0439 909 952
Email: phillip.brown@yancoal.com.au



WEBSITE: www.ashtoncoal.com.au
ABN 22 078 556 500

Mary-Anne Crawford
Singleton Shire Council
Po Box 314
Singleton NSW 2330

12/04/2018

Dear Mary-Anne,

Ashton Coal Operations Pty Limited - Mining Operations Plan 2018 - 2024

Ashton Coal Operations Limited (ACOL) mining activities are currently undertaken in accordance with the ACOL Mining Operations Plan (MOP). The MOP outlines the proposed operational and environmental management activities to be undertaken by ACOL for the period from 28 March 2013 to 1 July 2018. This MOP is due to expire and hence an updated MOP is required to cover the period from 1 July 2018 to 26 February 2024.

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The existing Environmental Management Plans (EMPs) have been reviewed and updated to address the requirements of Mod 5. There are currently two extraction plans approved for secondary extraction, including the Upper Liddell Seam Extraction plan Longwalls 105 – 107 (July 2015) and the Ashton Coal Mine Longwalls 201 to 204 Extraction Plan (November 2016). The new MOP will incorporate the updated EMPs, approved Extraction Plans and current mine plans, and will be prepared in accordance with the requirements of DA 309-11-2001-i (as modified) and the DRE guidelines, ESG3: Mining Operations Plan (MOP) Guidelines, September 2013.

ACOL is currently undertaking consultation with relevant stakeholders to inform the preparation of the updated MOP. ACOL invites the Singleton Shire Council to provide any comments or feedback that would assist in the preparation of the MOP. To assist in the timely preparation of the MOP, any feedback would be appreciated within 21 days of receipt of this letter.

If further information or clarification is required on this matter, please contact me via the below details.

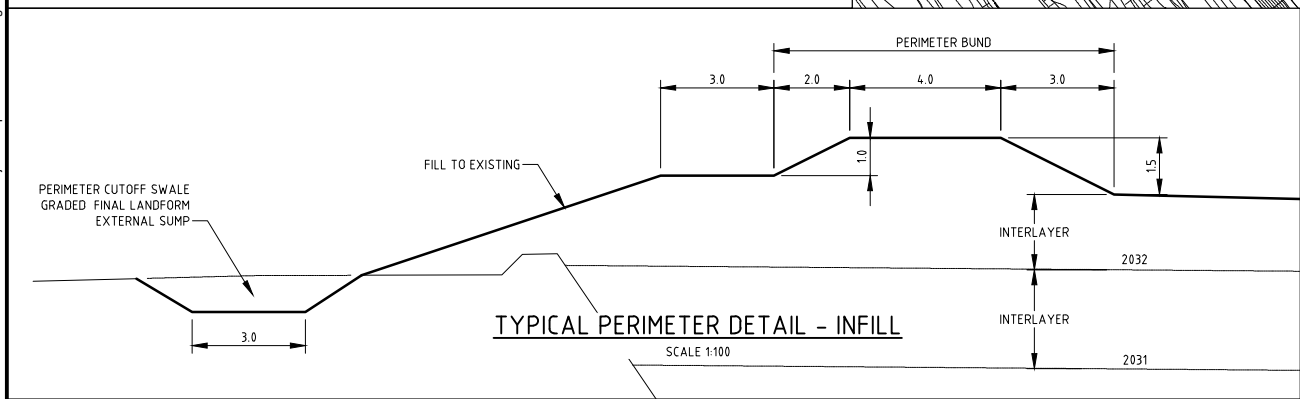
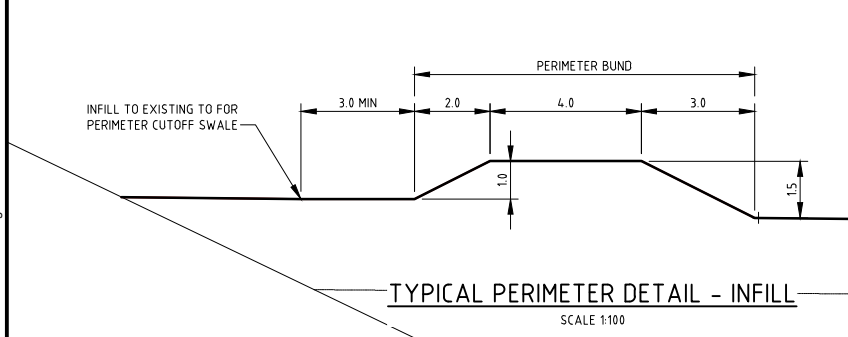
Yours sincerely,

Phillip Brown
Environment and Community Relations Superintendent
Ashton Coal

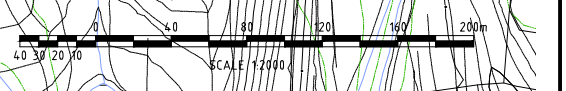
Phone: 6570 9219
Mobile: 0439 909 952
Email: phillip.brown@yancoal.com.au

Appendix D – Figure - North East Open Cut, Final Landform

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YEAR ENDING	FILL VOLUME
2012 emplacement surface	600,000m ³
2013 emplacement surface	1,550,000m ³
2014 emplacement surface	2,660,000m ³
STAGE 1 emplacement surface (MID 2015)	3,660,000m ³
2015 emplacement surface	4,680,000m ³
2016 emplacement surface	5,690,000m ³
2017 emplacement surface	6,710,000m ³
2018 emplacement surface	7,720,000m ³
2019 emplacement surface	8,740,000m ³
2020 emplacement surface	9,750,000m ³
2021 emplacement surface	10,770,000m ³
2022 emplacement surface	11,780,000m ³
2023 emplacement surface	12,790,000m ³
2024 emplacement surface	13,810,000m ³
2025 emplacement surface	14,820,000m ³
2026 emplacement surface	15,840,000m ³
2027 emplacement surface	16,850,000m ³
2028 emplacement surface	17,870,000m ³
2029 emplacement surface	18,880,000m ³
2030 emplacement surface	19,890,000m ³
2031 emplacement surface	20,910,000m ³
STAGE 2 Final SURFACE	21,920,000m ³



Rev	Date	Description	JBB	RKK	RKK
1	01/02/2012	ISSUED FOR CONSTRUCTION	JBB	RKK	RKK
2					

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Drawn	JBB	Date	24/01/2012
Checked	CJG	Date	24/01/2012
Designed	JBB	Date	24/01/2012
Verified	RKK	Date	24/01/2012
Approved	RKK	Date	24/01/2012

Client: **ASHTON COAL OPERATIONS LTD**
 NORTH EAST OPEN CUT
 REJECT EMPLACEMENT AREA
 PROPOSED FILL EMPLACEMENT
 STAGE 2 - FINAL LANDFORM

Status: FOR CONSTRUCTION			
Datum	A.H.D.	Council Ref:	Scale
			1:2000
Size	A1	Revision	1
Drawing Number	FR212062-002-217-C1002		

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Appendix E – Shortening of Longwall Panel 203

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27th August 2019

Matthew Quinn
Inspector Environment
Resources Regulator
516 High Street
Maitland NSW 2320

By email: Matthew.Quinn@planning.nsw.gov.au
minres.environment@planning.nsw.gov.au

Dear Matthew,

Re: Ashton Coal Mining Operations Plan Addendum

As discussed previously, Ashton Coal is preparing to shorten Longwall 203 (LW 302) due to geological conditions identified in the beginning of the longwall. We are writing to seek an amendment to the approved Ashton Coal Mining Operations Plan to allow the shortening of LW 203 and submit this letter and attached report as an addendum to the current Ashton Coal Mining Operations Plan.

Ashton Coal Project is approved to extract coal by longwall method under Development Consent DA 309-11-2001i. Ashton also has an approved Extraction Plan (EP) for Longwall Panels 201 -204 as required by Schedule 3 Condition32 of DC 309-11-2001i.

Shortening of LW 203

Currently mining is being completed in LW 202. Due to geological conditions found it is proposed to commence LW 203 some 600m shorter than the position shown on the approved plan under Schedule 2 Condition 2 and the approved EP for LW 201 - 204. Figure 1 of the enclosed MSEC report shows the revised starting line of LW 203.

Assessment

The attached MSEC Letter Report "*Effect of Shortening Longwall 203 on Surface Subsidence Impacts*" reviews the subsidence effects, subsidence impacts and environmental consequences of modifying the commencement location of LW 203.

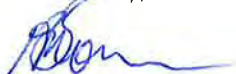
The Report assessment indicates "*that the main changes associated with shortening LW 203 would be a reduction in subsidence effects as no stacked goaf edge would be formed at the start of longwall 203 and a reduction in the area affected by subsidence. Consequently, less impacts are expected to surface features that was forecast in the EP for Longwalls 201 to 204.*"

Department's Approval

We submit the attached MSEC Letter Report "*Effect of Shortening Longwall 203 on Surface Subsidence Impacts*" and seek the Department's approval of the amendment to the Ashton Coal Mining Operations Plan for the shortening of Longwall 203 by adding this letter report as an addendum.

Please do not hesitate to contact me if you would like further information or have any questions regarding the content of this letter.

Yours sincerely,



Phillip Brown
Environment and Community Relations Superintendent

Enc. MSEC Report "Effect of Shortening Longwall 203 on Surface Subsidence Impacts"

COMPANY: ASHTON COAL OPERATIONS PTY LIMITED
SITE: Glennies Creek Road
Camberwell NSW 2330
POSTAL: PO Box 699 Singleton NSW 2330
PHONE: +61 2 6576 1111
FAX: +61 2 6576 1122
WEBSITE: www.ashtoncoal.com.au
ABN 22 078 556 500



SCT Operations Pty Ltd

ABN 23 078 328 953

www.sct.gs

30 July 2019

Phillip Brown
Environment & Community Relations
Superintendent
Ashton Coal Operations Pty Ltd
PO Box 699
SINGLETON NSW 2330

HEAD OFFICE

Cnr Kombla & Beach Streets Wollongong NSW 2500 Australia
PO Box 824 Wollongong NSW 2520 Australia
Telephone +61 2 4222 2777 Fax: +61 2 4226 4884
Email: sctnsw@sct.gs

BRISBANE OFFICE

Telephone/Fax: 0428 318 009 (international +61 428 318 009)
Email: p.cartwright@sct.gs

BENDIGO OFFICE

Telephone: +61 3 5443 5941
Email: s.macgregor@sct.gs

ASH5043

Dear Phil

EFFECT OF SHORTENING LONGWALL 203 ON SURFACE SUBSIDENCE IMPACTS

Ashton Coal Operations Pty Ltd (ACOL) is mining longwalls in the Upper Lower Liddell (ULLD) Seam as part of their ongoing multi-seam operations at the Ashton Underground Mine (AUM) located near Camberwell in the Hunter Valley of NSW. ACOL is planning to shorten Longwall 203 for operational reasons by approximately 600m from the panel length approved in development consent DA 309-11-2001i (MOD6) for the Ashton Coal Project (ACP) and the Extraction Plan (EP) for Longwalls 201 to 204. ACOL commissioned SCT Operations Pty Ltd (SCT) to review and assess the effects of shortening Longwall 203 on forecast subsidence impacts. This report presents the results of our assessment.

Figure 1 shows the proposed change in geometry of Longwall 203.

Our assessment indicates that the main changes associated with shortening Longwall 203 would be a reduction in subsidence effects as no stacked goaf edge would be formed at the start of longwall 203 and a reduction in the area affected by subsidence. Consequently, less impacts are expected to surface features than was forecast in the EP for Longwalls 201 to 204.

Infrastructure no longer impacted by moving the start of Longwall 203 600m to the north would include the Ausgrid 132kV powerline traversing the southern longwall panels, the secondary access road to Property 130, a section of Telstra line that connects Property 130, and ACOL's mine dewatering pump out pipeline and 11kV powerline. A slight increase in the area of ponding would be expected in a disused borrow pit at the head of a gully traversing the southern end of the panel. Planned minor earthworks are likely to keep this area free draining.

Subsidence monitoring lines established at the start of longwalls in the Pikes Gully Seam and Longwall 103 in the Upper Liddell Seam would no longer be effective, but the start line of Longwall 203 is close enough to the main crossline, XL5, for subsidence movements to be monitored without the need to extend the existing lines and survey these lines.

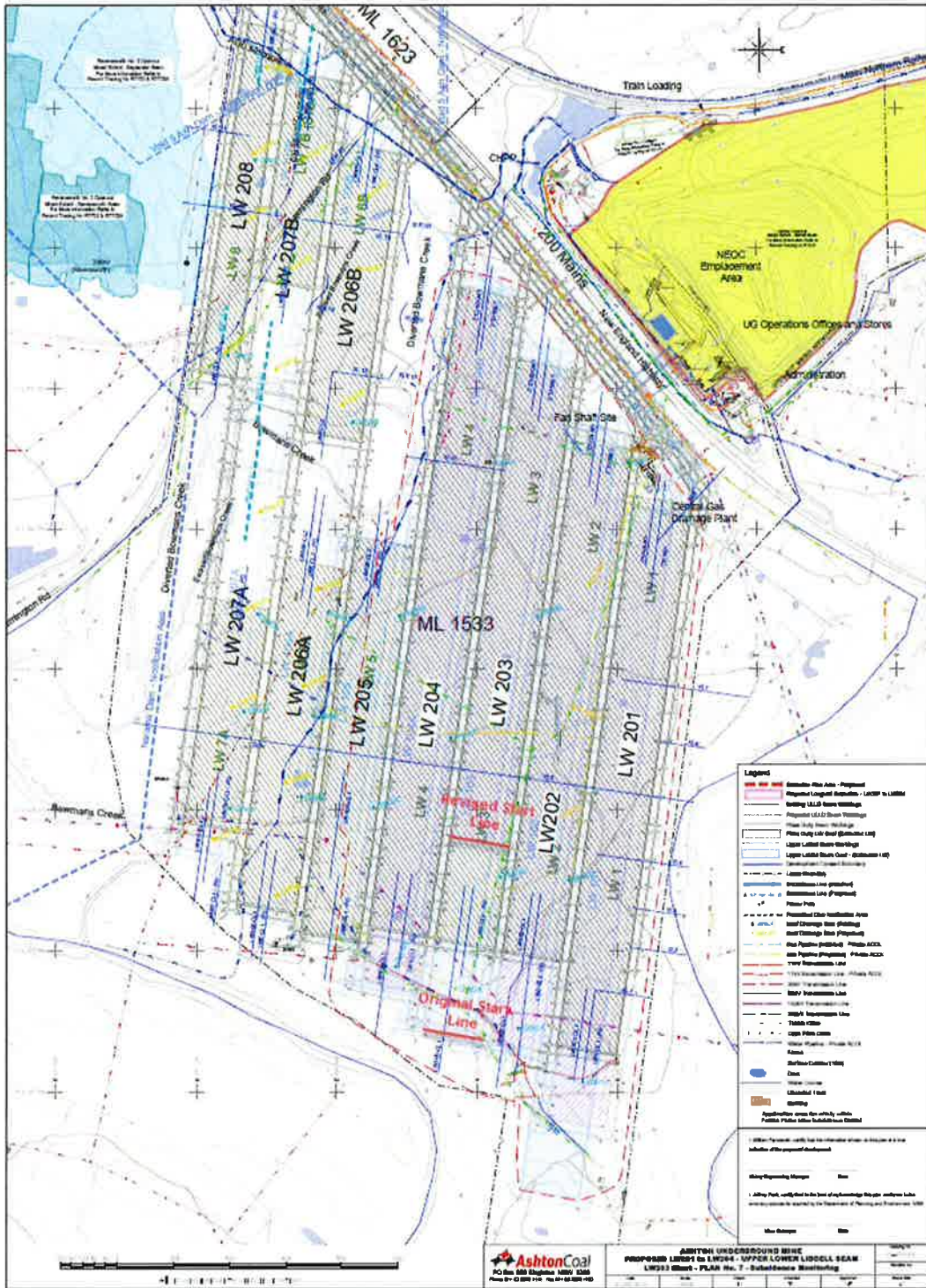


Figure 1: Plan showing location of revised start line for Longwall 203.

If you have any queries or require further clarification of any of the issues raised, please don't hesitate to contact me.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Ken Mills', with a large loop at the top.

Ken Mills
Principal Geotechnical Engineer