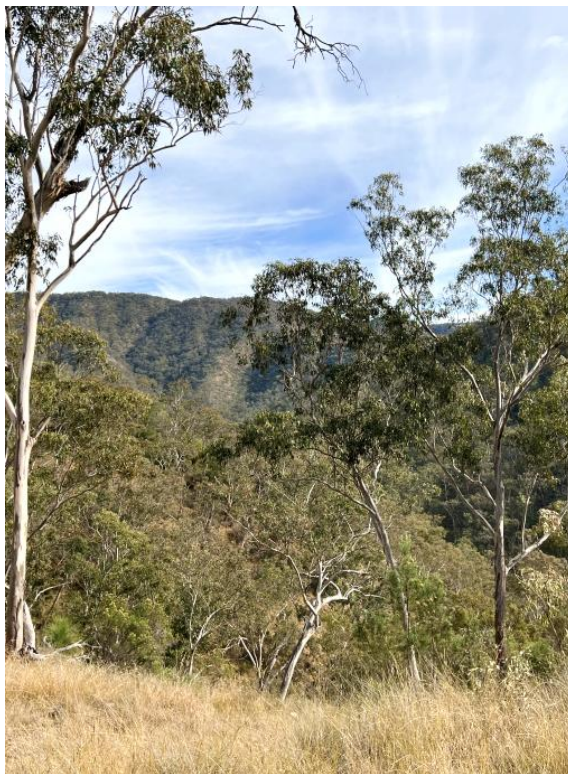




Document Title		Management Plan: Rehabilitation			
Document ID		Version	Issue/Submission Date	Review Time	Review Date
HGM-HSE-MPL-001		7	9 Dec 2024	12 months	May 2026
Approver Role	Approver Name	Approver Signature		Doc. Owner	Owner Name
GM Hillgrove	M.Varvari			HSEC Sup't	K.Bryant

A review of this document will be conducted within the review timeframe, or if any of the following occur:

- There is a change to the operating scope of the projects, eg:
 - The operations status changes from Exploration & Assessment.
- It becomes apparent that the process for managing Rehabilitation of Hillgrove Mine is not adequate to protect workers, the environment, or will not achieve the documented rehabilitation outcomes.
- There are legislative changes that affect requirements for managing Rehabilitation of Hillgrove Mine.
- Upon completion of an environmental audit.
- Annually.



Document History

Version No.	Revision Date	Change Notes
1	2016	Initial Management Plans
2	2018	Operational change to Care & Maintenance.
3	2020	Holding Company change to Red River Resources.
4	October 2022	General review following Independent Enviro Audit. Updating document template.
5	May 2024	Holding Company change to Larvotto Resources. Updating document template. Review for change of operational status from Care & Maintenance to Exploration & Assessment.
6	December 2024	Updating document to match Form and Way documentation from NSW Resource Regulator.
7	December 2024	Updated with comments from NSW Resource Regulator

Associated Documents and Relationships

Related Legislation:	• Mining Act 1992 • Environmental Planning and Assessment 1979 • Protection of the Environment Operations Act 1997 • Waste Avoidance and Resource Recovery Act 2001 • National Environment Protection (Movement of Controlled Refuse between States and Territories) Measure 1998 • Environment Protection and Biodiversity Conservation Act 1999 • Aboriginal and Torres Strait Islanders Heritage Protection Act 1984 • National Parks and Wildlife Act 1974 • Heritage Act 1977
Related Policies, Plans:	• Environmental, Social and Governance Policy
Related Procedures, Standards:	• Management Plan: Environment • Management Plan: Dam Safety • Standard: Control of Air Quality Impacts • Standard: Control of Noise & Vibration Impacts • Standard: Control of Surface Water Impacts • Standard: Control of Groundwater Impacts • Standard: Control of Hydrocarbons & Chemicals Impacts • Standard: Control of Waste (Refuse) Impacts • Standard: Control of Waste Rock Impacts • Standard: Control of Aboriginal & European Heritage Impacts • Standard: Control of Feral Animals & Weed Impacts



Mining Leases and expiry Dates	Standard: Control of Public Roads & Traffic Impacts			
	Exploration Licence	EL 3326	23 Aug 2026	
	Exploration Licence	EL 5973	19 Aug 2025	
	Exploration Licence	EL 5997	27 Sep 2025	
	Exploration Licence	EL 6419	17 May 2024	
	Gold Lease	GL 3959	8 Feb 2043	
	Gold Lease	GL 3980	29 Mar 2041	
	Gold Lease	GL 5845	16 Feb 2030	
	Mining Lease	ML 205	21 Mar 2042	
	Mining Lease	ML 219	16 Jun 2042	
	Mining Lease	ML 231	21 Jul 2042	
	Mining Lease	ML 391	16 Feb 2043	
	Mining Lease	ML 392	16 Feb 2043	
	Mining Lease	ML 592	3 May 2042	
	Mining Lease	ML 600	10 May 2042	
	Mining Lease	ML 649	4 Oct 2042	
	Mining Lease	ML 655	4 Oct 2042	
	Mining Lease	ML 714	21 Mar 2043	
	Mining Lease	ML 749	4 Jul 2042	
	Mining Lease	ML 772	5 Sep 2042	
	Mining Lease	ML 810	5 Mar 2043	
	Mining Lease	ML 945	8 Jul 2042	
	Mining Lease	ML 961	9 Dec 2042	
	Mining Lease	ML 972	6 Jan 2043	
	Mining Lease	ML 1020	11 Feb 2041	
	Mining Lease	ML 1026	8 Dec 2042	
	Mining Lease	ML 1100	9 Nov 2042	
	Mining Lease	ML 1101	9 Nov 2042	
	Mining Lease	ML 1332	11 Feb 2041	
	Mining Lease	ML 1440	12 Feb 2043	
	Mining Lease	ML 1441	12 Feb 2043	
	Mining Lease	ML 1442	12 Feb 2043	
	Mining Lease	ML 1598	4 Dec 2043	
	Mining Lease	ML 1599	4 Dec 2043	
	Mining Lease	ML 1600	4 Dec 2043	

	Mining Lease	ML 1601	4 Dec 2043
	Mining Lease	ML 1602	4 Dec 2043
	Mining Lease	ML 1603	4 Dec 2043
	Mining Lease	ML 1604	4 Dec 2043
	Mining Lease	ML 5643	14 Nov 2042
	Mining Lease	ML 6282	12 Mar 2042
	Mining Purpose Lease	MPL 146	9 Aug 2024
	Mining Purpose Lease	MPL 220	7 Dec 2042
	Mining Purpose Lease	MPL 745	11 Feb 2040
	Mining Purpose Lease	MPL 919	11 Feb 2041
	Mining Purpose Lease	MPL 1427	6 Jul 2043
	Private Lands Lease	PLL 350	28 May 2043
	Private Lands Lease	PLL 416	20 Dec 2042
	Private Lands Lease	PLL 661	27 Jul 2042
	Private Lands Lease	PLL 804	22 Jul 2032
Private Lands Lease	PLL 1252	23 Dec 2043	
Private Lands Lease	PLL 3827	21 Aug 2041	

TABLE OF CONTENTS

1. Introduction to Mining Project	8
1.1 History of operations	8
1.1.1 Location	8
1.1.2 Activities	10
1.1.3 Environmental Policy	12
1.1.3.1 Policy Section 3, Environmental	12
1.1.3.2 Policy Section 4, Social	13
1.2 Current development consents, leases and licences	14
1.2.1 Consents	16
1.2.1.1 DA98/35 – Hillgrove Mining Extension	16
1.2.1.2 DA95/26 – Continuing Mineral Extraction	17
1.2.1.3 DA42/82 – Mining of Sunlight Gorge	18
1.2.1.4 DA26/2005A – Sunlight Haul Road	19
1.2.1.5 DA19/2000 – Processing Plant.	19
1.2.1.6 DA174/2015A – Clarks Gully Mine.	20
1.3 Land Ownership and Land Use.	20
1.3.1 Land ownership and land use figure	22
2. Final Land Use	23
2.1 Regulatory Requirements for Rehabilitation	23
2.2 Final Land Use options assessment	26
2.3 Final Land Use Statement	26
2.4 Final Land use and Mining Domains	27
2.4.1 Final land use domain	27
2.4.2 Mining Domains	27
3. Rehabilitation risk assesement	29
4. Rehabilitation Objectives and Rehabilitation Completion Criteria	38
4.1 Rehabilitation Objectives and rehabilitation completion criteria.	38
4.2 Rehabilitation objectives and rehabilitation completion criteria- Stakeholder Consultation	57
5. Final Landform and Rehabilitation Plan	58
5.1 Final Landform and Rehabilitation Plan	58
6. Rehabilitation Implementation	59
6.1 Life of Mine Rehabilitation Schedule	59
6.2 Phases of Rehabilitation and General Methodologies	59
6.2.1 Active Mining Phase	60
6.2.1.1 Soils and materials	60
6.2.1.2 Flora	60



6.2.1.3	Fauna	61
6.2.1.4	Waste rock/overburden Emplacement	63
6.2.1.5	Waste management.	63
6.2.1.6	Geology and geochemistry	64
6.2.1.7	Material prone to spontaneous combustion	65
6.2.1.8	Material prone to generating acid mine drainage.	66
6.2.1.9	Ore beneficiation waste management (reject and tailings disposal)	66
6.2.1.10	Erosion and Sediment control	66
6.2.1.11	Ongoing Management of biological resources for use in rehabilitation	67
6.2.1.12	Mine Subsidence	67
6.2.1.13	Management of potential cultural heritage issues	68
6.2.1.14	Exploration activities	69
6.2.2	Decommissioning	70
6.2.2.1	Site security	70
6.2.2.2	Infrastructure to be removed or demolished	70
6.2.2.3	Buildings, structures and fixed plant to be retained	71
6.2.2.4	Management of carbonaceous/contaminated material	71
6.2.2.5	Hazardous materials management	72
6.2.2.6	Underground infrastructure	72
6.2.3	Landform establishment	73
6.2.3.1	Water management infrastructure	73
6.2.3.2	Final Landform construction: general requirements	74
6.2.3.3	Final Landform construction: reject emplacement areas and tailings dams.	74
6.2.3.4	Final Landform construction: final voids, highwalls and low walls	75
6.2.3.5	Construction of creek/ river diversion works.	75
6.2.4	Growth medium development	75
6.2.5	Ecosystem and land use establishment	76
6.2.5.1	Soil Amelioration	76
6.2.5.2	Seed collection and Propagation	76
6.2.5.3	Site Preparation	76
6.2.5.4	Revegetation Methods	76
6.2.6	Ecosystem and land use development	76
6.2.6.1	Overstory	76
6.2.6.2	Understory	77
6.2.6.3	Weed Management	77
6.2.6.4	Erosion and Sedimentation Controls	77
6.3	Rehabilitation of Areas Affected by Subsidence.	77
7.	Rehabilitation Quality Assurance Process	78
8.	Rehabilitation Monitoring Program	79
8.1	Analogue Site Baseline Monitoring	79
8.1.1	Vegetation Community Description	79
8.1.1.1	Community 1: Blakely Red Gum – Yellow Box Grassy open woodland of the New England Tableland Bioregion	79



8.1.1.2	Community 2: Hillgrove Box Shrubby Woodland on the Gorge Rim and Upper Gorge Slopes.	79
8.1.1.3	Community 3: Forset Red Gum Grassy Woodland on the lower and Mid Gorge Slopes	79
8.2	Rehabilitation Establishment Monitoring	79
8.2.1	Soil analysis	80
8.2.2	Flora Surveys	80
8.2.3	Photo Monitoring Points	80
8.2.4	Inspections	80
8.3	Measuring Performance Against Rehabilitation Objectives and Rehabilitation Completion Criteria	81
9.	Rehabilitation Research, Modelling and Trials	92
9.1	Current Rehabilitation Research, Modelling, and Trials	92
9.2	Future Rehabilitation Research, Modelling, and Trials	92
10.	Intervention and Adaptive Management	93
11.	Review, Revision, and Implementation	95
11.1	Review and Revision of the RMP	95
11.2	Implementation	95

1. INTRODUCTION TO MINING PROJECT

1.1 History of operations

Mining at Hillgrove commenced in Bakers Creek in 1877.

The first phase of operations ran until the 1920's and consisted of multiple mines and process plants constructed alongside Bakers Creek at the base of the gorge. During this time an estimate 7 Mt of waste rock and tailings were deposited into and adjacent Bakers Creek and vegetation in the gorge was entirely cleared for use in the mines as ground support.

Since that time, there have been three four broad phases of operation:

- In 1969 an antimony and gold concentrator was built atop the Hillgrove side of the gorge and nine mining areas were extracted from underground, plus two small open pits.
- In 1998 the current operating permit (DA98/35) was approved for New England Antimony Mines (NEAM) to continue operations and construct a pressure oxidation (POX) plant to produce gold ore' from the concentrate. NEAM was placed in receivership in 2002 and the operations were suspended.
- Straits Resources purchased the project in 2004 and in 2007 commenced construction of a new processing plant, antimony leaching and smelting facilities, and tailings storage facility (TSF2) but operations were suspended in 2009 due to under-performance of the antimony circuit.
- Hillgrove Mines Pty Ltd (wholly owned subsidiary of Bracken Resources), purchased the project in 2013, upgraded the plant to produce both gold and antimony concentrates, then recommenced operations in April 2014. The site was again suspended in 2016 due to low antimony prices.
- Red River Resources purchased Hillgrove Mines in 2019 in August 2019. Exploration drilling was carried out and processing restarted in December 2020 treating remnant stockpiles from the early (c.1900) workings at Bakers Creek, and leach residues from the Straits Resources era. Processing was suspended in September 2022 and in November 2022, Red River and its subsidiaries entered Administration.
- Larvotto Resources Limited are the current owners of Hillgrove Mines Pty Ltd, acquiring the project out of Administration in December 2023. Under Larvotto ownership, the site has moved from full Care & Maintenance to Exploration & Assessment.
- Hillgrove Mines are currently undergoing planning permission for the current development consent as well as other planning development applications.

1.1.1 Location

The Hillgrove Mine is located 23 km east of Armidale in the New England region of New South Wales (Figure 1). The project area is approximately 8x6 km and is topographically dominated by the Bakers Creek gorge. The gorge dissects the surrounding plateau with a drop-in elevation of approximately 450 meters. Processing and surface facilities are located on the eastern plateau near Hillgrove village.

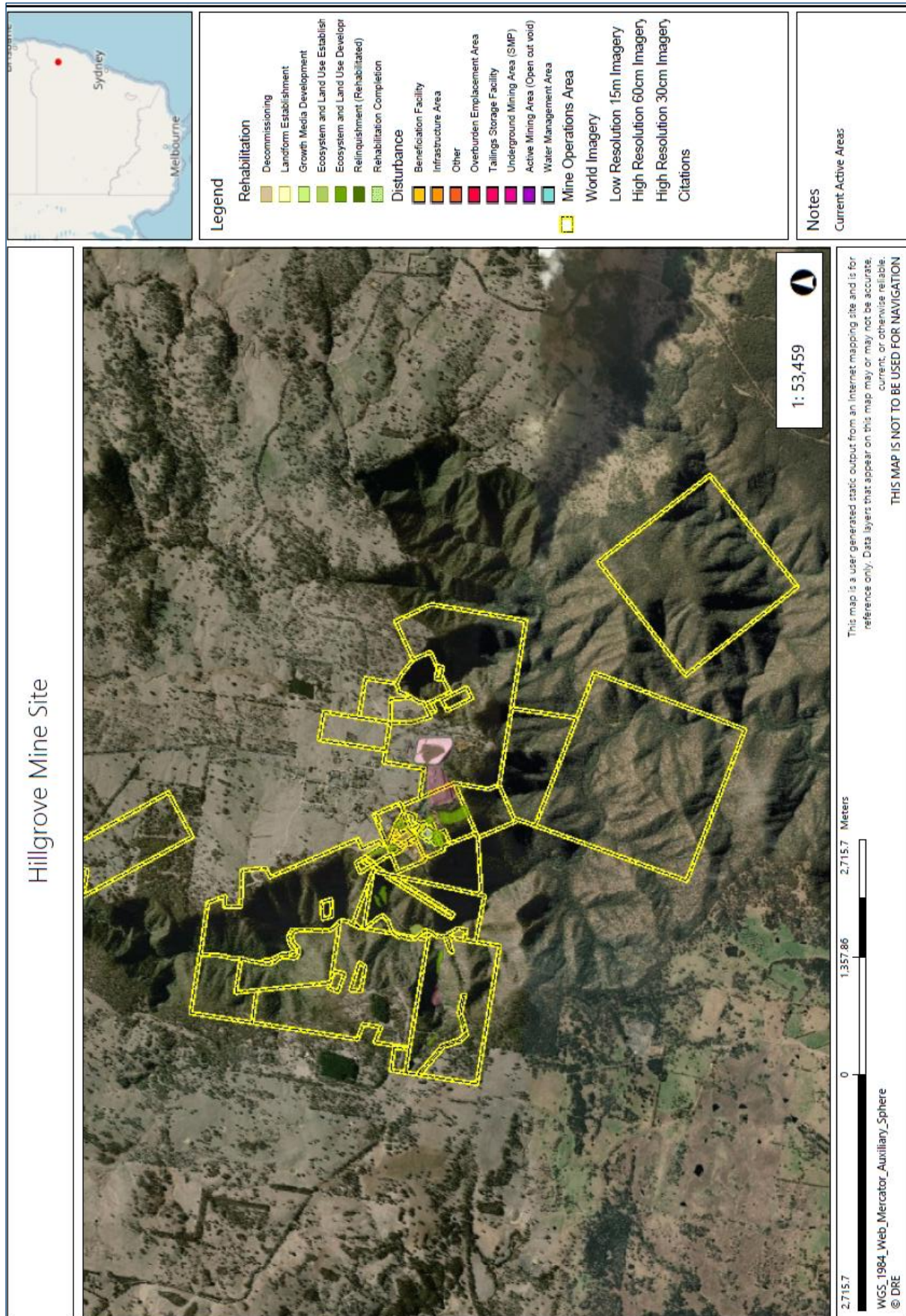


Figure 1: Location, Hillgrove Mine

1.1.2 Activities

Whilst the operational status is Exploration & Assessment, the following activities are authorised under current approvals and consents.

- Exploration Drilling and associated activity;
- Carrying out of Rehabilitation and Environmental Management activities (maintenance, monitoring and water treatment).

Other activities permitted by the consents only if the completion date defined in Condition 4 of DA98/35 is modified beyond 31 December 2023 are:

- Construction and Operation of infrastructure (haul roads, rock dumps, laydowns);
- Carrying out of Mining operations (underground);
- Carrying out of Ore Processing (crushing, grinding, flotation);
- Construction and Operation of Tailings Storage Facilities (TSF); and

When in full operation, the site operates for 24 hours per day, 7 days per week (construction activity is restricted to 0700-1800 Monday to Friday and 0700-1300 Saturday only) and employs 200 personnel (directly and through contractors).

Operational areas around the site are shown in Figure 2.

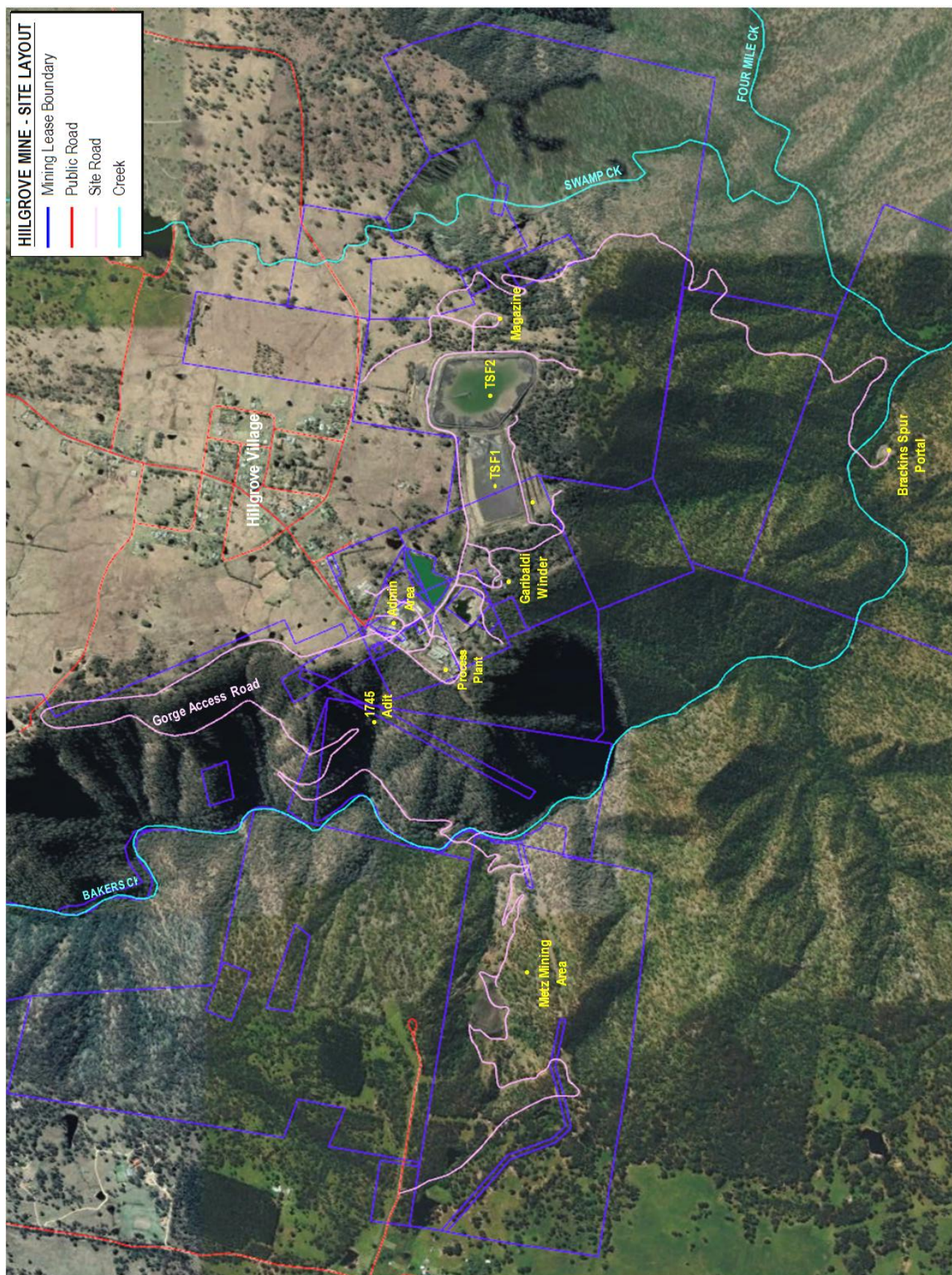


Figure 2: Operational Locations

1.1.3 Environmental Policy

Larvotto Resources Limited have an Environmental, Social and Governance Policy which was endorsed by the Larvotto Board on 19 July 2022.

Sections 3 and 4 of the policy address Environmental and Social commitments and are detailed below.

1.1.3.1 Policy Section 3, Environmental

- Section 3: Environmental:
 - 3.1: The Company's environment objectives are to be sustainable and efficient when exploring and producing and ultimately selling products and to understand and minimise any adverse environmental impacts its operations and products may have. The Company is committed to minimising any adverse environmental impacts from its operations and mitigating negative environmental impacts where practicable.
 - 3.2: In order to support continued global growth and allow for the prosperity of future generations, as well as reducing rising resource costs, the Company is also committed to minimising waste produced by its operations and managing its demand for natural resources, such as fresh water and energy, including consumption of carbon-intensive goods and services.
 - 3.3: The Company's principles to achieve these objectives apply at two levels:
 - In its exploration, and
 - In the conduct of its corporate and administrative activities.
 - 3.4: In relation to exploration, the Company's principles and actions aim to:
 - Source raw materials from suppliers who practice sustainable production practices;
 - Source raw material from suppliers close to the Company's facilities, to minimise cost and impact of transporting those materials;
 - Minimise waste materials from manufacturing and reuse/recycle where possible;
 - Source packaging materials, including bottles and cartons, from suppliers utilising recycled inputs where possible;
 - Design packaging, including bottles and cartons, to minimise weight and space; and
 - Use environmentally responsible transportation businesses to distribute our products,
 - 3.5: In relation to the conduct of its corporate and administrative activities, the Company's principles and actions aim to:
 - Switch off lights and electrical appliances when not in use;
 - Use energy-efficient lighting and systems throughout its office(s);
 - Support recycling by:
 - Recycling cardboard, paper and using recycled paper products;
 - Purchasing green office stationery products where possible;
 - Recycle used printer cartridges;
 - Reduce paper use by printing documents only when required, and using double-sided printing; and
 - Use teleconference or video conference facilities and minimise face to face meetings to minimise transportation costs and emissions.

1.1.3.2 Policy Section 4, Social

- Section 4: Social:
 - 4.1: The Company's social objectives are to be a responsible corporate citizen in connection with the direct impact on individuals of the Company's exploration, in particular, the exploration of mineral resources and marketing of its final products. In relation to the exploration of mineral and metal resources, the Company:
 - Recognises it has a responsibility to encourage responsible exploration of minerals and metals, to avoid waste, to discourage inappropriate use of those products and to recycle the waste whenever possible. To achieve this, the Company will comply with all applicable laws, industry codes and guidelines applicable to our products;
 - Will foster a positive culture;
 - Will actively engage in safe behaviours;
 - Will act ethically in all of its operations and activities; and
 - Will identify key stakeholders and engage in a close relationship, fostering engagement mechanisms and encouraging feedback.
 - 4.2: In relation to its employment environment, the Company will observe its obligations under employment and occupational health and safety legislation and will implement and maintain systems to facilitate employee well-being and safety.
 - 4.3: The Company has prepared a Community and Stakeholder Engagement Plan (CSEP) to outline the ways interested and impacted stakeholders can take part during each stage of the Project.
 - 4.4: The Company has focussed activities on liaising with directly impacted neighbours such as the communities and businesses that surround its operations. As the Projects and approvals progress, communication and engagement will increase. The Company takes its social responsibility seriously and has completed.
 - Stakeholders' identification and analysis;
 - Community and Stakeholder Engagement Plan;
 - Consultation Register; and
 - Implementation.

1.2 Current development consents, leases and licences

Current development consents and licences are shown in Table 1 and tenements in Table 2.

Table 1: Development Consents and Licences

Authority	Approval Type	Number	Issued	Expires	Comment
DPHI	Development Consent	DA-98/35, DC S98/ Mod.4	18 Nov 1998	31 Dec 2023	Consent for Mine Expansion, POX plant, Brackins Spur and Lower Cooney Haul Roads, TSF2 and Brackins Spur mining area. Production permission expires 31 Dec-23 but all other conditions continue.
EPA	Environment Protection Licence	EPL 921	8 May 2001	No expiry	EPL for Hillgrove Mine
	Radiation Licence to Sell/Possess	5060782	2007	21 Jan 2024	For processing plant density gauges. Annual licence.
DPI	Water Access Licence	WAL 39495	12 Aug 2023	Continuing	Bakers Creek
	Water Access Licence	WAL 39497	20 Oct 2016	Continuing	Hillgrove Station
	Water Access Licence	WAL 39498	28 Mar 2013	Continuing	Town Reservoir, Industrial Use
	Water Access Licence	WAL 39500	27 Feb 2005	Specific Purpose	Town Reservoir, Domestic Use
	Water Access Licence	WAL 40217	18 Mar 2015	Continuing	Mine Adits, Groundwater Capture
	Water Supply Works	30WA 308489	1 Jul 2016	30 Jun 2029	Baker Creek, Bywash Dam
	Bore Water Supply Works	30WA 314503	1 Jul 2016	17 Mar 2030	Mine Adits, Groundwater (permitted as bores)
ARC, including antecedents	Development Consent	22/81	23 Jun 1981	Perpetuity	Building Approval for Surface Workshop
	Development Consent	DA-19-2000/C	29 Mar 2001	Perpetuity	Processing plant
	Construction Certificate for Modified DA DA-19- 200/C	CC-75-2020	9 Nov 2020	Continuing	Modification to Processing plant
	Development Consent	42/82	22 Jul 1982	Perpetuity	Mining in Metz/Sunlight Gorge
	Development Consent	95/26	8 Mar 2004	Perpetuity	Consent under SEPP37 for continuing use of pre-1979 Mining Leases.
	Development Consent	26/2005/A	21 Sep 2006	Perpetuity	Sunlight haul road from Metz 7L to Bakers Creek.
	Conditional Deferred Commencement Consent	DA-174- 2015/A	18 Feb 2020	Lapsed	Clarks Gully underground Mine



Table 2: Mineral Tenements

Authority	Approval Type	Number	Issued	Expires
DRNSW	Exploration Licence	EL 3326	23 Aug 1989	23 Aug 2026
	Exploration Licence	EL 5973	19 Aug 2002	19 Aug 2025
	Exploration Licence	EL 5997	27 Sep 2002	27 Sep 2025
	Exploration Licence	EL 6419	17 May 2005	17 May 2024
	Gold Lease	GL 3959	8 Feb 1933	8 Feb 2043
	Gold Lease	GL 3980	29 Mar 1933	29 Mar 2041
	Gold Lease	GL 5845	16 Feb 1968	16 Feb 2030
	Mining Lease	ML 205	21 May 1976	21 Mar 2042
	Mining Lease	ML 219	16 Jun 1976	16 Jun 2042
	Mining Lease	ML 231	21 Jul 1976	21 Jul 2042
	Mining Lease	ML 391	16 Feb 1977	16 Feb 2043
	Mining Lease	ML 392	16 Feb 1977	16 Feb 2043
	Mining Lease	ML 592	3 May 1978	3 May 2042
	Mining Lease	ML 600	10 May 1978	10 May 2042
	Mining Lease	ML 649	4 Oct 1978	4 Oct 2042
	Mining Lease	ML 655	4 Oct 1978	4 Oct 2042
	Mining Lease	ML 714	21 Mar 1979	21 Mar 2043
	Mining Lease	ML 749	4 Jul 1979	4 Jul 2042
	Mining Lease	ML 772	5 Sep 1979	5 Sep 2042
	Mining Lease	ML 810	5 Mar 1980	5 Mar 2043
	Mining Lease	ML 945	8 Jul 1981	8 Jul 2042
	Mining Lease	ML 961	9 Dec 1981	9 Dec 2042
	Mining Lease	ML 972	6 Jan 1982	6 Jan 2043
	Mining Lease	ML 1020	3 Nov 1982	11 Feb 2041
	Mining Lease	ML 1026	8 Dec 1982	8 Dec 2042
	Mining Lease	ML 1100	9 Nov 1983	9 Nov 2042
	Mining Lease	ML 1101	9 Nov 1983	9 Nov 2042
	Mining Lease	ML 1332	7 Oct 1993	11 Feb 2041
	Mining Lease	ML 1440	12 Feb 1999	12 Feb 2043
	Mining Lease	ML 1441	12 Feb 1999	12 Feb 2043
	Mining Lease	ML 1442	12 Feb 1999	12 Feb 2043
	Mining Lease	ML 1598	4 Dec 2007	4 Dec 2043
	Mining Lease	ML 1599	4 Dec 2007	4 Dec 2043



Authority	Approval Type	Number	Issued	Expires
DRNSW	Mining Lease	ML 1600	4 Dec 2007	4 Dec 2043
	Mining Lease	ML 1601	4 Dec 2007	4 Dec 2043
	Mining Lease	ML 1602	4 Dec 2007	4 Dec 2043
	Mining Lease	ML 1603	4 Dec 2007	4 Dec 2043
	Mining Lease	ML 1604	4 Dec 2007	4 Dec 2043
	Mining Lease	ML 5643	4 Nov 1958	14 Nov 2042
	Mining Lease	ML 6282	12 Mar 1971	12 Mar 2042
	Mining Purpose Lease	MPL 146	9 Aug 1978	9 Aug 2024
	Mining Purpose Lease	MPL 220	7 Dec 1983	7 Dec 2042
	Mining Purpose Lease	MPL 745	29 Mar 1933	11 Feb 2040
	Mining Purpose Lease	MPL 919	31 Aug 1938	11 Feb 2041
	Mining Purpose Lease	MPL 1427	6 Jul 1973	6 Jul 2043
	Private Lands Lease	PLL 350	28 May 1932	28 May 2043
	Private Lands Lease	PLL 416	20 Dec 1935	20 Dec 2042
	Private Lands Lease	PLL 661	27 Jul 1943	27 Jul 2042
	Private Lands Lease	PLL 804	22 Jul 1949	22 Jul 2032
	Private Lands Lease	PLL 1252	23 Dec 1969	23 Dec 2043
	Private Lands Lease	PLL 3827	21 Jul 1973	21 Aug 2041

1.2.1 Consents

Hillgrove Mine has been developed in stages over with multiple consents.

1.2.1.1 DA98/35 – Hillgrove Mining Extension

- Pre-eminent DA covering most aspects of the operation and conditions which, mostly, cover the conditions and requirements of all other consents.
- Extension of mining and processing operations, construction of the Pressure Oxidation (POX) plant and TSF2.
- Initially approved in July 1998.
- Modified in 2000, 2005, 2015 and to current Mod.4 in April 2018.
- The condition permitting mining and processing under this consent expired after 31 December 2023.

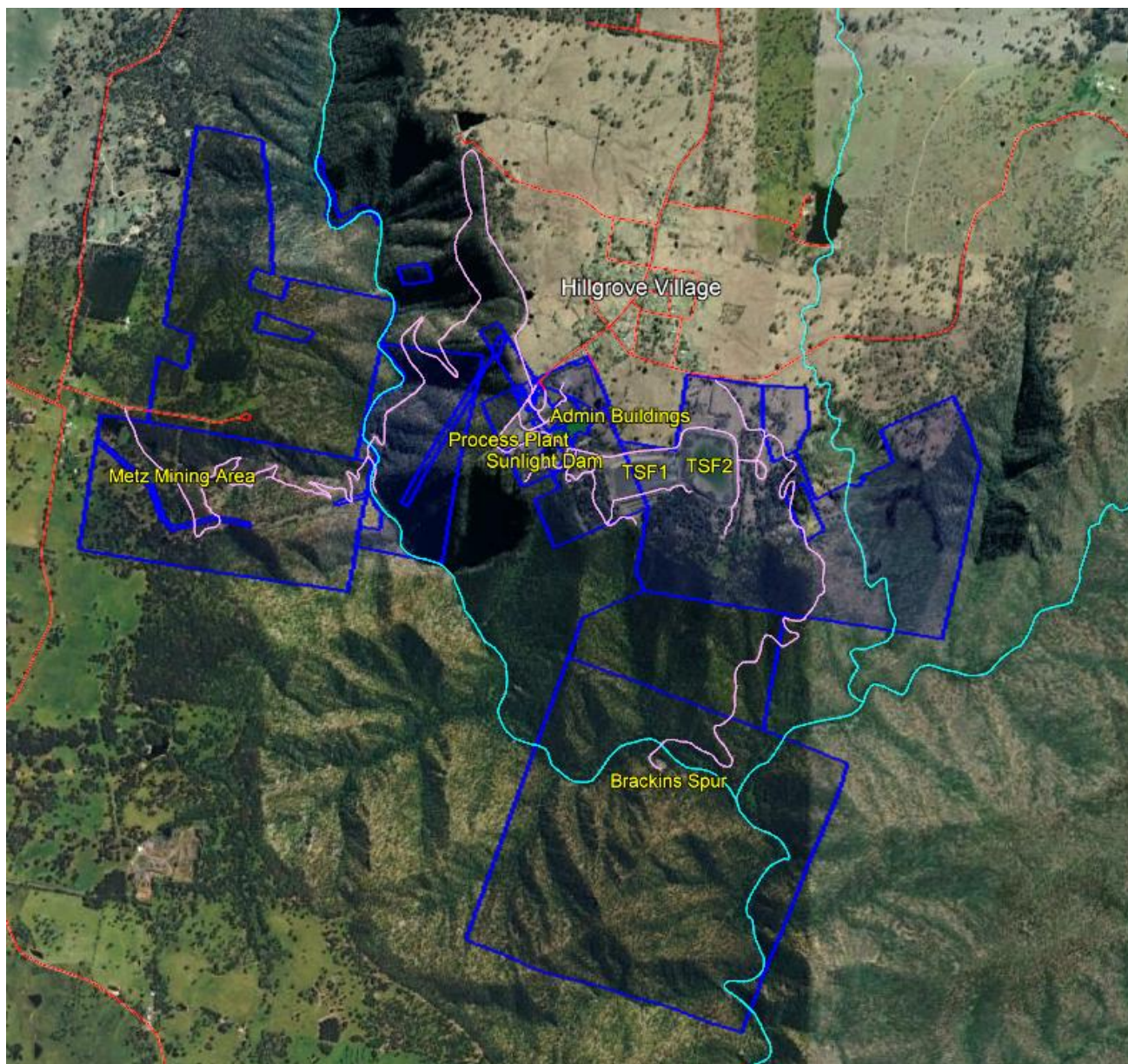


Figure 3: Tenements covered by DA98/35

1.2.1.2 DA95/26 – Continuing Mineral Extraction

under State Environmental Planning Policy No.37, for pre-1979 Mining Leases.

- Approved March 2004 by Armidale Dumaresq Council.
- Covers ongoing mining and processing activity on eastern side of Bakers Creek gorge.
- Lapses 8 March 2009 if development not commenced by that date (was commenced).

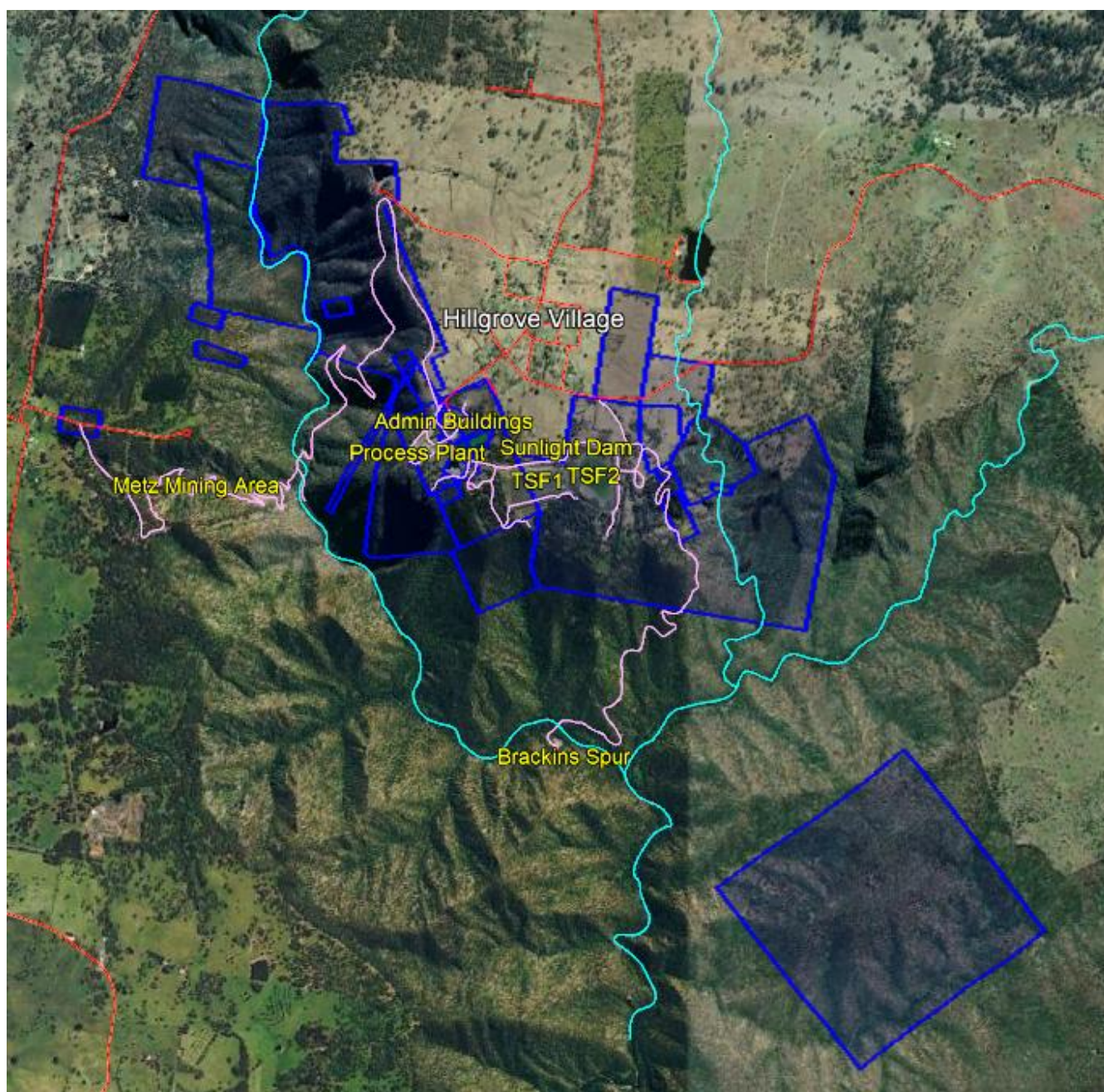


Figure 4: Tenements covered by DA95/26

1.2.1.3 DA42/82 – Mining of Sunlight Gorge

- Initially approved in July 1982 by Dumaesq Shire Council
- Modified in 2001 and 2003 with confirmation in 2004 of 2003 modification – modifications changed Condition 1 and added Conditions 6-8.

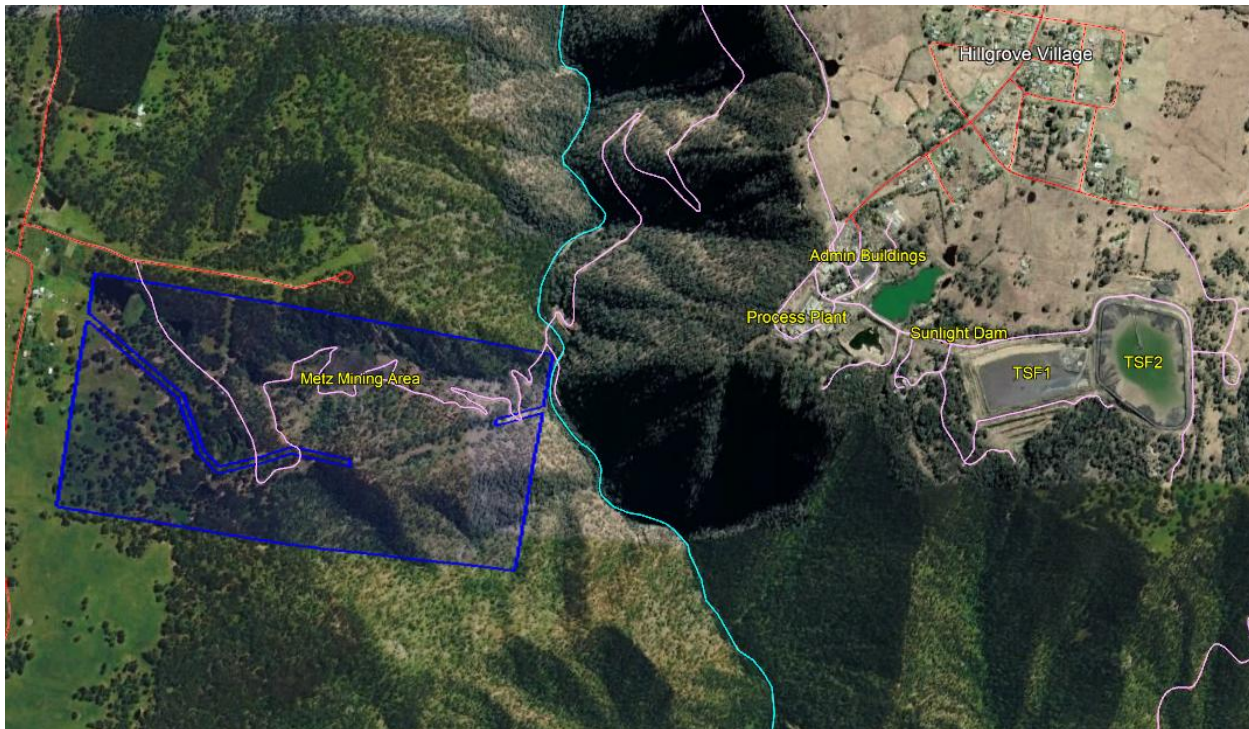


Figure 5: Tenements covered by DA42/82

1.2.1.4 DA26/2005A – Sunlight Haul Road

- Approved September 2006.
- Permits construction of the Sunlight haul road in Metz Gully from Metz 7L to Bakers Creek where it connected with an existing road from Bakers Creek to the crest of the east side of the gorge.

1.2.1.5 DA19/2000 – Processing Plant.

- Originally approved in 2001 for Antimony Trioxide Plant which was being constructed by NEAM.
- Modified as DA19/2000A in 2006 by Straits to change the Antimony Trioxide Plant to the Metal Production Facility, which removed/relocated the existing processing plant from the NEAM location to its current location, plus change the downstream process from one producing antimony trioxide to produce antimony metal.
- Modified as DA19/2000B in 2013 by Hillgrove Mines (under Bracken Resources) to add the gold concentrate flotation circuit and concentrate filtration/bagging facility.
- Modified as DA19/2000C in 2020 by Hillgrove Mines (under Red River Resources) to add the gravity gold and intensive cyanide leach reactor.



Figure 6: Tenements covered by DA19/2000

1.2.1.6 DA174/2015A – Clarks Gully Mine.

- Deferred consent, originally approved in 2015 for underground mine at Clarks Gully. As the project had not commenced construction in 2020, it was modified to extend the consent.
- Conditions of DA174/2015A are not detailed in this EMP as the deferred consent extension lapsed and is no longer on foot.

1.3 Land Ownership and Land Use.

Hillgrove Mine is a Level 1 mine as the main consent relied upon for operation is State Significant.

The majority of Hillgrove Mines' mining leases are over crown land or freehold land owned by Hillgrove Mines. A list of the ownership, title, and occupancy of the land under lease is given in Table 3 below which is section 1.3.1 Land ownership and land use figure. Note that where ownership or title is mixed over a lease the most conservative use has been allocated (i.e., "Occupied" then "Not Owned" then "Owned" then "Crown").



Table 3: Land Ownership for Mineral Leases

Land Ownership, Title & Occupancy	Relevant ML	Relevant GL	Relevant PLL	Relevant MPL
Crown Land	ML600 ML749 ML772 ML810 ML945 ML972 ML1100 ML1441 ML1442 ML1603 ML1604 ML5643 ML6282 ML5643	GL3959 GL3980	-	MPL146 MPL220 MPL745 MPL919 MPL1427
Freehold Land Owned by Hillgrove Mines	ML231 ML391 ML392 ML655 ML1440 ML1598 ML1599 ML1601 ML1602		PLL350 PLL661 PLL804 PLL416 PLL1252 PLL3827	
Freehold Land Not Owned by Hillgrove Mines	ML205 ML219 ML592 ML649 ML714 ML961 ML1020 ML1026 ML1101 ML1332 ML1600	GL5845		
Occupied Residences	0	0	0	0
Total Leases	33	3	6	5



1.3.1 Land ownership and land use figure

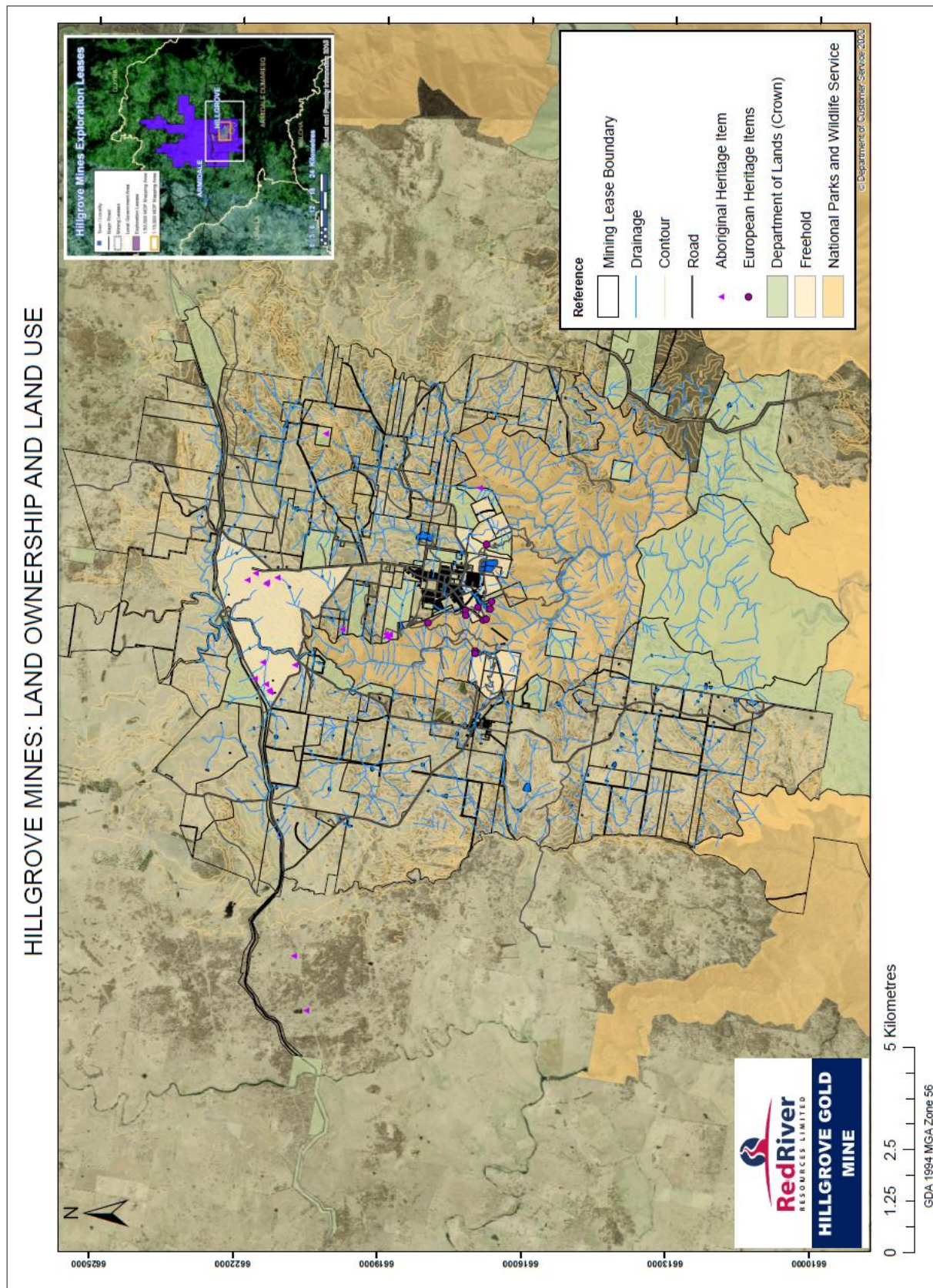


Figure 7: Hillgrove Land Ownership and Use

2. FINAL LAND USE

2.1 Regulatory Requirements for Rehabilitation

Conditions relating to rehabilitation and progress towards the post mining land use are contained in HILLGROVE MINE's:

- Project Approval (DA 98/35); and
- Mining Tenements

Table 4: Regulatory Requirements for Rehabilitation

Approval	Condition No. / Condition Details	Applicable Area								
DA 98/35 Hillgrove Expansion Mod. 3	REHABILITATION 49. The Applicant shall rehabilitate the site to the satisfaction of DRE. This rehabilitation must be generally consistent with the objectives in Table 1. <i>Table 1: Rehabilitation Objectives</i> <table><tr><th>Feature</th><th>Objective</th></tr><tr><td>Mine site (as a whole)</td><td> • Safe, stable & non-polluting • Final land use compatible with surrounding land uses • Site to be revegetated with suitable plant species </td></tr><tr><td>Surface infrastructure</td><td> • To be decommissioned and removed, unless DRE agrees otherwise </td></tr><tr><td>Community</td><td> • Ensure public safety and minimise the adverse socio-economic effects associated with mine closure </td></tr></table> <i>Notes</i> • These rehabilitation objectives apply to all environmental consequences caused by mining taking place after the date of this consent, and to all surface infrastructure and other disturbance which forms part of the development under this consent. • Rehabilitation of environmental impacts and consequences caused by mining which took place prior to the date of this consent may be subject to the requirements of other consents and/or applicable mining leases. 50. The Applicant shall carry out the rehabilitation of the site progressively, that is, as soon as reasonably practicable following disturbance. 51. The Applicant shall prepare and implement a Rehabilitation Management Plan for the development, in consultation with the Department, OEH and Council, and to the satisfaction of DRE. This plan must - be submitted to DRE for approval by the end of December 2015, unless otherwise agreed with the Secretary; - be prepared in accordance with any relevant DRE guideline and be consistent with the rehabilitation objectives in Table 1; - describe how the performance of the rehabilitation would be monitored and assessed against the objectives in Table 1; and - be integrated with the other management plans required under this consent.	Feature	Objective	Mine site (as a whole)	• Safe, stable & non-polluting • Final land use compatible with surrounding land uses • Site to be revegetated with suitable plant species	Surface infrastructure	• To be decommissioned and removed, unless DRE agrees otherwise	Community	• Ensure public safety and minimise the adverse socio-economic effects associated with mine closure	Brackins Spur Mine & Haul Road, TSF2, Lower Cooney Road & Mine, Eleanora Mine, Pressure Oxidation (POX) Plant.
Feature	Objective									
Mine site (as a whole)	• Safe, stable & non-polluting • Final land use compatible with surrounding land uses • Site to be revegetated with suitable plant species									
Surface infrastructure	• To be decommissioned and removed, unless DRE agrees otherwise									
Community	• Ensure public safety and minimise the adverse socio-economic effects associated with mine closure									
DA95/26 2004 Continuing mineral extraction under state SEPP No.37	7. The measures for operation, management, rehabilitation and restoration as described in the Statement of Environmental Effects, shall be reviewed to ensure that the measures are consistent with current best practice standards. 8. A copy of any revised plans and measures shall be provided for inclusion with the documentation accompanying this application. 9. The management practices, rehabilitation measures and restoration plans are to be implemented in accordance with the recommendations contained in the Statement of Environmental Effects or as updated following review as required under condition 7. 10. Disturbed and excavated areas of the site (particularly batters) shall be stabilised and drained to maximise safety and minimise erosion and siltation. 11. Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not	Various tenements dating prior to the EP&A Act 1979								



Approval	Condition No. / Condition Details	Applicable Area
	be exported from the site. Stockpiles are to be maintained in a stable and safe condition.	
DA42/82 Modification to Metz consent for 7 level pad	12. The applicant must develop in consultation with relevant stakeholders a closure plan for the Sunlight Gully mine, to minimise the long term environmental impact of the development. The applicant must amend the Rehabilitation and Stabilisation Plan for the Sunlight Gully mining operation in consultation with and to the satisfaction of the Environment Protection Authority and the National Parks and Wildlife Service, to minimise the environmental impact of the development.	Metz Mining Area
GL5845 ML1332 PLL804	18. Spoil dumps shall be graded by the lease holder to form undulating or flat sloping areas, and shall be planted with grass, shrubs or indigenous trees, as directed by the Minister.	Leases named
GL5845 ML1332 PLL804	79. Upon completion of operations or the early termination of this authority the lease holder shall rehabilitate any areas disturbed to the satisfaction of the Minister.	Leases named
ML1332	81. Machinery and buildings must be removed from the subject area on the expiry or early termination of the lease and the area left in a clean, tidy and stable condition to the satisfaction of the Director-General.	Clarks Gully
ML1332	84. b) Overburden should be stockpiled separately. Stockpile site should be far enough away from the excavation to allow for battering of the excavation at 1 in 3 when the mining operation is completed. Stockpiles should be shaped to no steeper than 1 vertical in 3 horizontal and sown to pasture if not to be re-spread within three months.	Clarks Gully
ML1440 ML1441 ML1442	12. Any topsoil that is removed in the course of the operations is to be set aside for the replacement at a later date. Other soil, rock and residues are to be used to fill abandoned shafts and excavations and are to be covered by the top soil previously removed. The land over which the operations have been carried on: - Is to be appropriately restored and landscaped, to the satisfaction of the Regional Inspector of Mines, to ensure that the land is properly drained and protected from soil erosion; and - Is to be planted with vegetation appropriate to the area and at a density acceptable to the Regional Inspector of Mines. Where the agreed final land use is to include native vegetation, indigenous species must be used in all re-vegetation programs, unless otherwise directed.	Brackin Spur, Lower Cooney
ML1440 ML1441 ML1442	13. The lease holder must comply with any direction given by the Regional Inspector of Mines regarding the stabilisation and re-vegetation of any mine residue, tailings or overburden dumps situated on the subject area.	Brackin Spur, Lower Cooney
ML1440 ML1441 ML1442	16. On completion of operations the lease holder must rehabilitate all areas disturbed as a result of operations having been carried out within the subject area and must ensure that such areas are adequately maintained for such a period as is necessary to satisfy the Minister that long term	Brackin Spur, Lower Cooney



Approval	Condition No. / Condition Details	Applicable Area
	rehabilitation standards and environmental safeguards have been fulfilled.	
GL3959 GL3980 PLL3827 PLL350 PLL416 PLL661 PLL1252 ML5643 ML6282 ML219 ML391 ML392 ML649 ML749 ML810 ML655 ML945 ML714 ML749 ML772 ML961 ML972 ML1020 ML1026 ML1100 ML1101 MPL745 MPL919 MPL1427 MPL146 MPL220	27. a) Rehabilitation of land: Land disturbed must be rehabilitated to a stable and permanent form suitable for a subsequent land use acceptable to the Department so that: (i) There is no adverse environmental effects outside the disturbed area and the land is properly drained and protected from soil erosion; (ii) The state of the land is compatible with the surrounding land and land use requirements. (iii) The landforms, soils, hydrology, and flora require no greater maintenance than that in or on the surrounding land. (iv) In cases where native vegetation has been removed or damaged, and where vegetation is required, species endemic to the area must be re-established. If the previous vegetation was not native, any re-established vegetation must be appropriate to the area or to the satisfaction of the landholder. Any re-established vegetation must be at an acceptable density and diversity; and (v) The land does not pose a threat to public safety. 13. b) Any topsoil that is removed must be stored and maintained in a manner acceptable to the Director-General. 14. The lease holder must comply with any direction given by the Director-General regarding the stabilisation and revegetation of any mine residues, tailings or overburden dumps situated in the lease area.	Leases named
EL6419 EL5997	27. Rehabilitation of land: b) Any topsoil that is temporarily removed from an area of prospecting operations must be stored, maintained, and returned as soon as possible in manner acceptable to the Department. c) Any shafts, drill holes and excavations, that remain abandoned from previous mining or exploration, which are opened up or used by the licence holder must be filled in or otherwise rehabilitation to standard acceptable to the department.	Tenements named



Approval	Condition No. / Condition Details	Applicable Area
	d) All rehabilitation of disturbed areas should be completed before expiry of the licence or immediately following termination of the licence. e) Activities undertaken in regard to this Condition must be included in reports prepared in accordance with Cn 28a.	
MLA47	4. Site to be cleaned up on completion of mining work	Lease named
ML749 ML810	29. b) Where excavations on, in or under protected river land are made, progressive rehabilitation of the area must be carried out during mining operations. Rehabilitation of all riverbanks must be made to an alignment and profile selected by the Department of Infrastructure, Planning and Natural Resources and the rehabilitated bank or area of operations stabilised by a dense growth of vegetation. Before any excavation commences the lease, holder must supply to the Department of infrastructure, Planning and Natural Resources a plan of the area of operations to a scale of not less than 1:2500 or an aerial photograph to a similar scale on which is to be shown details of the area in which excavations are proposed. A copy of such a plan must also be forwarded to the Environmental Sustainability Division of the Department.	Damifino Mine, Cosmopolitan Mine.

2.2 Final Land Use options assessment

This is not required under our development consent as it is defined within the consent as to the final land use of Hillgrove Mines.

2.3 Final Land Use Statement

Hillgrove Mines aim to achieve a post mining land use that provides a beneficial future of rehabilitated land, which can be sustained in view of a range of limiting factors. Therefore, to meet the rehabilitation objectives the final closure design will maintain and integrate the mining history and natural beauty of the area into the final land use. This will be done by developing the closure around allowing safe access to the remaining historical and natural features as a tourism feature for Hillgrove. This will:

- Ensure that the social impact of closure (consent condition) on Hillgrove will be minimised by providing a post-mining tourist destination to keep the village 'on the map'; and
- Integrate the location into the tourist theme of the Waterfall Way by providing safe access to Brereton Falls, normally not accessible to the public.

It is planned that the tourist facility will involve safe walking access to various features as follows:

- Eleanora and Garibaldi historic chimneys
- Eleanora winder
- Smiths Mine tramway headframe
- Brereton Falls (not visible to the public but fits with Waterfall Way tourist attraction)
- Bakers' Creek historic winder and steam engine.

A walking trail would include story boards providing an insight into the history of the area and specific features. These would be consistent with those that are already erected in Hillgrove Village, Metz Lookout and Bakers Creek Falls.

Any land not affected by the tourist facility will include a combination of pasture, woodland, and water management areas. The composition of these rehabilitated areas will be consistent with local needs and adjacent vegetation communities.

MEG, EPA, and Armidale Regional Council have all be consulted in determining the overarching post land use units. The Hillgrove Progress Association (community representative group) were also consulted and support the approach.

2.4 Final Land use and Mining Domains

2.4.1 Final land use domain

For the purpose of the table Section 2.4.1 and 2.4.2 have been placed together the table mentions both what the final land domains will be as well as the mining areas and meets criteria requested for both.

2.4.2 Mining Domains

For the purpose of the table Section 2.4.1 and 2.4.2 have been placed together the table mentions both what the final land domains will be as well as the mining areas and meets criteria requested for both.

Table 5: Land use domains, Primary and Secondary

Domain	Description	Code
<u>PRIMARY DOMAINS</u>		
Infrastructure	Includes: • Current processing plant • Pressure oxidation plant (POX) • Laboratory • Offices, stores and ablutions buildings • Workshop and surrounds • Garibaldi winder area	1
Tailings Storage Facility (TSF)	Includes both TSF1 and TSF2, and their immediate surrounding areas (including TSF1 Toe Dam).	2
Water Management Area	Includes the dams: • Eleanora • ES1 • ES2 • ES3 and their immediate surrounding areas.	3
Underground Mining Area	Includes: • Metz Gully waste dump footprint (after dump removed) • Historic Bakers Creek Waste Dump (part managed by Hillgrove Mine and MEG as a derelict mine). • Roads (haulage and access): ○ Major roads are the Bakers Creek Gorge Access Road (Cosmopolitan Dam to Metz) and Brackins Spur Road (Smiths to Brackins)	6



Domain	Description	Code
	○ Other roads include tracks from Bay 4 to Cosmopolitan Mine, Garibaldi Spur and Upper Cooney. ● Current and historic adits and shafts, including: ○ Metz portals (main access and ventilation) ○ Blacklode 5 and 6 levels ○ Eleanora 1745 ○ Lower Cooney tunnel ○ Cosmopolitan adit ○ Damifino adit ○ Lady Hopetoun adit ○ Silver Valley adit ○ Smiths adit ○ Brackins Spur portals ○ Garibaldi shafts (main plus 2-3 others) ○ Freehold shaft ○ Multiple un-named shafts	
<u>SECONDARY DOMAINS</u>		
Infrastructure	Remain disturbance to enable final land use (car park, walking track, etc)	I
Water Management Area	Eleanora Dam and Fresh Water Bypass	F
Rehabilitated Area, Grazing	TSF1 and TSF2	D
Rehabilitated Area, Native Ecosystem	Includes: ● ES1/2/3 ● Processing and admin office areas (not part of tourist walk) ● Current and historic adits and shafts (as per primary domain list) ● Mining areas (Bracins Spur, Metz and associated roads, if roads not retained) ● Bakers Creek Waste Dump	A

The domains for Hillgrove Mine will be:

- 1I: Infrastructure with a post mining land use of infrastructure 1I
- 1A: Infrastructure with a post mining land use of native ecosystem 1A
- 2B: Tailings Storage Facilities with a post mining land use of agricultural – grazing 2B
- 3F: Water Management Area with a post mining land use of a water management area 3F
- 3A: Water management Area with a post mining land use of native ecosystem 3A
- 6A: Underground Mining Area with a post mining land use of native ecosystem 3A

3. REHABILITATION RISK ASSESSEMENT

Potential risks to successful rehabilitation have been considered for the Hillgrove Mine. As per the *Rehabilitation Risk Assessment Guideline* (NSW Resources Regulator, 2021), and in accordance with Clause 7 of Schedule 8A, of the *Mining Regulation 2016*, this risk assessment:

- Identifies, assesses and evaluates the potential risks to achieving the rehabilitation objectives, rehabilitation completion criteria and the final land use as spatially depicted in the final landform and rehabilitation plan;
- Identifies the specific control measures that need to be implemented to eliminate, minimise or mitigate the risks; and
- Identifies how the effectiveness of the risk control measures will be assessed.

The risk assessment has been developed using the likelihood, consequence and matrix measures outlined in Table 6 and Table 7 respectively. The risk assessment outcomes are presented in Table 6.

The risk assessment has been developed considering risks associated with the specific activities undertaken during both operational and rehabilitation phases at Hillgrove Mine.

Table 6: Likelihood measures

Rating (level)	Description	Frequency
Rare (1)	Event may only occur in exceptional circumstances	Less than once in 15 years
Unlikely (2)	Event could occur at some time	At least once in 10 years
Possible (3)	Event should occur at some time	A least once in 3 years
Likely (4)	Event will probably occur in most circumstances	At least once per year
Almost certain (5)	Event is expected to occur in most circumstances	More than once per year

Table 7: Consequence measures

Rating (level)	Health Impact	Financial Impact	Environmental Impact
Insignificant (1)	Minor injuries not requiring first aid or near miss. No psychological stress.	Less than \$10k	Contained, reversible impact managed by on site response.
Minor (2)	First Aid treatment and/or one-off counselling.	\$10k to \$100k	Contained, reversible impact managed by internal response.
Moderate (3)	Medical treatment required and/or psychological intervention/treatment required.	\$100k to \$1.0M	Contained, reversible impact managed by external agencies.
Major (4)	Serious or extensive injuries and/or significant and long-term psychological stress.	\$1.0M to \$10M	Uncontained, reversible impact managed by a coordinated response from external agencies.
Catastrophic (5)	Death or severe permanent physical and/or psychological disablements.	More than \$10.0M	Uncontained, irreversible impact.



Table 8: Risk assessment matrix

Consequence	Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	1	2	3	4	5
Almost Certain, 5	Moderate, 5	High, 10	High, 15	Extreme, 20	Extreme, 25
Likely, 4	Low, 4	Moderate, 8	High, 12	High, 16	Extreme, 20
Possible, 3	Low, 3	Moderate, 6	Moderate, 9	High, 12	High, 15
Unlikely, 2	Low, 2	Low, 4	Moderate, 6	Moderate, 8	High, 10
Rare, 1	Low, 1	Low, 2	Low, 3	Low, 4	Moderate, 5

Table 9: Rehabilitation risk assessment

Potential Risk Situation	Impact	Controls	Residual Risk (L, C)	Method of Control Assessment
General – All Phases				
Use of inappropriate or inadequate rehabilitation techniques. Personnel with insufficient skills or experience for rehabilitation activities.	Nominated final land use and rehab completion criteria not achieved.	- Contracting of suitably qualified and experienced personnel to assist with appropriate aspects of rehabilitation, including design, monitoring, management and implementation. - All personal (internal or external) are trained, competent and authorised to undertake work relating to rehabilitation. - Use of science and research to ensure rehabilitation actions are appropriate for, and will lead to optimal outcomes for, the site.	Low (2,2)	
Responsibilities and timelines for rehabilitation poorly defined.	Nominated final land use and rehab completion criteria not achieved.	- Responsibilities for rehab implementation are defined in Rehabilitation Management Plan and are integrated into monitoring, management plans and quality assurance processes. - Annual preparation of a Forward Program for the site according to the relevant NSW RR Form and Way documentation provides a current defined and detailed 3-year rehabilitation schedule.	Low (2,2)	
Insufficient funds available to complete rehabilitation.	Nominated final land use and rehab completion criteria not achieved.	Annual review of the NSW RR Rehabilitation Cost Estimate tool for the site will be completed as part of the Forward Program.	Low (2,2)	
Unplanned or uncontrolled access to the site.	Risk to human safety and of disturbance or damage to rehabilitation areas or heritage items.	Site secured by perimeter fence in most areas. Some areas are high security (1.8m chain-link) and some are only stock fencing.	Moderate (2,3)	

Potential Risk Situation	Impact	Controls	Residual Risk (L, C)	Method of Control Assessment
Heritage assets or values impacted by operations or final land use.	Destruction or damage to heritage values. Flow-on impacts could be: - consent conditions not met - deterioration of stakeholder relationships - reputational damage - financial penalty	- Studies on Aboriginal heritage were undertaken for approval process in 1992, 1996 and 2000. No actual or potential Aboriginal heritage sites were identified. All concluded that steep terrain and extensive historical disturbance result in the low archaeological potential for the site. - European heritage sites within the mining area listed under the Armidale LEP 2012 were identified as part of the approvals process and there management controls in place to manage these sites. - Protocols (developed within the Control Standard for Aboriginal and European Heritage) are in place should Aboriginal or European artefacts be discovered during operations. - All Hillgrove Mine personnel receive an induction, including responsibilities for managing Aboriginal and European Heritage. - Fencing around identified European Heritage items for proposed final land use.	Moderate (1,5)	
Mine wastes with adverse geochemical or chemical composition are present onsite.	Adverse materials may present a risk to surface and groundwater resources and to the quality of surrounding vegetation and habitat.	- Testing of waste rock samples and assessment demonstrated low potential for Acid Mine Drainage (AMD) at the site. - There is no evidence or history of materials prone to spontaneous combustion being present on site. - Monitoring of ground and surface water quality during the operational phase. - Waste rock management is considered in the EMP, with a control standard developed, which includes periodic collection of waste rock samples for testing chemical characteristics against appropriate guidelines.	Moderate (3,3)	
Site contamination is present onsite.	Contamination or hazardous materials present a risk to human or fauna safety and the quality of surrounding vegetation and habitat.	- Waste (refuse), hydrocarbons and chemicals are considered in the EMP and control standards have been development for each. Specific controls consider design and construction of processing facilities, substance storage, training, records and incident response. - A Pollution Incident Response Management Plan is in place and outlines appropriate response procedures for spills. - Contamination assessment for infrastructure exposed to contaminants including processing facilities and workshop will be undertaken prior to demolition. - Contaminated soil will be removed from site as required by legislation, or placed in the spoil dump after bioremediation and testing confirms suitability. Contaminated soil may be placed in a TSF if assessed to be appropriate.	Low (2,2)	

Potential Risk Situation	Impact	Controls	Residual Risk (L, C)	Method of Control Assessment
Adverse surface water or groundwater quality is detected.	Adverse impact on surface or groundwater resources for downstream receptors.	- An adit discharge monitoring program has been implemented to monitor compliance with daily discharge limits under the EPL. - Regular monitoring of water volumes held within the Recycled Water Storage System (RWSS) to ensure discharged are in accordance with the EPL. - Flow meters have been installed to monitor water extraction from licenced water sources to ensure compliance with licences held by HM.	Low (2,2)	
<u>Decommissioning</u>				
Retained infrastructure poses a threat to human or animal safety.	Hazards in infrastructure present a risk to human or fauna safety.	- All surface mining infrastructure to be decommissioned, demolished in accordance with AS2601-2001: The Demolition of Structures (or its latest version) and removed from site. - All underground infrastructure is to be removed and adits sealed in consultation with the Resources Regulator and MDG6001 Guidelines for Permanent Filling and Capping of Surface Entries to Coal Seams. - All site services (electricity, telecommunications etc.) will be removed from site.	Moderate (2,4)	
Demolition and decommissioning of infrastructure produces waste materials.	Physical waste presents a risk to human or fauna safety or the quality of vegetation and habitat (remnant or rehabilitated).	- Demolition of structures will be in accordance with AS2601-2001: The Demolition of Structures or its latest version. - Any hazardous materials will be identified and removed from site and verified by a certificate of disposal. - All demolition and general waste will be removed from site prior to relinquishment.	Low (1,1)	
Historic underground works to be decommissioned are inhabited by native fauna.	Adverse impacts on fauna and removal of their habitat during decommissioning.	Underground workings will be inspected for presence of fauna. If present, sealing of underground workings will be modified appropriately.	Low (1,1)	
Insufficient volume of material for adequate capping of TSF.	Inability to achieve intended final landform, nominated final land use and rehabilitation completion criteria not achieved.	- A rehabilitation material balance study was completed in 2017 and indicated that there is sufficient bulk material onsite for rehabilitation purposes. - Inert waste rock is appropriately stockpiled and maintained on site.	Low (1,1)	

Potential Risk Situation	Impact	Controls	Residual Risk (L, C)	Method of Control Assessment
Capped TSF landform is geotechnically unstable or inadequately sealed.	Instability of final landform results in site degradation and safety risk. Inadequate sealing causes instability of final landform and downstream contamination.	- Detailed capping and landform design completed by a suitably qualified engineer. - Construction has been validated to the design by a suitably qualified person.	Moderate (2,3)	
Final landforms are not free draining (excluding retained water management infrastructure).	Nominated final land use and rehabilitation completion criteria are not achieved.	- Drainage controls and sediment ponds to be maintained in rehabilitation areas until stability is achieved. - Final landforms are designed to be free draining. - Rehabilitation monitoring to include identification of potential erosion issues as an indicator of poor surface water management.	Low (3,1)	
Final landforms are an ongoing source of pollutants (e.g. leachate, AMD) or sediment.	Leachate presents a risk to surface water and groundwater resources, human and fauna safety, and quality of surrounding vegetation. Sedimentation presents a risk to surface water quality onsite and to surrounding receptors.	- Detailed capping and landform design completed by suitably qualified engineer. - Prior testing and assessment demonstrated low potential for Acid Mine Drainage (AMD) at the site. - Waste rock samples from stockpiles are regularly tested for chemical characteristics against appropriate guidelines. - The quality of site-won and imported topsoil resources will be assessed by a suitably qualified person prior to use in rehabilitation. - Vegetation establishment and occurrence of bare ground or development of erosion features will be monitored during the land use establishment phase and corrective actions implemented to minimise risk of sedimentation, if required. - Drainage controls and sediment ponds to be maintained in rehabilitation areas until stability is achieved. - Final landforms are designed to be free draining.	Moderate (3,2)	
Occurrence of local or broad scale subsidence.	Subsidence presents a safety or stability risk for the final landform.	- Broad scale subsidence on site has been assessed and is not an issue. - Local-scale subsidence occurrence will take the form of small depressions or voids where historic workings occur near the surface. - Known shafts and stopes are proactively exposed and backfilled with rock as required.	Moderate (2,4)	

Potential Risk Situation	Impact	Controls	Residual Risk (L, C)	Method of Control Assessment
Insufficient volume of growth medium to achieve target depth or placement methods (e.g. over-compaction).	Inability for vegetation to establish on growth medium and inability to achieve the nominated final land use and rehabilitation completion criteria.	- Topsoil and subsoil handled in accordance with the Rehabilitation MP. Topsoil is stockpiled in windrows following stripping and set aside for rehabilitation. - A rehabilitation material balance study was completed in 2017 and indicated that there is a deficit of topsoil on site and other sources of growth medium will be required to complete rehabilitation. Costs associated with acquiring additional growth medium has been factored into the RCE.	Moderate (3,2)	
Insufficient quality of growth medium to achieve final land use capability.	Inability to achieve and/or sustain the nominated final land use (native ecosystem or pasture).	- Topsoil and subsoil handled in accordance with the Rehabilitation MP. Topsoil is stockpiled in windrows following stripping and set aside for rehabilitation. - Standard soil ameliorants (e.g. fertilisers) are not used to treat topsoil based on research by UNE finding that they can increase metal bioavailability in the endemic species used for rehabilitation. Alternative ameliorants (e.g. mulch) are used instead to prevent excessive metal uptake. - The quality of site-won and imported topsoil resources will be assessed by a suitably qualified person prior to use in rehabilitation.	Low (2,2)	
Occurrence of erosion.	Increased sediment loads in downstream or off-site areas. Active erosion features present a degradation risk to rehabilitated areas and stability of final landforms and retained water management infrastructure.	- Erosion and Sediment Control is considered in the EMP and a control standard has been developed. - Erosion and sediment control structures implemented where necessary across the site to minimise the amount of sediment entering Baker's Creek. - All runoff water from the process plant and TSF areas is captured for reuse or treatment. - Management plans are developed for critical aspects of the operation that have erosion and sediment impacts (including TSF operations and maintenance manuals and dam safety emergency plans). - Drainage controls and sediment ponds are maintained in rehabilitation areas until stability is achieved. - Progressive rehabilitation of disturbed land as soon as practicable to minimise the exposure of bare soil. - Regular inspections completed to identify new erosion issues.	Low (3,1)	

Potential Risk Situation	Impact	Controls	Residual Risk (L, C)	Method of Control Assessment
A failure of water management measures or infrastructure.	Uncontrolled release of water into rehab areas or downstream catchments. Risk of harm to fauna, adverse sedimentation or contamination on surrounding receptors.	- TSF Operations and Maintenance manuals and Dam Safety Emergency Plans have been developed and include inspection and monitoring requirements. - Water infrastructure to be retained will be inspected prior to closure and certified by an appropriately qualified person as conforming to design standards and specifications consistent with best practice.	Moderate (2,3)	
<u>Ecosystem Land Use Establishment & Development</u>				
Insufficient native seed bank, or seed/tube stock quantity or quality.	Unsuccessful revegetation of disturbed areas, disturbed areas not revegetated as soon as practicable.	- Biological salvage of seed on site will occur where possible and will be in accordance with the seed collection and propagation method outlined in the Ecosystem and Rehabilitation Strategy. - A local suitable nursery (BioBank Seed Uralla) has been nominated for use in rehabilitation activities which is able to provide native seeds from the local area.	Low (2,2)	
Weed presence and/or abundance is or has the potential to impact rehabilitation outcomes.	Competition with native vegetation results in inability to meet the relevant ecosystem completion criteria.	- Feral Animal and Weed Control is considered in the EMP and a control standard has been developed. - Regular inspections of areas with known weed infestations until controlled. - The presence of weeds to be noted and recorded for corrective action during other routine activities (opportunistic monitoring). - Rehabilitation of disturbed areas as soon as practicable to prevent the establishment and/or spread of weed species. - Species specific management actions developed for priority weeds Blackberry (<i>Rubus fruticosus</i> agg. spp.) and Sweet briar (<i>Rosa rubiginosa</i>) in the EMP.	Low (3,1)	
Feral animal presence and/or abundance is or has the potential to impact rehabilitation outcomes.	Loss of native vegetation, predation or competition of native fauna, facilitation of soil erosion.	- Feral Animal and Weed Control is considered in the EMP and a control standard has been developed. - Regular inspections of areas where there are known feral animal populations until effectively controlled or eradicated. - Presence of feral animals to be noted and recorded for corrective action during other routine activities (opportunistic monitoring). - Species specific management actions developed for feral goats and rabbits in the EMP.	Moderate (3,2)	

Potential Risk Situation	Impact	Controls	Residual Risk (L, C)	Method of Control Assessment
Insufficient establishment of target vegetation species, species diversity, structure, or density.	Site not rehabilitated to the appropriate final land use. Nominated final land use and rehabilitation completion criteria are not achieved.	- Development of appropriate rehabilitation completion criteria - Assisted revegetation species mix is chosen by a suitably qualified person which is based on baseline analogue sites. - Annual monitoring of species, species diversity, vegetation structure and density will occur in rehabilitation areas by a suitably qualified ecologist. If monitoring sites are found not to be tracking towards the defined completion criteria, corrective actions will be taken.	Low (3,1)	
Adverse climatic conditions or weather events (drought, bushfire, flooding).	Disturbance or damage to rehabilitation areas, threat to stability of final landforms, poor vegetation establishment or growth, inability to achieve or sustain final land use.	- Final landforms are designed to be free draining. - Annual rehabilitation monitoring and general opportunistic monitoring of active erosion features will occur. - Planning of revegetation activities will take into account anticipated weather conditions. - Retained water storage dams will provide an additional water source if an unexpected drought occurs during initial revegetation.	Moderate (3,2)	

4. REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA

4.1 Rehabilitation Objectives and rehabilitation completion criteria.

Table 10: Proposed Rehabilitation Objectives for Hillgrove Mine

Development Consent Ref No.	Rehabilitation Objective Sourced from Development Consent	Spatial Reference	Rehabilitation Objective Category	Proposed Rehabilitation Objective
DA98/35 (MOD 4)	Surface infrastructure to be decommissioned and removed, unless the Resources Regulator (formerly MEG and DRG) agrees otherwise.	A1	Removal of infrastructure	All infrastructure not to be retained in the final land use is decommissioned and removed.
DA98/35 (MOD 4)	Surface infrastructure to be decommissioned and removed, unless the Resources Regulator (formerly MEG and DRG) agrees otherwise.	A3	Removal of infrastructure	All infrastructure not to be retained in the final land use is decommissioned and removed.
DA98/35 (MOD 4)	Surface infrastructure to be decommissioned and removed, unless the Resources Regulator (formerly MEG and DRG) agrees otherwise.	A6	Removal of infrastructure	All infrastructure not to be retained in the final land use is decommissioned and removed.
DA98/35 (MOD 4)	Surface infrastructure to be decommissioned and removed, unless the Resources Regulator (formerly MEG and DRG) agrees otherwise.	B2	Removal of infrastructure	All infrastructure not to be retained in the final land use is decommissioned and removed.
DA98/35 (MOD 4)	Ensure public safety and minimise the adverse socio-economic effects associated with mine closure.	I1	Retention of infrastructure	Surface infrastructure remaining for the final land use does not pose a hazard to public safety.
DA98/35 (MOD 4)	Ensure public safety and minimise the adverse socio-economic effects associated with mine closure.	H1	Retention of infrastructure	Surface infrastructure remaining for the final land use does not pose a hazard to public safety and retains heritage values.
DA98/35 (MOD 4)	Ensure public safety and minimise the adverse socio-economic effects associated with mine closure.	H6	Retention of infrastructure	Surface infrastructure remaining for the final land use does not pose a hazard to public safety and retains heritage values.
DA98/35 (MOD 4)	Ensure public safety and minimise the adverse socio-economic effects associated with mine closure.	F3	Retention of infrastructure	Retained water management infrastructure is suitable for the final land use and does not pose a hazard to public safety.

Development Consent Ref No.	Rehabilitation Objective Sourced from Development Consent	Spatial Reference	Rehabilitation Objective Category	Proposed Rehabilitation Objective
DA98/35 (MOD 4)	Surface infrastructure to be decommissioned and removed, unless the Resources Regulator (formerly MEG and DRG) agrees otherwise.	I1	Retention of infrastructure	Surface infrastructure remaining for the final land use has been approved by the Resources Regulator
DA98/35 (MOD 4)	Surface infrastructure to be decommissioned and removed, unless the Resources Regulator (formerly MEG and DRG) agrees otherwise.	F3	Retention of infrastructure	Water management infrastructure remaining for the final land use has been approved by the Resources Regulator.
DA98/35 (MOD 4)	Ensure public safety and minimise the adverse socio-economic effects associated with mine closure.	I1	Retention of infrastructure	The final land use facilitates socio-economic benefits for the community.
DA98/35 (MOD 4)	Ensure public safety and minimise the adverse socio-economic effects associated with mine closure.	F3	Retention of infrastructure	The final land use facilitates socio-economic benefits for the community.
DA98/35 (MOD 4)	The Applicant shall carry out the rehabilitation of the site progressively, that is as soon as reasonably practicable following disturbance.	I1	Retention of infrastructure	Rehabilitation of the site will be carried out as soon as reasonably practicable following disturbance.
DA98/35 (MOD 4)	The Applicant shall carry out the rehabilitation of the site progressively, that is as soon as reasonably practicable following disturbance.	F3	Retention of infrastructure	Rehabilitation of the site will be carried out as soon as reasonably practicable following disturbance.
DA98/35 (MOD 4)	Safe, stable and non-polluting.	A1	Land contamination	No residual hazardous or contaminated material remains that poses a hazard to public safety or the potential to cause environmental harm.
DA98/35 (MOD 4)	Safe, stable and non-polluting.	A3	Land contamination	No residual hazardous or contaminated material remains that poses a hazard to public safety or the potential to cause environmental harm.
DA98/35 (MOD 4)	Safe, stable and non-polluting.	A4	Land contamination	No residual hazardous or contaminated material remains that poses a hazard to public safety or the potential to cause environmental harm.
DA98/35 (MOD 4)	Safe, stable and non-polluting.	A6	Land contamination	No residual hazardous or contaminated material remains that poses a hazard to public safety or the potential to cause environmental harm.

Development Consent Ref No.	Rehabilitation Objective Sourced from Development Consent	Spatial Reference	Rehabilitation Objective Category	Proposed Rehabilitation Objective
DA98/35 (MOD 4)	Safe, stable and non-polluting.	B2	Land contamination	No residual hazardous or contaminated material remains that poses a hazard to public safety or the potential to cause environmental harm.
DA98/35 (MOD 4)	Safe, stable and non-polluting.	I1	Land contamination	No residual hazardous or contaminated material remains that poses a hazard to public safety or the potential to cause environmental harm.
DA98/35 (MOD 4)	Safe, stable and non-polluting.	F3	Land contamination	No residual hazardous or contaminated material remains that poses a hazard to public safety or the potential to cause environmental harm.
DA98/35 (MOD 4)	Safe, stable and non-polluting.	A4	Management of waste and process materials	Potentially hazardous mine waste associated with the approved activity has been removed and does not prohibit the achievement of the nominated final land use.
DA98/35 (MOD 4)	Safe, stable and non-polluting.	B2	Management of waste and process materials	Potentially hazardous mine waste associated with the approved activity has been remediated, encapsulated or removed to ensure public safety and does not prohibit the achievement of the nominated final land use.
DA98/35 (MOD 4)	Safe, stable and non-polluting.	A1	Groundwater	Discharge quality and quantity from historical adits meets the specifications agreed with the Environmental Protection Authority.
DA98/35 (MOD 4)	Safe, stable and non-polluting.	A3	Groundwater	Discharge quality and quantity from historical adits meets the specifications agreed with the Environmental Protection Authority.
DA98/35 (MOD 4)	Safe, stable and non-polluting.	A4	Groundwater	Discharge quality and quantity from historical adits meets the specifications agreed with the Environmental Protection Authority.
DA98/35 (MOD 4)	Safe, stable and non-polluting.	A6	Groundwater	Discharge quality and quantity from historical adits meets the specifications agreed with the Environmental Protection Authority.

Development Consent Ref No.	Rehabilitation Objective Sourced from Development Consent	Spatial Reference	Rehabilitation Objective Category	Proposed Rehabilitation Objective
DA98/35 (MOD 4)	Safe, stable and non-polluting.	F3	Surface Water	Water quality discharged from rehabilitated mining operation meets the specifications agreed with the Environmental Protection Authority.
DA98/35 (MOD 4)	Ensure public safety and minimise the adverse socio-economic effects associated with mine closure.	F3	Water approvals	Retained water management infrastructure is appropriately licensed.
DA98/35 (MOD 4); DA 95/26-2004	Safe, stable and non-polluting; Disturbed and excavated areas of the site (particularly batters) shall be stabilised and drained to maximise safety and minimise erosion and siltation.	A1	Landform stability	The final landform is stable, free-draining and compatible with the surrounding landscape.
DA98/35 (MOD 4); DA 95/26-2004	Safe, stable and non-polluting; Disturbed and excavated areas of the site (particularly batters) shall be stabilised and drained to maximise safety and minimise erosion and siltation.	A3	Landform stability	The final landform is stable, free-draining and compatible with the surrounding landscape.
DA98/35 (MOD 4); DA 95/26-2004	Safe, stable and non-polluting; Disturbed and excavated areas of the site (particularly batters) shall be stabilised and drained to maximise safety and minimise erosion and siltation.	A4	Landform stability	The final landform is stable, free-draining and compatible with the surrounding landscape.
DA98/35 (MOD 4); DA 95/26-2004	Safe, stable and non-polluting; Disturbed and excavated areas of the site (particularly batters) shall be stabilised and drained to maximise safety and minimise erosion and siltation.	A6	Landform stability	The final landform is stable, free-draining and compatible with the surrounding landscape.
DA98/35 (MOD 4); DA 95/26-2004	Safe, stable and non-polluting; Disturbed and excavated areas of the site (particularly batters) shall be stabilised and drained to maximise safety and minimise erosion and siltation.	B2	Landform stability	The final landform is stable, free-draining and compatible with the surrounding landscape.
DA98/35 (MOD 4); DA 95/26-2004	Safe, stable and non-polluting; Disturbed and excavated areas of the site (particularly batters) shall be stabilised and drained to maximise safety and minimise erosion and siltation.	F3	Landform stability	The final landform is stable.

Development Consent Ref No.	Rehabilitation Objective Sourced from Development Consent	Spatial Reference	Rehabilitation Objective Category	Proposed Rehabilitation Objective
DA 95/26-2004	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.	A1	Landform stability	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.
DA 95/26-2004	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.	A3	Landform stability	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.
DA 95/26-2004	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.	A4	Landform stability	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.
DA 95/26-2004	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.	A6	Landform stability	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.
DA 95/26-2004	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.	B2	Landform stability	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.
DA98/35 (MOD 4)	The Applicant shall carry out the rehabilitation of the site progressively, that is as soon as reasonably practicable following disturbance.	A1	Ecological rehabilitation	Rehabilitation of the site will be carried out as soon as reasonably practicable following disturbance.
DA98/35 (MOD 4)	The Applicant shall carry out the rehabilitation of the site progressively, that is as soon as reasonably practicable following disturbance.	A3	Ecological rehabilitation	Rehabilitation of the site will be carried out as soon as reasonably practicable following disturbance.
DA98/35 (MOD 4)	The Applicant shall carry out the rehabilitation of the site progressively, that is as soon as reasonably practicable following disturbance.	A4	Ecological rehabilitation	Rehabilitation of the site will be carried out as soon as reasonably practicable following disturbance.
DA98/35 (MOD 4)	The Applicant shall carry out the rehabilitation of the site progressively, that is as soon as reasonably practicable following disturbance.	A6	Ecological rehabilitation	Rehabilitation of the site will be carried out as soon as reasonably practicable following disturbance.
DA 95/26-2004	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.	A1	Ecological rehabilitation	Growth media is suitable for establishing and maintaining the nominated final land use.

Development Consent Ref No.	Rehabilitation Objective Sourced from Development Consent	Spatial Reference	Rehabilitation Objective Category	Proposed Rehabilitation Objective
DA 95/26-2004	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.	A3	Ecological rehabilitation	Growth media is suitable for establishing and maintaining the nominated final land use.
DA 95/26-2004	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.	A4	Ecological rehabilitation	Growth media is suitable for establishing and maintaining the nominated final land use.
DA 95/26-2004	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.	A6	Ecological rehabilitation	Growth media is suitable for establishing and maintaining the nominated final land use.
DA98/35 (MOD 4)	Site to be revegetated with suitable plant species.	A1	Ecological rehabilitation	Rehabilitation area floristics and structure is representative of, or trending towards (based on ongoing monitoring data) a native woodland consistent with the intended final land use.
DA98/35 (MOD 4)	Site to be revegetated with suitable plant species.	A3	Ecological rehabilitation	Rehabilitation area floristics and structure is representative of, or trending towards (based on ongoing monitoring data) a native woodland consistent with the intended final land use.
DA98/35 (MOD 4)	Site to be revegetated with suitable plant species.	A4	Ecological rehabilitation	Rehabilitation area floristics and structure is representative of, or trending towards (based on ongoing monitoring data) a native woodland consistent with the intended final land use.
DA98/35 (MOD 4)	Site to be revegetated with suitable plant species.	A6	Ecological rehabilitation	Rehabilitation area floristics and structure is representative of, or trending towards (based on ongoing monitoring data) a native woodland consistent with the intended final land use.
DA98/35 (MOD 4)	Site to be revegetated with suitable plant species.	A1	Ecological rehabilitation	Rehabilitation areas demonstrate that they are self-sustaining.
DA98/35 (MOD 4)	Site to be revegetated with suitable plant species.	A3	Ecological rehabilitation	Rehabilitation areas demonstrate that they are self-sustaining.
DA98/35 (MOD 4)	Site to be revegetated with suitable plant species.	A4	Ecological rehabilitation	Rehabilitation areas demonstrate that they are self-sustaining.
DA98/35 (MOD 4)	Site to be revegetated with suitable plant species.	A6	Ecological rehabilitation	Rehabilitation areas demonstrate that they are self-sustaining.
DA98/35 (MOD 4)	The Applicant shall carry out the rehabilitation of the site progressively, that is as soon as reasonably practicable following disturbance.	B2	Agricultural revegetation	Rehabilitation of the site will be carried out as soon as reasonably practicable following disturbance.

Development Consent Ref No.	Rehabilitation Objective Sourced from Development Consent	Spatial Reference	Rehabilitation Objective Category	Proposed Rehabilitation Objective
DA 95/26-2004	Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.	B2	Agricultural revegetation	Growth media is suitable for establishing and maintaining the nominated final land use.
DA98/35 (MOD 4)	Site to be revegetated with suitable plant species.	B2	Agricultural revegetation	Revegetation is self-sustaining and only requires maintenance that is consistent with the nominated final land use.
DA98/35 (MOD 4)	Final land use compatible with surrounding land uses.	B2	Agricultural revegetation	Rehabilitated land quality can support the nominated final land use.
DA98/35 (MOD 4)	Ensure public safety and minimise the adverse socio-economic effects associated with mine closure.	A1	Bushfire	The risk of bushfire and its impacts have been addressed for rehabilitation.
DA98/35 (MOD 4)	Ensure public safety and minimise the adverse socio-economic effects associated with mine closure.	A3	Bushfire	The risk of bushfire and its impacts have been addressed for rehabilitation.
DA98/35 (MOD 4)	Ensure public safety and minimise the adverse socio-economic effects associated with mine closure.	A4	Bushfire	The risk of bushfire and its impacts have been addressed for rehabilitation.
DA98/35 (MOD 4)	Ensure public safety and minimise the adverse socio-economic effects associated with mine closure.	A6	Bushfire	The risk of bushfire and its impacts have been addressed for rehabilitation.
DA98/35 (MOD 4)	Ensure public safety and minimise the adverse socio-economic effects associated with mine closure.	B2	Bushfire	The risk of bushfire and its impacts have been addressed for rehabilitation.
DA98/35 (MOD 4)	Ensure public safety and minimise the adverse socio-economic effects associated with mine closure.	I1	Bushfire	The risk of bushfire and its impacts have been addressed for rehabilitation.



Table 11: Domain Rehabilitation Objectives

Primary Domain	Secondary Domain	Rehabilitation Objective
1 - Infrastructure	1A	- Infrastructure removed that is not identified to remain as part of final land use - Vegetation appropriate - Domain safe and free from hazardous materials - Free draining, stable landform established - Non-polluting - Compatible with surrounding land use
	1I	- Infrastructure removed that is not identified to remain as part of final land use - Vegetation appropriate - Domain safe and free from hazardous materials - Free draining, stable landform established - Non-polluting - Compatible with surrounding land use
2 - Tailings Storage Facility	2B	- Infrastructure removed and domain made safe - Vegetation appropriate (shallow rooted pasture species) - Free draining, stable landform established - Non-polluting
3 - Water Management Area	3A	- Stable and non-polluting - Infrastructure removed (ES1-3 and pumps etc.) - Vegetation appropriate - Safe and stable landform
	3F	- Stable and non-polluting - Infrastructure removed (ES1-3 and pumps etc.) - Safe and stable landform
4 - UG mining area	6A	- Infrastructure removed (TBD which roads to remain if any) and domain made safe - Vegetation appropriate e.g. Forest consistent with surrounding gorge ecosystem - Free draining, stable landform established - Non-polluting - Compatible with surrounding land use
	8A (Bakers Creek Waste Dump)	- Waste rock removed and returned to original landform - Domain made stable with erosion and sediment control measures in place - Vegetation appropriate and consistent with surrounding gorge ecosystem

Table 12: Proposed Completion Criteria for Hillgrove Mine

Final Land Use Domain (Spatial Ref)	Mining Domain (Spatial Ref)	Rehabilitation Objective	Performance Indicator	Completion Criteria	Validation Method
Infrastructure (I)	Infrastructure Area (1)	Surface infrastructure remaining for the final land use does not pose a hazard to public safety.	Assessment of infrastructure condition.	Infrastructure has been assessed by a suitably qualified person and determined to be safe and suitable for the final land use.	Reports, plans, or statements.
			Formal landowner acceptance of remaining infrastructure.	Formal acceptance has been received from the subsequent landowner that infrastructure is in a condition that is suitable for the intended final land use in accordance with formal agreement.	Formal acceptance from landowner.
		Surface infrastructure remaining for the final land use has been approved by the Resources Regulator	Necessary approvals in place.	Formal approval to retain infrastructure in the final land use has been issued by the Resources Regulator, where applicable.	Copies of relevant documentation.
		No residual hazardous or contaminated material remains that poses a hazard to public safety or the potential to cause environmental harm.	Removal of all operational waste materials.	All operational waste materials including hazardous substances have been removed from site.	Certificates of disposal; Site records and photographs.
			Remediation / removal of contaminated material.	Residual contamination has been appropriately assessed and remediated according to appropriate standard relevant to the proposed final land use , e.g. <i>National Environment Protection (Assessment of Site Contamination) Measure</i> (1999) or an appropriate site-specific risk assessment that includes consideration of background contaminant concentrations.	Contamination Remediation Report prepared by Land Contamination Consultant; Site Contamination Audit Report and Site Audit Statement prepared by EPA Accredited Auditor, where required.
		Rehabilitation of the site will be carried out as soon as reasonably practicable following disturbance.	Initiation of rehabilitation activities in disturbed areas.	Progressive rehabilitation has been commenced within 2 years of areas becoming available for final rehabilitation within the operational land disturbed under the relevant development consent.	Site records and photographs.

Final Land Use Domain (Spatial Ref)	Mining Domain (Spatial Ref)	Rehabilitation Objective	Performance Indicator	Completion Criteria	Validation Method
		The risk of bushfire and its impacts have been addressed for rehabilitation.	Implementation of bushfire controls.	Appropriate bushfire hazard controls, where required, have been implemented on the advice from suitable persons or the NSW Rural Fire Service.	Site records and photographs.
		The final land use facilitates socio-economic benefits for the community.	Establishment of assets to facilitate tourism.	Assets to facilitate tourism have been established in the final landform.	As constructed final landform plan.
Heritage Area (H)	Infrastructure Area (1) Underground Mining Area (6)	Surface infrastructure remaining for the final land use does not pose a hazard to public safety and retains heritage values.	Heritage obligations.	Heritage obligations have been met and permits and approval documents have been issued where required. The safety of remaining heritage items has been assessed by a suitably qualified person and necessary mitigation measures adopted.	Copies of relevant documentation. Assessment report: Site records and photographs of adoption of mitigation measures (as required)
Water Management Areas (F)	Water Management Area (3)	Retained water management infrastructure is suitable for the final land use and does not pose a hazard to public safety.	Condition of water management infrastructure.	Infrastructure has been designed and/or assessed by a suitably qualified person and determined to be safe and suitable for the final land use.	Engineering reports, plans, or statements.
			Formal landowner acceptance of remaining infrastructure.	Formal acceptance has been received from the subsequent landowner that infrastructure is in a condition that is suitable for the intended final land use in accordance with formal agreement.	Formal acceptance from landowner.
		Water management infrastructure remaining for the final land use has been approved by the Resources Regulator.	Necessary approvals in place.	Formal approval to retain infrastructure for the final land use has been issued by the Resources Regulator, where applicable.	Copies of relevant documentation.

Final Land Use Domain (Spatial Ref)	Mining Domain (Spatial Ref)	Rehabilitation Objective	Performance Indicator	Completion Criteria	Validation Method
		Retained water management infrastructure is appropriately licensed.	Necessary approvals / licences in place.	Water approvals / licences have been granted by relevant NSW Government Agencies, where required.	Copies of relevant documentation.
		No residual hazardous or contaminated material remains that poses a hazard to public safety or the potential to cause environmental harm.	Removal of all operational waste materials.	All operational waste materials including hazardous substances have been removed from site.	Certificates of disposal; Site records and photographs.
			Remediation / removal of contaminated material.	Residual contamination has been appropriately assessed and remediated according to appropriate standard relevant to the proposed final land use, e.g., <i>National Environment Protection (Assessment of Site Contamination) Measure</i> (1999) or an appropriate site-specific risk assessment, that includes consideration of background contaminant concentrations.	Contamination Remediation Report prepared by Land Contamination Consultant; Site Contamination Audit Report and Site Audit Statement prepared by EPA Accredited Auditor, where required.
		The final landform is stable.	Final landform survey.	A survey of the final landform verifies that it has been constructed in accordance with the design and with the Final Landform and Rehabilitation Plan	As constructed final landform plans; Quality assurance records.
			Visual erosion and stability indicators.	There are no visual signs of active gully erosion or land instability (e.g., cracking, subsidence).	Ongoing rehabilitation inspections and monitoring.
		Water quality discharged from rehabilitated mining operation meets the specifications agreed with the Environmental Protection Authority.	Water quality monitoring of discharge.	Monitoring confirms that water quality standards specified in the Environmental Protection Licence have been met for relinquishment.	Relinquishment of Environmental Protection Licence.

Final Land Use Domain (Spatial Ref)	Mining Domain (Spatial Ref)	Rehabilitation Objective	Performance Indicator	Completion Criteria	Validation Method
		Rehabilitation of the site will be carried out as soon as reasonably practicable following disturbance.	Initiation of rehabilitation activities in disturbed areas.	Progressive rehabilitation has been commenced within 2 years of areas becoming available for final rehabilitation within the operational land disturbed under the relevant development consent.	Site records and photographs.
		The final land use facilitates socio-economic benefits for the community.	Establishment of assets to facilitate tourism.	Assets to facilitate tourism have been established in the final landform.	As constructed final landform plan.
Native Ecosystem (A).	Infrastructure Area (1) Water Management Area (3) Underground Mining Area (6)	All infrastructure not to be retained in the final land use is decommissioned and removed.	Removal of infrastructure.	Operational and water management infrastructure not required for final land use has been decommissioned, demolished and/or removed including processing facilities, workshop, office and amenity buildings.	As-constructed final landform plans; Site records and photographs.
			Demolition work activities.	Infrastructure not required for final land use has been demolished accordance with <i>AS2601-2001: The Demolition of Structures</i> or its latest version.	Demolition records; Site records and photographs.
			Underground mine entry sealing verification.	Surveying and sealing of all underground mine entries in accordance with departmental guidelines and relevant standards.	Sealing records; Site records and photographs.
			Removal of all plant, machinery, stockpiles, and equipment from the site.	Plant, machinery equipment and stockpiles have been removed.	Site records and photographs.
			Removal of footings.	Concrete footings have been removed to a depth of 0.5 m.	Site records and photographs.
			Sealing of drill holes and boreholes.	Sealing of all drill holes and boreholes has been completed, as required, in accordance with departmental guidelines and relevant standards.	Site records and photographs.

Final Land Use Domain (Spatial Ref)	Mining Domain (Spatial Ref)	Rehabilitation Objective	Performance Indicator	Completion Criteria	Validation Method
			Removal of pumps and piping.	Pumps and piping have been removed unless formally agreed with the subsequent landholder.	Site records and photographs; Record of formal agreement
			Removal of all site services (electricity, telecommunications etc).	Services have been disconnected and removed.	Utility disconnection statements.
	Overburden Emplacement Area (4)	Potentially hazardous mine waste associated with the approved activity has been removed and does not prohibit the achievement of the nominated final land use.	Removal of mine waste.	Mine waste associated with the approved activity has been removed for processing and validation sampling confirms that waste has been removed to native ground.	Site records and photographs; Sampling results and analysis by a suitably qualified person.
	Infrastructure Area (1) Water Management Area (3) Overburden Emplacement Area (4) Underground Mining Area (6)	No residual hazardous or contaminated material remains that poses a hazard to public safety or the potential to cause environmental harm.	Removal of all operational waste materials.	All operational waste materials including hazardous substances have been removed from site.	Certificates of disposal; Site records and photographs.
			Remediation / removal of contaminated material.	Residual contamination has been appropriately assessed and remediated according to appropriate standard relevant to the proposed final land use, e.g. <i>National Environment Protection (Assessment of Site Contamination) Measure</i> (1999) or an appropriate site-specific risk assessment that includes consideration of background contaminant concentrations.	Contamination Remediation Report prepared by Land Contamination Consultant; Site Contamination Audit Report and Site Audit Statement prepared by EPA Accredited Auditor, where required.

Final Land Use Domain (Spatial Ref)	Mining Domain (Spatial Ref)	Rehabilitation Objective	Performance Indicator	Completion Criteria	Validation Method
		The final landform is stable, free-draining, and compatible with the surrounding landscape.	Final landform survey.	A survey of the final landform verifies that it has been constructed in accordance with the design and with the Final Landform and Rehabilitation Plan	As constructed final landform plans; Quality assurance records.
			Visual inspections of erosion and stability indicators.	There are no visual signs of active gully erosion, land instability (e.g., cracking, subsidence) or surface water management issues.	Ongoing rehabilitation inspections and monitoring.
		Discharge quality and quantity from historical adits meets the specifications agreed with the Environmental Protection Authority.	Water quality and volume monitoring of historical adits.	Monitoring confirms that water quality standards specified in the Environmental Protection Licence have been met for relinquishment.	Relinquishment of Environmental Protection Licence.
		Rehabilitation of the site will be carried out as soon as reasonably practicable following disturbance.	Initiation of rehabilitation activities in disturbed areas.	Progressive rehabilitation has been commenced within 2 years of areas becoming available for final rehabilitation within the operational land disturbed under the relevant development consent.	Site records and photographs.
		Stripped topsoil shall be stockpiled for re-use during rehabilitation and landscaping, and shall not be exported from the site.	Maintenance of topsoil stockpiles onsite.	Stripped topsoil has been maintained onsite and utilised where possible for rehabilitation and has not been exported from the site unless it comprises of contaminated material requiring appropriate disposal.	Site records and photographs.
		Growth media is suitable for establishing and maintaining the nominated final land use.	Compaction activities.	Compacted surfaces have been deep ripped along the contour.	Inspections and reports, including photographs, during growth medium development phase. To be included in relinquishment report. Single occurrence assessments.
			Adequate topsoil and/or ameliorants have been utilised for rehabilitation.	A minimum of 100 mm of topsoil and/or other suitable growth medium has been spread over disturbed areas and has been appropriately ameliorated in accordance with previous research completed at the site.	

Final Land Use Domain (Spatial Ref)	Mining Domain (Spatial Ref)	Rehabilitation Objective	Performance Indicator	Completion Criteria	Validation Method
			Soil development and function.	An assessment by a suitably qualified person has determined that processes of soil formation and soil function are evident, which may include soil structure development, return of soil fauna, litter incorporation (nutrient cycling) or organic matter accumulation.	Assessment results provided in relinquishment report. Single occurrence assessments.
			Physical and chemical soil quality.	An assessment of physical and chemical soil quality has been completed by an suitably qualified person and has confirmed that the developing soil profile shows no existing or developing characteristics that would be a limitation to the long-term maintenance of an agricultural land use.	
		Rehabilitation area floristics and structure is representative of, or trending towards (based on ongoing monitoring data) a native woodland consistent with the intended final land use.	Vegetation composition.	Revegetation areas contain flora species characteristic of the surrounding analogue native vegetation communities with 50% or more of the overstorey species present in rehabilitated areas having been recorded at analogue sites.	Annual rehabilitation monitoring and reports completed by an ecologist. Ongoing until relinquishment.
			Vegetation structure.	Native ecosystem rehabilitation areas provide a range of structural features (e.g. trees, shrubs, ground cover, developing litter layer etc.).	
			Priority weed presence and abundance (cover).	Priority weeds have been controlled, and median cover is within the 90 th percentile of analogue sites.	
		Rehabilitation areas demonstrate that they are self-sustaining.	Regeneration of relevant characteristic species.	Rehabilitation monitoring verifies seedlings of species characteristic of the surrounding native vegetation communities are present or likely to be, based on comparable older rehabilitation sites.	Annual rehabilitation monitoring and reports completed by an ecologist.

Final Land Use Domain (Spatial Ref)	Mining Domain (Spatial Ref)	Rehabilitation Objective	Performance Indicator	Completion Criteria	Validation Method
Agricultural - Grazing (B)	Tailings Storage Facility (2)		Resilience of rehabilitation area.	Rehabilitation area at some point since seeding or final surface preparation has experienced a fire event, a declared drought or at least one year with annual rainfall in the first decile range and all other vegetation completion criteria have been met.	Ongoing until relinquishment.
			Vertebrate pest management.	The presence of vertebrate pest species and any related damage has been recorded, controlled and remediated.	Ongoing rehabilitation inspections and monitoring.
			The risk of bushfire and its impacts have been addressed for rehabilitation.	Appropriate bushfire hazard controls (where required) have been implemented on the advice from suitable persons or the NSW Rural Fire Service.	Site records and photographs.
		All infrastructure not to be retained in the final land use is decommissioned and removed.	Removal of operational infrastructure.	Infrastructure not required for final land use has been removed.	Site records and photographs.
			Removal of all plant, machinery, stockpiles, and equipment from the site.	Plant, machinery equipment and stockpiles not required for final land use have been removed.	
			Removal of all site services (electricity, telecommunications etc).	Services have been disconnected and removed.	Utility disconnection statements.

Final Land Use Domain (Spatial Ref)	Mining Domain (Spatial Ref)	Rehabilitation Objective	Performance Indicator	Completion Criteria	Validation Method
		No residual hazardous or contaminated material remains that poses a hazard to public safety or the potential to cause environmental harm.	Removal of all operational waste materials.	All operational waste materials including hazardous substances have been removed from site.	Certificates of disposal; Site records and photographs.
			Remediation / removal of contaminated material.	Residual contamination has been appropriately assessed and remediated according to appropriate standard relevant to the proposed final land use, e.g. <i>National Environment Protection (Assessment of Site Contamination) Measure</i> (1999) or an appropriate site-specific risk assessment that considered background contaminant concentrations	Contamination Remediation Report prepared by Land Contamination Consultant; Site Contamination Audit Report and Site Audit Statement prepared by EPA accredited auditor, as req'd
		Potentially hazardous mine waste associated with the approved activity has been remediated, encapsulated, or removed to ensure public safety and does not prohibit the achievement of the nominated final land use.	Removal, remediation or encapsulation of mine waste.	Mine waste associated with the approved activity has been remediated, encapsulated, or removed from the site and disposed of appropriately.	Site records and photographs; Waste characterisation; Waste landform and capping design; Certificates of disposal.
			Visual indicators.	No visual signs of compromised capping or sealing, including unexpected seepage occurrence.	Ongoing rehabilitation inspections and monitoring.
		The final landform is stable, free-draining, and compatible with the surrounding landscape.	Final landform survey.	A survey of the final landform verifies that it has been constructed in accordance with the design and with the Final Landform and Rehabilitation Plan	As constructed final landform plans; Quality assurance records.
			Signoff by a suitably qualified person.	The final landform has achieved signoff by a suitably qualified person.	Report/statement prepared by a suitably qualified person.
			Erosion and stability indicators.	There are no visual signs of active gully erosion, land instability (e.g., cracking, subsidence) or surface water management issues on the final landform.	Ongoing rehabilitation monitoring.

Final Land Use Domain (Spatial Ref)	Mining Domain (Spatial Ref)	Rehabilitation Objective	Performance Indicator	Completion Criteria	Validation Method
		Rehabilitation of the site will be carried out as soon as reasonably practicable following disturbance.	Initiation of rehabilitation activities in disturbed areas.	Progressive rehabilitation has been commenced within 2 years of areas becoming available for final rehabilitation within the operational land disturbed under the relevant development consent.	Site records and photographs.
		Topsoil, which has been stripped, shall be stockpiled for re-use during site rehabilitation and landscaping, and shall not be exported from the site.	Maintenance of topsoil stockpiles onsite.	Stripped topsoil has been maintained onsite and utilised where possible for rehabilitation and has not been exported from the site unless it comprises of contaminated material requiring appropriate disposal.	Site records and photographs.
		Growth media is suitable for establishing and maintaining the nominated final land use.	Presence of adequate topsoil and/or ameliorants.	A minimum of 100 mm of topsoil and/or appropriate ameliorants (in accordance with previous research completed at the site) have been spread over all disturbed areas.	Inspections and reports, including photographs, during growth medium development phase. To be included in relinquishment report. Single occurrence assessments.
			Soil development and function.	An assessment by a suitably qualified person has determined that processes of soil formation and soil function are evident, which may include soil structure development, return of soil fauna, litter incorporation (nutrient cycling) or organic matter accumulation.	Assessment results provided in relinquishment report. Single occurrence assessments.
			Physical and chemical soil quality.	An assessment of physical and chemical soil quality has been completed by a suitably qualified person which confirms that the developing soil profile shows no existing or developing characteristics that would be a limitation to the long-term maintenance of an agricultural land use.	

Final Land Use Domain (Spatial Ref)	Mining Domain (Spatial Ref)	Rehabilitation Objective	Performance Indicator	Completion Criteria	Validation Method
		Rehabilitated land quality can support the nominated final land use.	Rural Land Capability Classification Class of rehabilitated area.	An assessment by a suitably qualified person has determined that rehabilitated land is consistent with Rural Land Capability Classification Class VI.	Land capability assessment report. Single occurrence assessment.
		Revegetation is self-sustaining and only requires maintenance that is consistent with the nominated final land use.	Ground cover (%).	Not less than 50% ground cover (vegetation, litter, rock etc.) is maintained, or if prevailing climatic conditions prevent maintenance of 50% ground cover, then groundcover is not less than on unmined (analogue) land of equivalent Rural Land Capability Classification Class.	Annual rehabilitation monitoring and reports completed by an ecologist. Ongoing until relinquishment.
			Productivity.	Median herbage biomass exceeds the minimum herbage biomass required for sustainable grazing (1000 kg/ha).	
			Pasture species composition.	Average vegetation cover is dominated by native and introduced grass, legume and herbage species recognised as pasture species or known to be palatable and provide forage for livestock.	
			Priority weed presence and abundance (cover).	Priority weeds have been controlled, and median cover is within the 90 th percentile of analogue sites.	
			Resilience of rehabilitation areas to adverse climatic conditions.	Rehabilitation area has, at some point since seeding or final surface preparation, experienced a declared drought or at least one year with annual rainfall in the first decile range and all other vegetation completion criteria have been met.	
		The risk of bushfire and its impacts have been addressed for rehabilitation.	Implementation of bushfire controls.	Appropriate bushfire hazard controls, where required, have been implemented on the advice from suitable persons or the NSW Rural Fire Service.	Site records and photographs.

4.2 Rehabilitation objectives and rehabilitation completion criteria- Stakeholder Consultation

Stakeholders including the Office of Environment and Heritage, Armidale Dumaresq Council and the Department of Planning and Environment were consulted in 2015 during the development of the initial rehabilitation and closure outcomes for Hillgrove Mine. The proposed final land use and outcomes of rehabilitation have not been altered since this time.

In 2020, the Resources Regulator, Legacy Mines, the EPA, Armidale Regional Council, Save Our Macleay River (SOMR) group and the Hillgrove community were consulted regarding the proposed recovery and rehabilitation of the legacy Bakers Creek Waste Dump (low grade ore mined and processed). This included consultation with SOMR in Kempsey and a site visit by the group to Hillgrove which received a positive response.

The removal of the dump also triggered the Native Title Agreement between Dunghutti, Anaiwain and Gambayngirr People and Hillgrove Mines and commitments required by Hillgrove have been met.

All future stakeholder consultation in relation to rehabilitation objectives and completion criteria will be recorded for inclusion in this RMP in the format required under the NSW Resource Regulator's (2021) *Form and way: Rehabilitation Management Plan (large mines)* or its latest version, namely in a table with the following information:

- Stakeholder name
- Date
- Description of consultation activities
- Matters subject to consultation
- Actions taken in response to consultation matters.

5. FINAL LANDFORM AND REHABILITATION PLAN

5.1 Final Landform and Rehabilitation Plan

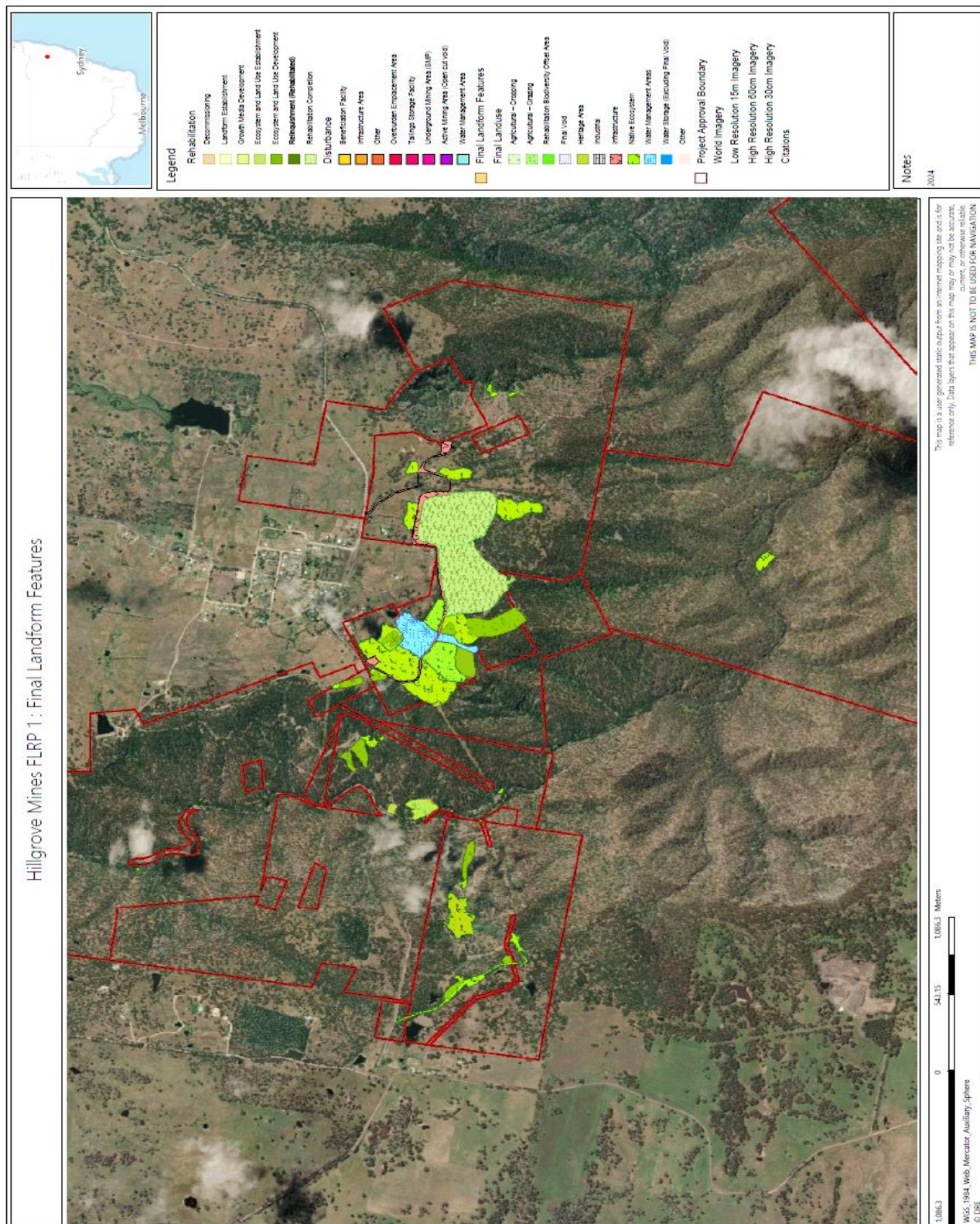


Figure 8: Final Landform and Rehabilitation Plan

6. REHABILITATION IMPLEMENTATION

6.1 Life of Mine Rehabilitation Schedule

NSW Resource Regulator's (2021) *Form and way: Rehabilitation Management Plan (large mines)* requires the inclusion of a schedule for the Life of Mine until lease relinquishment, including the mine layout and progressive rehabilitation sequencing. During generation of this plan Hillgrove Mines Pty Ltd was progressing toward recommencement of mining at Syndicate for 1.5 years in line with the existing Development Authority. In the final month of preparing this plan, that re-commencement has been delayed and the operation has been placed under care and maintenance. The intent is to complete planning for an extension of the existing DA and/or a new DA for re-commencement of operations at Hillgrove. The schedule for decommissioning and rehabilitation of the remaining operational disturbance at Hillgrove Mines is subject to the outcomes of this planning work and as such has not been confirmed.

The schedule until the end of 2023 includes ongoing exploration, although is subject to determination of the timing of recommencing operations, some underground mining and processing of mined and waste materials on site. The only new surface disturbance that may occur is associated with the construction of one further lift on TSF2, in two stages. No disturbed areas will become available for the commencement of rehabilitation in this period.

A full life of mine schedule will be completed as soon as practicable after determination of the proposed application for continuation of the mine.

6.2 Phases of Rehabilitation and General Methodologies

The phases of rehabilitation have been set in accordance with the DRE rehabilitation planning methodology (MEG, 2013), the rehabilitation phases status of each domain is listed below in Table 13.

The progress of the rehabilitation phase for each domain will be reported in the Annual Review and the Annual Rehabilitation Report.

Table 13: Rehabilitation phase status by domain

Phase	TSF	Water Mg't Area	Mining Area (adits & shafts)	Mining Area (other)	Mining Area (gorge roads)	Infra-structure
Active Mine	Complete	Complete	Complete	Complete	Complete	Complete
Decommissioning	Not Complete	n/a	Partially Complete	Partially Complete	Not Complete	Not Complete
Landform Establishment	Not Complete	n/a	Not Complete	Not Complete	Not Complete	Not Complete
Growth Medium Development	Not Complete	n/a	n/a	Not Complete	Not Complete	Partially Complete
Ecosystem and Land Use Establishment	Not Complete	n/a	Not Complete	Not Complete	Not Complete	Not Complete
Ecosystem and Land Use Sustainability	Not Complete	n/a	Not Complete	Not Complete	Not Complete	Not Complete
Land Relinquishment	Not Complete	n/a	Not Complete	Not Complete	Not Complete	Not Complete

6.2.1 Active Mining Phase

6.2.1.1 Soils and materials

The soil types are mostly granite and sediment based. Topsoil is stockpiled in windrows separately following stripping and set aside for later use in rehabilitation works. Topsoil is respread usually using graders or dozers. No soil ameliorants are normally used based on findings from research conducted by UNE. Where adequate topsoil is not available then mulch or similar products are used.

6.2.1.2 Flora

Consultants EcoLogical Australia (ELA) were engaged to complete vegetation surveys to development ecosystem metrics and to establish analogue sites for each post mining vegetation community. In 2017 baseline field surveys were completed by ELA and 8 analogue sites established.

Vegetation species identified within the analogue sites are used to determine species selection for rehabilitation works. This ensures that final land use and vegetation is compatible with the surrounding landscape.

6.2.1.2.1 Threatened Species

Two flora species listed under the Rare or threatened Australian Plant (ROTAP) system (Briggs and Leigh 1992), *Acacia ingramii* and *Eucalyptus michaeliana*, are also known to occur on the mining leases at Hillgrove. Both species have been recorded within the Bakers Creek and Four Mile gorges. The highest abundance of the species, however, is found along the gorge rim and on upper ridges.

6.2.1.2.2 Seed Collection and Propagation

In the past, endemic seed from trees has been collected onsite and a local native tree nursery used to propagate the plants. Species selected have included threatened species such as the *E. Michaeliana* and *E. Magnificata*. Shrub seed (usually *Cassinia* sp.) and grass seed (*poa* sp.) are also collected and direct seeded as required. A NPWS Scientific License has been issued under the Biodiversity Conservation Act 2016 for seed collection and rehabilitation work, allowing the collection of seed, including threatened species to continue.

6.2.1.2.3 Clearance Permits

A clearance permit system is used to authorise impacts on biodiversity (e.g. removal of dangerous trees directly affecting operations) as a control to ensure certain aspects are not impacted (e.g. hollow bearing trees or listed species).

6.2.1.2.4 Controlling weeds

Weeds can displace native vegetation, pasture or crops, reducing productivity and degrading the natural environment. Weed management will be managed in accordance to Control Standard for Feral Animals and Weeds in the EMP, which applies to all land owned or leased by Hillgrove Mine. The aim of the Weeds Management Plan is to control existing weed populations and prevent the spread and establishment of new populations as far as is practicable.

Weed species that are commonly targeted at Hillgrove Mine are:

- Blackberry
- Prickly pear and Tiger pear
- Bathurst burr
- African boxthorn
- Sweet briar



The Control Standard for Feral Animals and Weeds includes the following measures:

- Identification of weeds by conducting a quarterly weeds inspection and keeping records specifying the type and location of weeds identified. The results will be reported in the Annual Environmental Management Report.
- Ensuring all vehicles, including drill rigs, are thoroughly cleaned and inspected when travelling between areas to minimise seed transport and the spread of weed species.
- Removal of weeds by application of approved herbicides or mechanical removal following the quarterly weeds inspection. A follow up site inspection will be conducted to determine the effectiveness of weed control measures.
- Progressive rehabilitation of disturbed areas as soon as practicable, using locally occurring native species.

In addition to the quarterly weed inspection program, further activities conducted at Hillgrove Mine provide the opportunity to identify weed species in more remote locations, including:

- The Annual Floristic Survey conducted by EcoLogical Australia
- The quarterly Rehabilitation Monitoring Program
- While conducting routine and non-routine activities (eg: water monitoring)

6.2.1.3 Fauna

6.2.1.3.1 Pest Control

Feral animals can destroy native vegetation. Increasing the risk of erosion from wind and water and can carry and spread weeds and diseases. Some feral animals compete with native animals for food and shelter, exposing them to predators, while others, such as foxes and feral cats, prey on native fauna and domestic livestock. Pest control will be managed in accordance to Control Standard for Feral Animals and Weeds in the EMP, which applies to all land owned or leased by Hillgrove Mine. The aim of feral animal management is to control existing feral species populations and prevent the establishment of new populations as far as is practicable.

Feral animal species that occur at Hillgrove Mine are:

- Goats
- Rabbits
- Foxes and wild dogs
- Cats

The Control Standard for Feral Animals and Weeds includes the following measures:

- Regular inspections to assess the status of pest populations.
- Working in conjunction with Cooney Creek Wild Dog Association and registering wild dog sightings on the Feral Scan app.
- Filling in of rabbit burrows, particularly along dam walls.
- Implement eradication programs for declared pests in accordance with Pest Control Orders under the NSW Local Land Services Act, 2013.
- Inspections to assess the effectiveness of control measures implemented
- Record keeping of feral animal sightings and control measures implemented.

In addition to regular feral animal inspections, further activities conducted at Hillgrove Mine provide the opportunity to identify feral animals around the mine site, including:

- Weekly dam inspections where dam walls are routinely checked for animal disturbance and burrows
- The quarterly Rehabilitation Monitoring Program
- While conducting other routine and non-routine activities (eg: water monitoring)

6.2.1.3.2 Rare and Threatened Fauna

Detailed fauna surveys have been conducted on the mining leases at Hillgrove over several years. These surveys have recorded 7 species listed as threatened under the Threatened Species Conservation Act 1995 NSW (TSC Act) or the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Table 14).

Table 14: Threatened species recorded in the Hillgrove area during impact assessment surveys

Species	Status	Reference	Area Recorded
Brush-tailed Rock Wallaby <i>Petrogale penicillata</i>	Endangered, TSC Vulnerable, EPBC	GEC 1995, 1998 Debus 2001	Swamp Creek gorge Northern section of Bakers Creek gorge Bakers Creek downstream of confluence with Four Mile Creek. Metz lookout
Spot-tailed Quoll <i>Dasyurus maculatus</i>	Vulnerable, TSC Endangered, EPBC	Debus 2001	Tailings dam Bakers Creek Gorge
Eastern Bent-wing Bat <i>Miniopterus schreibersii oceanensis</i>	Vulnerable, TSC	GEC 1995, 1998	Lower Cooney Road area Freehold Mine area
Golden-tipped Bat (tentative ID) <i>Kerivoula papuensis</i>	Vulnerable, TSC	GEC 1991, 1995, 1998	Swamp Creek gorge
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i>	Vulnerable, TSC	GEC 1995	Northern section of Bakers Creek gorge
Glossy Black-Cockatoo <i>Calyptorhynchus lathami</i>	Vulnerable, TSC	GEC 1995, 1998	Freehold Mine area
Hooded Robin <i>Melanodryas cucullata cucullata</i>	Vulnerable, TSC	GEC 1998	Not specified but probably woodland on the plateau

The potential impacts on rare and threatened species due to mining activities may include:

- Direct mortality due to vegetation clearing
- Interruption of key life stages such as breeding
- Fragmentation of populations

The specific management objective at HM is to minimize the impacts of mining activities on known rare and threatened species and comply with consent and statutory conditions related to rare and threatened species.

The protection of rare and threatened fauna species will be managed in accordance to Control Standard for Rare and Threatened Flora and Fauna, which applies to all land owned or leased by Hillgrove Mine. The aim of the rare and threatened flora and fauna management is to minimize the impacts of mining activities on known and threatened species and comply with consent and statutory conditions related to rare and threatened species.

The Control Standard for Rare and Threatened Flora and Fauna in the EMP includes the following measures:

- To minimize the disturbed footprint due to mining operations at Hillgrove Mine as far as is practicable
- Impacts on threatened species will be assessed and minimized as far as is practicable during the planning and approval process for proposed developments at Hillgrove Mine
- Proposed developments will be assessed against the EPBC Act criteria
- The presence of fauna and habitat sites will be included within the vegetation clearing permit system, which has been undertaken and approved by the Environmental Officer.

All environmental incidents related to all fauna, including rare and threatened species, will be reported to the Environmental Officer.

6.2.1.4 Waste rock/overburden Emplacement

Historical waste rock has been deposited at the 1740 to 4 level in the gorge on the Metz side, currently the mine is doing a restart sequencing and production profile, this would include using the external waste rock as backfill in the underground operation.

6.2.1.5 Waste management.

Mining operations have the potential to amass large quantities of waste therefore, it is essential for waste materials to be managed in a way where waste production is minimized, reuse of materials is maximized, and contamination of land and surface water by wastes is avoided. Waste management will be managed in accordance with the Control Standard for Waste (Refuse) in the EMP, which applies to all land owned or leased by Hillgrove Mine. The goal of waste management is to reduce waste production, recover resources through the reuse, reprocess and recycling of materials, and disposal of waste to conform to consent/license conditions and legislative requirements.

During the operation of Hillgrove Mine there are several potential sources of waste, including:

- Hydrocarbons (plant/vehicle maintenance)
- Domestic and office waste
- Sewage
- Chemical and hydrocarbon containers
- Construction and structural

The Control Standard for Waste (Refuse) includes the following measures:

- Paper, cardboard and uncontaminated organic material is to be collected and deposited into the growth media pit.
- Glass and plastic bottles and aluminium cans to be deposited in designated bins around the mine site. These are collected and taken to the Return and Earn in Armidale in exchange for vouchers towards Hillgrove Mines social days.
- Scrap metal is to be stockpiled in skip bins and collected for recycling by a scrap metal contractor.
- Batteries are to be collected and taken to Armidale Council Recycling Centre.
- Waste oil and hydraulic fluid is stored at the workshop and collected for recycling by a waste oil contractor.
- General waste and oily rags to be deposited in the general waste skip bins and collected by a waste contractor.
- Used tyres are stockpiled and recycled for bank stabilisation or collected by a waste tyre contractor.
- Sewage and grey water are treated in the approved on-site sewage system.
- Regular inspections of waste facilities and record keeping of waste tracking data, incidents, and corrective actions.

The responsibilities of waste management are communicated to all Hillgrove Mine staff and contractors through the site induction and by ongoing training. All bins and storage areas contain signage to indicate the relevant waste type and any further instructions required. All incidents regarding waste management are investigated and corrective actions implemented to prevent re-occurrences from happening.

6.2.1.5.1 Contaminated Soils

A formal land contamination assessment has not been conducted to date. There is little background data available due to the long history of operations at Hillgrove and significant impact of these on the area. The site consent environmental assessments also contain very limited information. In light of this Hillgrove Mine has consulted with the NSW EPA on an approach to developing detailed site-specific contamination assessment criteria (which can be used as closure criteria and be included in the rehabilitation TARP). It is recognised that using NEPM or similar criteria is not useful due to the local area having a naturally elevated crustal abundance of Sb and As. This has been documented through a number of studies completed by the University of New England.

Previous studies have been undertaken by UNE that will be built into the rehabilitation plan. Results from the metals uptake project showed that the endemic plant species used to date in rehabilitation are efficient in excluding metals from their biomass. This means that the metals present in their root system do not significantly transfer to stems and leaves, thereby limiting the bioavailability of contaminants. This means that any metals present in the soil will not become more bioavailable. The results also showed that adding soil ameliorants (e.g., fertilisers) appeared to inhibit the exclusion mechanism was inhibited and thereby allowed metals to become bioavailable in those species. As a result, alternative ameliorants (e.g., mulch) may be used instead.

6.2.1.6 **Geology and geochemistry**

The Hillgrove Mineral field occupies a roughly elliptical area some 9 km by 6 km (with the long axis oriented in the prime vein direction of NNW-SSE) with some 200 individual deposits recognised. The deposits are generally of vein type, up to 1.5 km in strike length and 5 m in width. There is potential for high tonnage, lower grade deposits.

The veins, although sinuous both vertically and horizontally, are normally sub-vertical although dips in some lodes are as flat as 60 to 70°. Dips are not consistently orientated either side of vertical although most veins have a consistent orientation.

Three primary vein orientations (N 20-30 W, N 35-45 W and N 50-55 W) (Comsti, 1983) are recognised, although individual veins may swing up to 20 degrees from these orientations. Intersections of differently oriented major veins do not appear to produce any improvement in the grade or width of the veins. The veins are not contained within a broad shear zone but are individual structures which pinch into insignificance along strike. Bedding is rarely observed but is normally sub-vertical with an NW-SE strike.

There appears to be a major structure running the length of the field, from Brackins Spur in the South-east through the Garibaldi and Eleanor mines, for a distance of 3.5 km.

Some veins are definitely crosscutting the local bedding direction while others roughly parallel it. The field is cut by a major gorge system up to 500 metres deep some of whose orientation may be related to a N-S trending mylonite which is sometimes mineralised.

The veins range from simple single veins through zones of parallel stringer veins to quartz-wall rock breccias. All major veins are intruded along a shear of sinistral movement that may be from millimetre to metre plus width. Splits in the veins enclose mineralised zones up to 8 metres in width were tension gash type stringer veins cut across the enclosed rocks. Spur veins enclose similar zones that die out as the veins diverge. Major splits (with only minimal mineralisation between the veins except at the start of the split) are also known. In the larger splits the separation can be up to 20 metres between the veins.

There is no apparent mineralogical zoning related to rock type. Stibnite has been seen to become less common with depth in some deposits (e.g., Syndicate, Eleanor) whilst increasing with depth in others (e.g., Brackins

Spur). This change is often abrupt with a change from consistent stibnite mineralisation to erratically distributed patches of stibnite. Most veins have a consistent mineralogical character with the same set of phases occurring in comparatively uniform proportions throughout the vein. This can lead to veins which are dominantly scheelite phase or dominantly stibnite - calcite phase.

The veins are the product of a multi-phase mineralisation in the following sequence:

- Barren Quartz
- Quartz-Scheelite
- Quartz-Arsenopyrite-Pyrite-Gold
- Quartz-Stibnite-Gold
- Quartz-Stibnite-Calcite
- Barren Quartz-Chlorite

All these phases can occur within the ore bearing structures, although the barren phases are rare within them. At Brackins Spur a sericite – carbonate alteration phase is present predating this mineralisation. The final barren phase is often found within the post-mineralisation NE-SW striking dextral faults. The initial barren phase and the scheelite phase often seal the structures in the granitoids so that little if any later mineralisation occurs within the structure.

Quartz-wall rock breccias and veins may be formed by any of the ore-bearing phases with successive phases being present as either laminae or as the matrix to a breccia of the earlier phases.

The arsenopyrite phase forms a broad halo of fine parallel veins in a siliceous-sericitic alteration zone around most mineralised structures. This halo is retrograde away from the main vein and is responsible for the elevation of production grades by 0.1 to 0.2 % As and 0.5 to 1 g Au/t above that derived from sampling of the primary vein zone. The gold in the arsenopyrite is present as atomic substitution and has widely varying grades within the arsenopyrite grains, related to the arsenic grade of the arsenopyrite (Ashley et al 1997).

The arsenopyrite phase is responsible for the majority of the gold grade within the stringer vein zones, either parallel to the main structure or enclosed within vein splits or spurs, but these stringer veins may themselves contain significant free gold and rarely some additional stibnite.

The ore grade material in veins is restricted to 'ore shoots' with the intervening zones normally being below viable grade. The ore shoots are due to subtle flexures forming dilation zones which have provided the main fluid conduits.

Within the ore shoots, the grades and widths can vary quite widely. The ore shoots themselves are dominantly vertical to steeply south plunging but minor high-grade north and south plunging 'link' shoots are known. The ore shoots generally occupy from 30 to 60 % of the strike length of a vein with good vertical continuity. Several shoots are known to be composed of a linear string of ore grade pods.

The source of mineralisation at Hillgrove is thought to be remobilization of a deep strata bound tungsten, antimony, gold source in the Middle Palaeozoic Woolomin Beds or the Tamworth Group (Comsti, Plimer).

Rehabilitation aims to remove man made sources and antimony and arsenic (old tailings etc) however it should be noted that elevated background levels occur naturally throughout parts of the site. Research conducted by UNE shows that the reduction in the use of soil ameliorants during rehabilitation plays a vital role in reducing metal bioavailability.

6.2.1.7 Material prone to spontaneous combustion

There is no evidence or history of this being an issue at Hillgrove.

6.2.1.8 Material prone to generating acid mine drainage.

Test work indicates that there is no AMD potential with all NAP and NAG testing to date showing waste rock and soils to be non-acid forming with good buffering capacity. This is due to a high carbonate content in the rock which provides significant buffering capacity.

6.2.1.9 Ore beneficiation waste management (reject and tailings disposal)

Tailings Storage Facility 2 (TSF2) is currently operational. The stage 3 lift has required a change in design due to the ongoing wet weather and inability to evaporate water sufficiently to facilitate an upstream tailings lift. A new submission is being prepared for a downstream lift which would increase capacity to 274,348 cubic metres. This will be conducted in 2 x 2m lifts and is expected to be conducted between February and December 2022. TSF2 Stage 3 lift is permissible under Development Consent S98/00802.

6.2.1.10 Erosion and Sediment control

Construction and operational activities at Hillgrove Mine will require disturbance to the ground surface. Erosion of fine particles from such disturbed areas has the potential to contribute to the sedimentation of waterways. Works undertaken on steep topography in the gorges at Hillgrove Mine have potential for erosion and sedimentation impacts.

Sediment deposition and suspension in watercourses can have a direct impact on water quality and aquatic plants and animals. Suspended solids can smother aquatic habitat and diminish the channel capacity of the waterway. Heavy metals are readily adsorbed to fine particle fractions, affecting the water chemistry. Erosion and sediment controls will be managed in accordance with the Control Standard for Erosion and Sediment in the EMP, which applies to all land owned or leased by Hillgrove Mine.

The goal of erosion and sediment control is to minimise the potential for erosion and implement appropriate sedimentation controls during construction, earthworks and operation activities to ensure sedimentation of watercourses is minimised.

The potential effects on erosion and sedimentation from activities at Hillgrove Mine include:

- Erosion of soil and fine particles from recently disturbed and partially rehabilitated areas
- Increased sediment loads entering the Bakers Creek catchment due to runoff from disturbed areas.

The Control Standard for Erosion and Sediment includes the following measures:

- Erosion and sediment control structures have been implemented along roadways throughout the gorge and other areas outside the controlled drainage network. These controls, generally in the form of bunding and sediment capture points, have been introduced to minimise the amount of sediment entering the Bakers Creek and other creek systems.
- The RWSS capture all runoff water from the process and TSF area so that turbid water is contained onsite for reuse or for treatment prior to discharge.
- Developed management plans for critical aspects of the operation that take into consideration erosion and sediment control (eg: Operation and Maintenance manual for TSF dams, Dam Safety Emergency Plan).
- Manage for potential erosion and implement management techniques for newly disturbed areas and rehabilitation areas.
- Consider erosion as part of any risk assessment process.
- Prior to major construction works, a Construction Environmental Management Plan will be developed and implemented specific to the task.



- For all internal works, determination of erosion and sediment controls will occur early in the planning process and the costs will be incorporated into the work program.
- Erosion and sediment control structures will be inspected regularly.
- Progressive rehabilitation of disturbed land will occur as soon as practicable.
- Crossings over Bakers Creek are designed so vehicles do not enter the water. Hillgrove Mine policy ensures vehicles do not use these crossings while water levels are over bridge level.

Monthly monitoring and review of water quality results from surface water monitoring locations. Results of the monitoring program are published in the AEMR.

6.2.1.11 Ongoing Management of biological resources for use in rehabilitation

6.2.1.11.1 a) Soil stockpiling

At Hillgrove Mine all soil stripped from disturbed area that is to be stored long-term for future rehabilitation works is to be stockpiled. The stripped materials are directly transferred to a designated stockpile area adjacent to TSF2.

The objectives of stockpiling excess topsoil and subsoils are:

- To undertake rehabilitation progressively to final landform phase as soon as practicable
- Stripping and stockpiling of soil resources in a manner that provides long term viability

The protocol for stockpiling soils includes:

- Leaving the surface of soil stockpiles in a rough condition to increase water infiltration and minimize erosion of stockpiled soils
- Deep ripping soil stockpiles to improve soil structure and encourage microbial activity
- Revegetation of soil stockpiles allowed to provide surface stability and as an effective means of controlling dust and preventing erosion
- Soil stockpiles are to be inspected by the Environmental Officer on an annual basis to ensure stockpiles remain in good condition

6.2.1.11.1 b) Soil Ameliorants

Previous studies undertaken by University of New England (UNE) have established that endemic plant species in the Hillgrove area are efficient in excluding metals from their biomass. This means that any metals present in the soil will not become more bioavailable. By adding soil ameliorants, the exclusion mechanism becomes inhibited, allowing metals to become bioavailable in those species. Because of this, no soil ameliorants are used at Hillgrove Mine.

6.2.1.12 Mine Subsidence

Broad scale subsidence is not an issue. Occasionally a small depression or void may be found where historic workings were very near to the surface but this does not have a significant impact on rehabilitation. If this occurs then the voids are easily backfilled. Known shafts/stopes are proactively exposed and backfilled with rock as required to stabilise them into the future.

6.2.1.13 Management of potential cultural heritage issues

Aboriginal and European heritage will be managed in accordance with the Control Standard for Aboriginal and European Heritage in the EMP, which applies to all mining and exploration activities undertaken by Hillgrove Mine and describes the actions which are required for Hillgrove Mine to meet its heritage management objectives. The aim of the Aboriginal and European heritage management is to maintain Aboriginal and European heritage values, that activities are managed to ensure protection of heritage listed items, and to comply with all legislation requirements.

The key heritage legislation affecting Hillgrove Mine are:

- **Environment Protection and Biodiversity Conservation Act, 1999**
 - Administered by the Commonwealth Dept. of Environment this act provides for the identification and protection of heritages items and places. These are listed on the National Heritage List. No items at Hillgrove Mine are listed on the National Heritage List.
- **Aboriginal and Torres Strait Islanders Heritage Protection Act, 1984**
 - Protects Aboriginal heritage where protection is not available or forthcoming at the State level.
- **NSW National Parks and Wildlife Act, 1974**
 - Protects Aboriginal places, objects and sites. Provides for Conservation Agreements and Interim Protection Orders over significant natural areas.
- **NSW Heritage Act, 1977**
 - Establishes the Heritage Council of NSW and allows the making of Interim Heritage Orders. Establishes the State Heritage Register. Requires minimum standards of maintenance for items on the State Heritage Register. Protects non-Aboriginal archaeological relics. No items at Hillgrove Mine are listed on the State Heritage Register.
- **NSW Environmental Planning and Assessment 1979**
 - Incorporates heritage into environmental assessment. Establishes Local and Regional Planning Instruments. Requires Development Applications, Reviews of Environmental Factors, Statements of Environmental Effects or Environmental Impact Statements for proposed developments.

6.2.1.13.1 a) *Aboriginal Heritage*

Three Aboriginal groups have an existing native title agreement for four of the Hillgrove Mine mining leases. These groups are the Anaiwain People, the Dunghutti People, and the Gumbayngirr People.

Three archaeological studies have been carried out on mining leases at Hillgrove. The first study was conducted during 1992 by an archaeologist accompanied by an Aboriginal Elder (Mr Bruce Lockwood Snr) and Mr Michael Kim, Cultural and Heritage Officer of the New South Wales Aboriginal Land Council – Northern Tablelands Branch. A search of the sides of the gorges within the areas proposed for the Lower Cooney Road, Bracken Spur haul road, Bracken Spur processing facilities and a considerable stretch of Baker's Creek was conducted. This study suggested that any artefacts that may have been present would have disappeared due to the clearing of the area for fuel and other purposes over previous mining periods. Mr Lockwood reported that Bakers Creek was lacking in suitable camping areas.

The second study was conducted by Helen Brayshaw Heritage Consultants during 1996. The results of this heritage study were summarised as follows.

"No Aboriginal sites or potential sites were identified during the reconnaissance survey. Except for the proposed tailings area, the landscape is either prohibitively steep and/or disturbed. The archaeological potential of the area is considered very low. The results of the reconnaissance suggest no further survey to be warranted."

The third study was conducted during August 2000 and surveyed the area proposed for a second tailings storage facility. The study was conducted by E.A. Systems Pty. Limited with representatives of the NSW Aboriginal Land Council - Northern Tablelands Branch and Jane Durkin, an archaeologist from Oorama Cultural Heritage Enterprises. The survey did not locate any Aboriginal sites or potential sites.

All studies have suggested that due to extensive disturbance during previous phases of mining operations and the extremely steep terrain, the archaeological potential of the area is considered to be low.

6.2.1.13.1 b) *European Heritage*

Mining has been a prominent land use in the Hillgrove area since the 1870's and has been one of the largest producing fields in the state. At its peak in about 1898, the population of Hillgrove was approximately 4,000 and the township had developed an extensive number of community organisations and supported its own newspaper, golf course, racetrack, retail stores, banks, a mining exchange and a technical school.

Due to the long history of mining at Hillgrove there are five items of European occupation with historical value at Hillgrove Mine that are listed in Schedule 5 on the Armidale Dumaresq Local Environment Plan, 2012. These items are:

- Garibaldi Chimney
- Eleanora Chimney
- Bakers Creek Winding Engine House
- Bakers Creek Chimney
- Bakers Creek Mine surface buildings

The Aboriginal and European Heritage Management Plan described in the EMP include the following measures:

- All Hillgrove Mine personnel will receive an environmental induction with specific components on responsibilities for managing Aboriginal and European heritage.
- An assessment of the impact of proposed mining activities on Aboriginal and European heritage will be undertaken by a qualified archaeologist as part of the development approval process.
- If Aboriginal or European artefacts are identified on the site during mine redevelopment or operations, an investigation and assessment of the artefact's heritage value will be conducted. If destruction of the artefacts is required appropriate consents will be obtained prior to destruction.

6.2.1.14 **Exploration activities**

Exploration during the next period will focus on multiple historic prospects and the Metz Mining Centre.

Exploration will occur generally as below:

- **Metz Mining Centre**

The Metz Mining Centre is located within the ML592, ML1026 and ML1604 mining lease. This lease contains the Syndicate, Blacklode, Coxs and Sunlight orebodies. It is likely that drilling activities will be conducted that target these orebodies, their extensions and their associated splays. This drilling may involve both underground and surface drilling.

- **Eleanora Corridor:**

The Eleanora Corridor contains multiple orebodies that have the same orientation and are considered one continual mineralised structure and associated splays. The main orebodies within this corridor are Eleanora, Garibaldi, Brackin Spur, Cosmopolitan South, Cosmopolitan North, Hopetoun, Golden Gate and Clarks Gully. The Eleanora Corridor and associated deposits are contained within the following leases: ML231, ML391, ML649, ML714, ML749, ML810, ML972, ML1332, ML1441, ML1442, ML1598, ML1599, MPL220, PPL416, PPL804, GL3959, GL3980, GL5845, EL3326 and EL5973. Drilling will be from surface only, targeting one or multiple orebodies within the Eleanora Corridor and associated leases.



- **Bakers Creek Corridor:**

The Bakers Creek Corridor contains multiple orebodies that have the same orientation and are considered one continual mineralised structure and associated splays. The main orebodies in this corridor are Bakers Creek, Baalgammon, Cooney, Damifino and Hills Reef. The Bakers Creek Corridor and associated deposits are contained in the following leases: ML1101, ML1440, MPL220 and EL3326. Drilling will be from surface only, targeting one or multiple orebodies within the Bakers Creek Corridor and associated leases.

- **Freehold Corridor:**

The Freehold Corridor contains multiple orebodies that have the same orientation and are considered one continual mineralised structure and associated splays. The main orebodies within the Freehold Corridor and Freehold, Freehold East, Becks Point, Smiths, Silver Valley and Currys Lode. The Freehold Corridor and associated deposits are contained in the following leases: ML219, ML600, ML945, ML961, ML1020, ML6282, MPL146, PLL661, PLL1252, EL3326 and EL5973. Drilling will be from surface only, targeting one or multiple orebodies within the Freehold Corridor and associated leases.

- **Tailings Storage Facility 1 (TSF1):**

TFS1 is an old, dry tailings dam that is no longer in use. Hillgrove Mine may investigate the options of drilling and bulk sampling the tails dam in an effort to define any potential resource for reprocessing. TSF1 is within leases ML219 and ML391.

- **Other locations:**

Other exploration activities such as geological mapping and sampling (rock & soil) will be conducted within the exploration and mining leases. All core produced from the drilling campaigns will be processed on site and sent away for analysis.

6.2.2 Decommissioning

6.2.2.1 Site security

A security control plan has been developed for the site. Site security is principally managed by security fencing and locked gates around all operational areas which will remain during the decommissioning phase. Site environmental inductions incorporate rehabilitation, heritage and security awareness and include a competency assessment. The site perimeter is inspected weekly with unauthorised access addressed as required. Signage is erected around rehabilitation areas and fencing will be installed around heritage items during the development of the final land use.

6.2.2.2 Infrastructure to be removed or demolished

Hillgrove Mine will decommission, demolish and remove all operational infrastructure for the final land use. This includes the processing plant (including ROM), Pressure Oxidation Plant, laboratory, offices, stores, amenities and the workshop. All demolition work will be carried out in accordance with *AS2601-2001: The Demolition of Structures* or its latest version. It is not anticipated that removal of infrastructure will require detailed designs, studies or regulatory approvals. Demolition waste will be disposed of in accordance with the *NSW Protection of the Environment Operations Act 1997* and subordinate legislation.

Services across the site including electricity and telecommunications will be disconnected and removed from the site. Pumps and piping infrastructure utilised in the TSF and water management area domains will also be removed for the final land use.

6.2.2.3 Buildings, structures and fixed plant to be retained

Table 15 identifies the structures which are proposed to be retained post-closure and the key actions required for each to achieve a condition that is suitable for the nominated final land use.

Table 15 Decommissioning activities for assets to remain in the final land use.

Final land use domain	Structure	Key actions for rehabilitation
Infrastructure	Access Roads and Carpark	These areas will require design specifications to be developed by a suitably qualified person. The design development process would address the safety risks associated with these structures, which include the road condition, speed and road safety, and the safety of the public when accessing the area around the gorge edge and heritage items.
	Walking Tracks and Lookouts	
Heritage Area	Heritage Points	Rehabilitation activities are not required for heritage items.
	Fencing	Fencing and safety signage will be installed around heritage items if not already erected during active mining.
Water Management Area	Eleanora Dam	A suitably qualified dam engineer will be engaged to complete a closure assessment for the dam, which will address short- and long-term risks to public safety including dam structural integrity and failure potential.
	Freshwater Bypass	The final land use function of the Freshwater Bypass will be the same as its current function, therefore it is not expected to require any rehabilitation activities to achieve the nominated final land use.
	Drainage Line	A suitably qualified person will be engaged to design the spillway drainage for Eleanora Dam.

6.2.2.4 Management of carbonaceous/contaminated material

As outlined in Section 6.2.2.2, after cessation of mining and processing operations, a contamination assessment of infrastructure areas exposed to contaminants will be undertaken by a suitably qualified person prior to demolition. It is anticipated that this would include an intrusive site investigation comprising a site walkover and field sampling in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure* 1999 (as amended in May 2013).

If materials or soils are found to contain concentrations of hazardous materials that are inconsistent with the proposed final land use, removal and/or treatment of the contaminated material would be managed in accordance with recommendations from the contamination expert. On-site bioremediation may be available for treatment of material until testing indicates it is suitable for disposal in the spoil dump. If removal of material from the site is required, it would be disposed of appropriately in accordance with the relevant legislation (as verified by appropriate transport and tracking documentation). If remediation is required, verification would be sought from the contamination expert that the affected area adheres to any standards associated with and is able to adequately support the approved final land use.

During active mining operations, incidences of contamination onsite will be addressed through the PIRMP as they are identified.

6.2.2.5 Hazardous materials management

Hazardous materials are managed during active mining operations in accordance with the Control Standard for Hydrocarbons and Chemicals in the EMP. This management will continue after cessation of operations until the site is decommissioned. Management relevant to the decommissioning phase primarily includes the following:

- The maintenance of an inventory of Safety Data Sheets on site in a central register while there are still hydrocarbons and chemicals remaining on site.
- The maintenance of spill containment material and emergency response procedures while there are still hydrocarbons and chemicals remaining on site.
- The continued inspection of all hydrocarbon and chemical containment facilities until such time as they are removed.
- The provision of suitable facilities for the temporary storage of used hydrocarbons and hazardous waste, including the containment of hydrocarbons that need to be temporarily stored within portable bunds.
- The use of licenced contractors for the removal and disposal of used hydrocarbons and hazardous waste offsite.
- The inclusion of containment facilities in the areas that require a contamination assessment of operational infrastructure prior to demolition outlined in Section 6.2.2.4.

6.2.2.6 Underground infrastructure

The four adits (three large, one small) associated with the current approved operations will be sealed by the construction of a brick wall appropriately constructed to achieve the final land use outcome. Underground mining equipment will be salvaged and removed prior to sealing where practicable. The security measures outlined in Section 6.2.2.a will ensure there is no unauthorised entry to the haul roads which provide access to the underground entries in the gorge as they are decommissioned. Additional measures will be implemented if they are determined to be necessary during decommissioning activities.

Small-scale instability of former underground workings due to interaction of current operations is possible, with occasional small depressions or voids found where historic workings were very near to the surface. Where this occurs, the voids are backfilled as required. Where they interact with current operations, known shafts/stopes are proactively exposed and backfilled with rock as required to stabilise them.

All exploration boreholes are progressively sealed after drilling. Any remaining service boreholes will be sealed upon cessation of their use unless intended to support the nominated final land use, with agreement from the Resources Regulator.

Discharges from underground workings are monitored and managed under EPL921. It is anticipated that prior to relinquishment consultation with the EPA and the Resources Regulator will be required to confirm that all obligations relating to ongoing discharges from underground workings have been met.

No subsidence monitoring pegs have been installed at the site, however if they are installed during mining or rehabilitation activities, they will be removed prior to relinquishment.

6.2.3 Landform establishment

6.2.3.1 Water management infrastructure

Table 16 provides an outline of the proposed function and final land use for water management assets and the measures to be implemented during the landform establishment phase to achieve this.

Table 16 Landform establishment

Water management asset	Location and status for the final land use	Required landform establishment measures
Eleanora Dam	Eleanora Dam is located in the central area of the site. It will be retained for the final land use and incorporated into the proposed tourist facility.	A closure design for Eleanora Dam will be prepared at least 6 months prior to decommissioning. The closure design will inform the measures to be implemented during the landform establishment phase. Measures may include: Removal of contaminated sediment from the dam The implementation of any design specifications required to ensure the spillway can accommodate the appropriate design event The implementation of any design specifications required to ensure the downstream embankment and spillway are stable in the long term Documentation of on-going care and maintenance requirements post-relinquishment.
Freshwater Bypass	The Freshwater Bypass is located on the eastern side of Eleanora Dam. It will be retained for the final land use. It will retain its function to divert clean water run-on away from the site through to Bakers Creek Gorge.	As the final land use function of the Freshwater Bypass will be the same as its current function, it is not expected to require any activities in the landform establishment phase to achieve the nominated final land use.
Emergency Storage Dams 1, 2 and 3	Emergency Storage Dams 1, 2 and 3 are located downstream of Eleanora Dam. All dams will be decommissioned for the final land use; however, it is proposed that a drainage line is constructed through the existing dam footprints to provide a direct outlet for Eleanora Dam into Baker's Creek Gorge. Outside of this drainage line, the former dam footprints will have a Native Ecosystem final land use.	A closure design for the Emergency Storage Dams, including the proposed drainage line, will be prepared at least 6 months prior to decommissioning. The closure design will inform the measures to be implemented during the landform establishment phase. Measures may include: Draining of the dams Removal of contaminated sediment from the dams Removal of the downstream embankments of the dams and levelling of the area Grading of the new drainage line and application of appropriate scour protection.

6.2.3.2 Final Landform construction: general requirements

Potential geochemical risks at the site are considered to be low. Assessments to date have shown waste rock and soils to be non-acid forming with good buffering capacity. Therefore, waste rock and tailings are not considered to have acid mine drainage (AMD) potential. Waste rock is regularly collected for testing of chemical characteristics against appropriate guidelines and this will continue until waste material is no longer produced. There is also no evidence or history of materials prone to spontaneous combustion being an issue at the site.

Broad scale subsidence is not considered to be an issue for the site. Occasionally small depressions or voids are found where historic workings were very near to the surface. They are backfilled as required. Known shafts/stopes are proactively exposed and backfilled with rock as required to stabilise them.

Closure designs for higher risk landforms including the Bakers Creek Waste Dump (for which the landform establishment has now been completed) and the TSFs consider the specific geotechnical and geochemical risks associated with the landform establishment of these features. With the exception of the retained water management infrastructure, all other landforms will be constructed to be free draining and with the. Drainage controls and sediment ponds will be maintained in rehabilitation areas until landform stability is achieved.

The general characteristics of the final landform will take into account the characteristics of surrounding landforms. Rehabilitation areas in the gorge will replicate the natural steep topography with additional landform features as required to ensure stability and safety. The Bakers Creek Waste Dump slope has been constructed at a safe gradient replicating the natural landform which also incorporates catch benches and bunds to prevent material falling onto the roadway and into Bakers Creek. The infrastructure and TSF areas on the plateau will reinstate a landform consistent with the flatter natural landform at this location that is free-draining and stable.

The final landform will retain the Freshwater Bypass which diverts clean water run-on away from the site through to Bakers Creek Gorge into Bakers Creek Gorge. As Eleanora Dam is proposed to be retained in the final land use, a drainage line will be constructed to reinstate the natural catchment drainage from the spillway outlet into Bakers Creek Gorge. Design specifications for the drainage line will incorporate appropriate scour protection to minimise downstream erosion and sedimentation risks to Bakers Creek.

6.2.3.3 Final Landform construction: reject emplacement areas and tailings dams.

The two main reject emplacement areas at the Site are the Historic Bakers Creek waste dump and the Metz Gully waste dump and both are temporary emplacement areas which will be removed prior to closure. Bakers Creek waste dump was removed, and the final landform established in 2021. The landform establishment phase for Bakers Creek waste dump included the following rehabilitation activities:

- Installation of temporary sediment traps and drains during works to prevent sediment from entering Bakers Creek
- Recovery of waste materials from the dump using a D6 dozer and excavator, haulage by truck to the ROM pad for processing and deposition of process residues in the TSF2
- Collection and analysis of soil samples from the footprint of the former waste dump to confirm that waste material had been removed as far as reasonably practicable, to ensure a condition suitable for revegetation and rehabilitation to Native Ecosystem,
- Shaping of the steep slope to expose the natural rill and rock outcrop topography
- Contouring of the steep embankments
- Construction of a permanent road with input from survey and geotechnical assessment
- Bunding along the edge of the riparian zone with granite boulders to prevent loose material from entering Bakers Creek.

A draft closure plan has been developed for TSF1 only at this stage and is currently under review. Detailed closure designs and plans have not been developed for TSF1 or 2. Successful rehabilitation of the TSFs will be foremostly dependent on ensuring that the capping method and final landform are designed by suitably qualified persons that will identify and appropriately manage geotechnical, geochemical, and erosional risks, and that the final landform construction is verified as conforming to this design. The risk assessment and detailed designs will be reviewed against the material balance which will be updated for if the detailed designs are materially different from the concept designs with regard to capping material depth.

At this stage, it is anticipated that the landform establishment phase of the TSFs will include the following rehabilitation activities:

- Reshaping to a final landform with a traditional convex (domed) shape with water shedding to natural drainage lines (i.e. free draining)
- Installation of a capping layer consisting of an impermeable geotextile liner, as there are minimal sources of appropriate clay known within reasonable distance of the site, and at least 100mm of topsoil cover
- A bulk fill of waste rock material from onsite sources, which is expected to be inert
- Capping of the batters on the southern TSF1 emplacement, as many have steep slopes between benches, and application of rock mulching to ensure low velocity of surface water runoff
- Construction or scour protection on drainage lines or water course entry points, if required.

Comprehensive methods for construction will be developed during detailed design, in addition to quality assurance procedures and ongoing monitoring and management requirements further to those already in place under this RMP.

6.2.3.4 Final Landform construction: final voids, highwalls and low walls

There will be no voids, highwalls or low walls in the final landform.

6.2.3.5 Construction of creek/ river diversion works.

There will be no creek or river diversion works constructed for the final landform.

6.2.4 Growth medium development

A Land Clearance Permit is required before any soil disturbance. For areas of short-term disturbance (ie. Drill pad), removed topsoil is to be stockpiled to the side of the disturbed area and used for rehabilitation works of the site. For longer-term disturbance areas, topsoil and subsoil is stockpiled behind TSF2 and may be used for other rehabilitation works.

Previous studies conducted by UNE have determined that adding soil ameliorants increased the bio-availability of metals within endemic plant species of the area. Therefore, no ameliorants are used within the stockpiled soils.

The current stocks of topsoil (growth media) fall short of the required amount to achieve full coverage of the mines disturbed footprint. The most practical solution to overcome this shortfall is to source topsoil/subsoil material from within the Hillgrove Mine site.

To increase stock of growth media and improve recycling at Hillgrove Mine, a growth media pit was installed. A load of timber mulch was sourced and delivered from an uncontaminated site to begin the mulch pile. A program has been implemented to collect all paper, cardboard and uncontaminated organic material from around the mine site and deposited into the growth media pit.

Further efforts will be invested in sourcing clean growth media from external sources in the coming years.

Document ID:	HGM-HSE-MPL-002	Version:	6	Date:	9 Dec 2024	Page 75 of 96
CONTROLLED DOCUMENT – ALTERATIONS MUST NOT BE MADE BY UNAUTHORISED PERSONNEL						

6.2.5 Ecosystem and land use establishment

Rehabilitation works aim to restore vegetation communities, comparable to that in surrounding undisturbed land. Disturbed areas will be restored and revegetated as soon as practicable with species that are representative of the target vegetation communities.

6.2.5.1 Soil Amelioration

A soil analysis will be conducted prior to rehabilitation activities to ensure the soil will not limit rehabilitation potential. Following research conducted by UNE, no amelioration of the soil will be undertaken (refer Section Contaminated Soils).

6.2.5.2 Seed collection and Propagation

Where possible, seed will be collected on site. Any tree and shrub seed collected will be provided to local nurseries to propagate, while any native grass seed collected will be broadcast sown over the rehabilitation areas with a cover crop.

The majority of seed and plants (i.e. tubestock) will be sourced from local nurseries. Any native seed collected on site will follow the principles provided by Ralph (2006) and Florabank (2008). These principles include:

- Obtaining the necessary permits and property permission (where required)
- Collecting a maximum of 15% of the seed from one plant
- Collecting a maximum of 20% of the seed from a particular species from one seed collection site
- Avoiding or minimize damage to sites and native vegetation
- Collecting local provenance seed to maintain genetic diversity
- Labelling seeds and storing correctly.

6.2.5.3 Site Preparation

Site preparation will be undertaken prior to revegetation to minimize mortality and increase both survival and growth. Site preparation will include spraying to control any identified competing grasses. This will occur either across the whole site, or where understory is to be retained, spraying individual plants. If practical, soil will be ripped to increase soil moisture. Soil preparation should be undertaken 6 to 12 months prior to planting unless soil moisture is already present.

6.2.5.4 Revegetation Methods

Hillgrove Mine will assist natural regeneration of the vegetation communities where possible as the preferred method of revegetation. Direct seeding and planting methods will be used in areas of low resilience and may be used in areas where natural regeneration is identified to be slow or non-existent.

6.2.6 Ecosystem and land use development

Revegetation methods to restore woodland vegetation communities across the site comprise of overstorey and understory revegetation strategies:

6.2.6.1 Overstorey

If after sufficient time (approximately 5 years) and in areas identified as low resilience rehabilitation areas, active revegetation methods will be implemented to complement natural regeneration. Given the open woodland nature of the vegetation communities to be restored, planting of overstorey species is the preferred method to control stem density and species richness.

6.2.6.2 Understory

If after sufficient time (approximately 5 years) and in areas identified as low resilience rehabilitation areas, active rehabilitation methods will be implemented to complement natural regeneration. This will involve sowing native grass seed, preferably collected from on-site or endemic species sourced from a local nursery.

Where natural regeneration and broadcasting seed fail, more intensive methods will be employed. This will involve direct seeding of multiple species seed mixes that are representative of the vegetation community being restored. Local weather conditions and rainfall will determine the timing of direct seeding, however late summer through to early spring achieves successful results. In areas where significant exotic species are present, weed management will be undertaken prior to direct seeding.

6.2.6.3 Weed Management

Pursuant to the Biosecurity Act 2015, Hillgrove Mine have a biosecurity duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated, or minimized. Weed management undertaken on site will ensure that Hillgrove Mine's biosecurity duty is discharged under Section 25 of the Biosecurity Act.

6.2.6.4 Erosion and Sedimentation Controls

Erosion and sediment control structures are implemented on all new rehabilitation sites. These controls, generally in the form of bunding and sediment capture points, are used to minimize the amount of sediment leaving the rehabilitation site and entering waterways.

6.3 Rehabilitation of Areas Affected by Subsidence.

Broad scale subsidence is not an issue. Occasionally a small depression or void may be found where historic workings were very near to the surface, but this does not have a significant impact on rehabilitation. If this occurs, then the voids are easily backfilled. Known shafts/stopes are proactively exposed and backfilled with rock as required to stabilise them into the future.

7. REHABILITATION QUALITY ASSURENCE PROCESS

The quality assurance process for implementation of rehabilitation at Hillgrove Mine is overseen and managed by the Environmental Officer. Rehabilitation methodologies and status are recorded by the Environmental Officer through the internal record management platform and reporting, including a monthly environmental report which is issued internally. Hillgrove Mines will develop specific inspection test plans for key activities during the construction of higher risk landforms (such as the TSFs). These will allow sign off of particular control points to ensure that works have been carried out according to the specification in the detail designs.

Rehabilitation progress will be evaluated annually during preparation of the Annual Rehabilitation Report. This will include an assessment of rehabilitation areas against the proposed completion criteria and identify any corrective actions required to keep rehabilitation progress on a trajectory to meet the required criteria.

8. REHABILITATION MONITORING PROGRAM

8.1 Analogue Site Baseline Monitoring

Hillgrove Mine is required to use environmental data derived from analogue sites to define completion criteria for the Rehabilitation Management Plan. Analogue sites were established in 2018 by ELA who were engaged to complete an Analogue Baseline Site study. This study identified analogue sites that are representative of the desired vegetation communities and land use in rehabilitation areas. These sites have been established in surrounding undisturbed areas and are monitored concurrently with rehabilitated areas to determine long term trends and to provide a comparison to assess the progression of rehabilitated areas.

8.1.1 Vegetation Community Description

8.1.1.1 Community 1: Blakely Red Gum – Yellow Box Grassy open woodland of the New England Tableland Bioregion

Woodland on the plateau is dominated by Yellow Box (*Eucalyptus melliodora*) often in association with Blakely's Red Gum (*E. blakelyi*) and the New England Stringybark (*E. caliginosa*). The latter species is common only to the south of the large dam 1.5 km east of the mine office. Shrubs are relatively uncommon, and the structure of this community is usually a grassy woodland. This community occurs on relatively flat ground on the plateau on deeper, more fertile soils.

All five patches surveyed meet the criteria of the Threatened Ecological Community (TEC) known as "White Box Yellow Box Blakely's Red Gum Woodland" on the NSW Biodiversity Conservation Act 2016 and the federally listed "White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland" on the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. This community would likely have dominated most of the cleared areas where the Hillgrove village now occurs, including all cleared areas on the plateau where mining infrastructure currently stands.

8.1.1.2 Community 2: Hillgrove Box Shrubby Woodland on the Gorge Rim and Upper Gorge Slopes.

This woodland is dominated by Hillgrove Box (*E. retinens*) with occasional Yellow Box, Silvertop Stringybark (*E. laevopinea*) and Hillgrove Spotted Gum (*E. michaeliana*). It occurs along the gorge rim and occasionally on the adjacent plateau in rocky areas with shallow soils. It also extends downslope of the gorge rim for approximately a 100m altitudinal drop, where it slowly grades into Community 3. A shrub layer is usually present while the ground layer is generally sparser than on the grassy woodland on the plateau.

8.1.1.3 Community 3: Forest Red Gum Grassy Woodland on the lower and Mid Gorge Slopes

A grassy woodland strongly dominated by Forest Red Gum (*E. tereticornis*) but also with occasional Rough-barked Apple (*Angophora floribunda*) and Yellow Box. This common community occupies most of the gorge country, approximately 100 m below the gorge rim. At this point it slowly grades into Community 2.

8.2 Rehabilitation Establishment Monitoring

An annual rehabilitation monitoring program is conducted by ELA with the objective to evaluate the rehabilitation progress and achieving the required ecological community and land use objectives in accordance with the completion criteria. Rehabilitation monitoring will include the following:

8.2.1 Soil analysis

Composite soil samples will be collected within the rehabilitation and analogue areas and analysed by a soil laboratory. Soils analysis will include testing chemical and physical parameters. Soil test results will allow for comparison against analogue sites to determine trends in soil and vegetation condition over time and progress towards achieving the completion criteria.

8.2.2 Flora Surveys

Floristic monitoring will be conducted by qualified ecologists during summer/autumn. Floristic and biometric survey methodologies will be an adjusted version of the Biobanking assessment methodology, to align with the rehabilitation objectives and completion criteria. Monitoring will assess:

- Plant community structural attributes
- Cover, species density, height and structural diversity
- Species richness, including the number of plants present in each structural layer of each vegetation community
- Presence and abundance of any weed species
- Assessment of natural regeneration of new species

All rehabilitation monitoring sites are permanently marked with 20 x 20 m quadrants where all vascular plant species will be identified, recorded and compiled into species lists and compared to analogue sites.

Biometric plot data will also be collected at each plot using the BioBank assessment methodology. The additional information collected includes:

- A 50 m transect along which native over-storey cover, native mid-storey cover, native groundcover and exotic cover will be recorded
- A 50 x 20 m transect in which the number of trees with hollows, over-storey generation and total length of logs will be recorded.

The data will be collated and compared to previous assessments and benchmarks.

8.2.3 Photo Monitoring Points

Photo monitoring points will be established at each BioBank site. A photo will be taken at each corner of the 20x20 m quadrant looking in towards the centre of each plot. These photo reference points provide a visual reference of changes in the vegetation structure and will be repeated annually.

8.2.4 Inspections

The Hillgrove Mine Environmental Officer will undertake quarterly inspections. Quarterly inspections will involve a visual field-based rapid assessment of various landscape contributors and triggers appropriate management actions. Visual inspections will include:

- Surface stability and erosion issues
- Vegetation components (overstorey, understorey and groundcover)
- Presence of exotic weed and feral animal species
- Disturbance factors (dumped rubbish, unauthorized access)
- A photo monitoring point for a visual comparison record

8.3 Measuring Performance Against Rehabilitation Objectives and Rehabilitation Completion Criteria

As previously referenced Hillgrove Mine have committed to undertaking a number of specialist studies (background contamination criteria and rehabilitation criteria) to fully develop quantitative closure criteria and associated monitoring. This table will be updated as these studies are completed.

Table 17: Performance indicators and completion criteria

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Monitoring Methodology	Monitoring Frequency	Progress RMP start	Expected Completion	Tarp Ref. no
PHASE – ACTIVE MINING								
<u>Domain – Mining Areas (adits and shafts)</u>								
Infrastructure removed (selected adits/shafts not part of current mine plan) and made safe	Infrastructure not required for final land use removed	Infrastructure not required for final land use removed	Relevant infrastructure removed and adits sealed in consultation with DRE and MDG6001 Guidelines for Permanent Filling and Capping of Surface Entries to Coal Seams	Photograph	As feature rehabilitation commences	Not commenced	Majority post RMP	1
PHASE 1 – DECOMMISSIONING								
<u>Domain – Mining Areas</u>								
Infrastructure removed (remaining adits/shafts) and made safe	Infrastructure not required for final land use removed	Infrastructure not required for final land use removed	Relevant infrastructure removed and adits sealed in consultation with DRE and MDG6001 Guidelines for Permanent Filling and Capping of Surface Entries to Coal Seams	Photograph	Post decommissioning	Not commenced	Post RMP	1&9
	Disconnect services	All site services have been removed (electricity, telecommunications, etc.)	Photograph	Post decommissioning	Not commenced	Post RMP	1&9	Disconnect services

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Monitoring Methodology	Monitoring Frequency	Progress RMP start	Expected Completion	Tarp Ref. no
<u>Domain - Infrastructure</u>								
Infrastructure removed that is not identified to remain as part of final land use	Infrastructure not required for final land use removed	Infrastructure not required for final land use removed	All infrastructure that is not required as part of the post-mining land use has been demolished and removed from the site (unless otherwise agreed by the DRE).	Photograph	Post cessation of active mining	Not commenced	Post RMP	1
			All demolition work has been carried out in accordance with <i>AS2601-2001: The Demolition of Structures</i> or its latest version	Photograph	Post decommissioning	Not commenced	Post RMP	1&9
Domain safe and free from hazardous materials	Contaminated land identified and remediated	Assessment indicates contamination is acceptable for final land use	A contamination assessment for infrastructure exposed to contaminants including processing facilities, workshop has been undertaken prior to demolition. Any contaminated soil has been removed from site in accordance with legislation or relocated to the bioremediation area until testing indicates the material is suitable for disposal in the spoil dump.	Report prepared by qualified person	Post decommissioning			3-6
	No hazardous material remain	All material removed from site	Hazardous materials are identified and removed from site (verified by Certification of disposal).	Inspection report	Post decommissioning			2

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Monitoring Methodology	Monitoring Frequency	Progress RMP start	Expected Completion	Tarp Ref. no
<u>Domain – Water Management Area</u>								
Infrastructure removed that is not identified to remain as part of final land use.	Infrastructure not required for final land use removed	Infrastructure not required for final land use removed	Relevant infrastructure removed	Photograph	Post rehabilitation of infrastructure area	Not commenced	Post RMP	1
	Contaminated land identified and remediated	Assessment indicates contamination is acceptable for final land use	A contamination assessment for infrastructure exposed to contaminants including processing facilities, workshop has been undertaken prior to demolition.	Report prepared by qualified person	Post decommissioning			3-6
			Any contaminated soil has been removed from site in accordance with legislation or relocated to the bioremediation area until testing indicates the material is suitable for disposal in the spoil dump.	Report prepared by qualified person	Post decommissioning			3-6
	No hazardous material remain	All material removed from site	Hazardous materials are identified and removed from site (verified by Certification of disposal).	Inspection report	Post decommissioning			2
<u>Domain – Tailings Storage Facilities</u>								
Infrastructure removed and domain made safe	Infrastructure not required for final land use or during phase development removed	Infrastructure not required for final land use removed	Relevant infrastructure removed	Photograph	As feature rehabilitation commences	Not commenced	Majority post RMP	1 & 9

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Monitoring Methodology	Monitoring Frequency	Progress RMP start	Expected Completion	Tarp Ref. no
PHASE 2 – LANDFORM ESTABLISHMENT								
<u>Domain – Mining Areas</u>								
Free draining, stable landform established	Landform geotechnically stable	Geotechnical stability of landform	Inspection reports showing no evidence subsidence, erosion	Inspection report and photographs	Quarterly in 1 st year	Not commenced	Post RMP	8
	Free draining landform		Landforms are free draining (excluding retained water storage dams)					
	AMD		Rehabilitation areas not impacted by Acid Mine Drainage					
<u>Domain - Infrastructure</u>								
Free draining stable landform established	Landform geotechnically stable	Geotechnical stability of landform	Inspection reports showing no evidence erosion etc.	Inspection report and photographs	Annual	Not commenced	Post RMP	8
<u>Domain – Water Management Area</u>								
Stable landform established	Landform geotechnically stable	Geotechnical stability of landform	Inspection reports showing no evidence erosion etc.	Inspection report and photographs	Annual	Not commenced	Post RMP	8
<u>Domain – Tailings Storage Facilities</u>								
Free draining stable landform established	Landform geotechnically stable	Geotechnical stability of landform	Signoff from Dam Engineer	Inspection report from Dam Engineer	Biannual after first report	Not commenced	Post RMP	7
			TSFs suitably capped (to be agreed with DRE)	Inspection report from Dam Engineer	Biannual after first report	Not commenced	Post RMP	7

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Monitoring Methodology	Monitoring Frequency	Progress RMP start	Expected Completion	Tarp Ref. no
PHASE 3 – GROWTH MEDIUM DEVELOPMENT								
<u>Domain – Mining Areas (excluding gorge roads)</u>								
Non-polluting	Groundwater monitoring	Seepage monitoring	No seepage from adits, gullies no surface ingress to shafts	Visual inspection for seepage, water quality results	Annual	Existing adits and Metz Gully being sampled for background	Post RMP	4
	Soil sampling	Soil samples	Result within agreed criteria (to be agreed with EPA)	Soil results report	Once post rehabilitation work	Not commenced	Post RMP	3
<u>Domain – Mining Areas (gorge roads)</u>								
Growth media suitable for establishing desired vegetation community	Growth medium volume	Growth medium available	Sufficient growth medium available for rehab over RMP term and Life of Mine, as determined by the Rehabilitation Material Balance study to be completed			Not commenced	Post RMP	10
	Growth medium placement	Growth medium depth	Growth medium spread evenly at a suitable depth appropriate for the final land use			Not commenced	Post RMP	11
	Soil characterisation	Soil samples	Physical, chemical and biological properties of topsoil and subsoil has been tested to assess suitability for intended post mining land use	Soil results report	Once post rehabilitation work	Not commenced	Post RMP	11
	Soil amelioration	Soil samples	Appropriate soil ameliorants have been applied in accordance with specifications and recommendation of soil characterisation reports as required.	Soil results report	Once post rehabilitation work	Not commenced	Post RMP	11

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Monitoring Methodology	Monitoring Frequency	Progress RMP start	Expected Completion	Tarp Ref. no
Non-polluting	Water monitoring of run-off or seepage	Water monitoring results	Results within agreed criteria (to be agreed with EPA)	Visual inspection for seepage, water quality results	Quarterly to start then reduced frequency	Not commenced	Post RMP	6
Growth media suitable for establishing desired vegetation community	Growth medium volume	Growth medium available	Sufficient growth medium available for rehabilitation over RMP term and Life of Mine, as determined by the Rehabilitation Material Balance study to be completed			Not commenced	Post RMP	10
	Growth medium placement	Growth medium depth	Growth medium spread evenly at a suitable depth appropriate for the final land use			Not commenced	Post RMP	11
	Soil characterisation	Soil samples	Physical, chemical and biological properties of topsoil and subsoil has been tested to assess suitability for intended post mining land use	Soil results report	Once post rehabilitation work	Not commenced	Post RMP	11
	Soil amelioration	Soil samples	Appropriate soil ameliorants have been applied in accordance with specifications and recommendation of soil characterisation reports as required.	Soil results report	Once post rehabilitation work	Not commenced	Post RMP	11

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Monitoring Methodology	Monitoring Frequency	Progress RMP start	Expected Completion	Tarp Ref. no
<u>Domain – Water Management Area</u>								
Non-polluting	Water monitoring of run-off or seepage	Water monitoring results	Results within agreed criteria (to be agreed with EPA)	Visual inspection for seepage, water quality results	Quarterly to start then reduced frequency	Not commenced	Post RMP	4,6
Growth media suitable for establishing desired vegetation community	Growth medium volume	Growth medium available	Sufficient growth medium available for rehabilitation over RMP term and Life of Mine, as determined by the Rehabilitation Material Balance study to be completed			Not commenced	Post RMP	10
	Growth medium placement	Growth medium depth	Growth medium spread evenly at a suitable depth appropriate for the final land use			Not commenced	Post RMP	11
	Soil characterisation	Soil samples	Physical, chemical and biological properties of topsoil and subsoil has been tested to assess suitability for intended post mining land use	Soil results report	Once post rehabilitation work	Not commenced	Post RMP	11
	Soil amelioration	Soil samples	Appropriate soil ameliorants have been applied in accordance with specifications and recommendation of soil characterisation reports as required.	Soil results report	Once post rehabilitation work	Not commenced	Post RMP	11

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Monitoring Methodology	Monitoring Frequency	Progress RMP start	Expected Completion	Tarp Ref. no
<u>Domain – Tailings Storage Facilities</u>								
Non-polluting	Water monitoring of wells and seepage pits	Water monitoring results	Results within agreed criteria (to be agreed with EPA)	Visual inspection for seepage, water quality results	Quarterly to start then reduced frequency	Commenced as part of operations	Post RMP	5
Growth media suitable for establishing desired vegetation community	Growth medium volume	Growth medium available	Sufficient growth medium available for rehabilitation over RMP term and Life of Mine, as determined by the Rehabilitation Material Balance study to be completed			Not commenced	Post RMP	10
	Growth medium placement	Growth medium depth	Growth medium spread evenly at a suitable depth appropriate for the final land use			Not commenced	Post RMP	11
	Soil characterisation	Soil samples	Physical, chemical and biological properties of topsoil and subsoil has been tested to assess suitability for intended post mining land use	Soil results report	Once post rehabilitation work	Not commenced	Post RMP	11
	Soil amelioration	Soil samples	Appropriate soil ameliorants have been applied in accordance with specifications and recommendation of soil characterisation reports as required.	Soil results report	Once post rehabilitation work	Not commenced	Post RMP	11

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Monitoring Methodology	Monitoring Frequency	Progress RMP start	Expected Completion	Tarp Ref. no
PHASE 4 – ECOSYSTEM AND LAND USE ESTABLISHMENT								
<i>Domain – Mining Areas</i>								
Vegetation Appropriate	Species selected in line with agreed list	Species mix used	Mix of species is generally consistent with agreed mix as identified in the Analogue Site Baseline study to be completed by ELA.	Assessment report by suitably qualified person	Annual	Not commenced	Post RMP	
Weeds and pests are controlled	Feral animal and weed presence	Monitoring results	Feral animal and weed species presence and abundance is not considered to adversely impact the intended final land use	Assessment report by suitably qualified person	Annual	Not commenced	Post RMP	14
Vegetation Appropriate	Species selected in line with agreed list	Species mix used	Mix of species is generally consistent with agreed mix as identified in the Analogue Site Baseline study to be completed by ELA.	Assessment report by suitably qualified person	Assessment report by suitably qualified person	Annual	Not commenced	Post RMP
Weeds and pests are controlled	Feral animal and weed presence	Monitoring results	Feral animal and weed species presence and abundance is not considered to adversely impact the intended final land use	Assessment report by suitably qualified person	Annual	Not commenced	Post RMP	14

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Monitoring Methodology	Monitoring Frequency	Progress RMP start	Expected Completion	Tarp Ref. no
<u>Domain – Water Management Area</u>								
Vegetation Appropriate (areas to be re-vegetated)	Species selected in line with agreed list	Species mix used	Mix of species is generally consistent with agreed mix as identified in the Analogue Site Baseline study to be completed by ELA.	Assessment report by suitably qualified person	Annual	Not commenced	Post RMP	
Weeds and pests are controlled	Feral animal and weed presence		Feral animal and weed species presence and abundance is not considered to adversely impact the intended final land use	Assessment report by suitably qualified person	Annual	Not commenced	Post RMP	14
<u>Domain – Tailings Storage Facilities</u>								
Vegetation Appropriate (shallow rooted pasture species)	Pasture species selected in line with Dam Engineers recommendations	Species mix used	Mix of species is generally consistent with agreed mix as identified in the Analogue Site Baseline study to be completed by ELA.	Assessment report by suitably qualified person	Annual	Not commenced	Post RMP	
Weeds and pests are controlled	Feral animal and weed presence		Feral animal and weed species presence and abundance is not considered to adversely impact the intended final land use	Assessment report by suitably qualified person	Annual	Not commenced	Post RMP	14

Document ID:	HGM-HSE-MPL-002	Version:	6	Date:	9 Dec 2024	Page 91 of 96
CONTROLLED DOCUMENT – ALTERATIONS MUST NOT BE MADE BY UNAUTHORISED PERSONNEL						

9. REHABILITATION RESEARCH, MODELLING AND TRIALS

9.1 Current Rehabilitation Research, Modelling, and Trials

Hillgrove Mine has developed a close relationship with the University of New England who have conducted a significant volume of research in antimony and arsenic in the environment. As part of this research Hillgrove have sponsored a number of projects. Two Honours projects were completed which looked at metal uptake in selected species of plants from Hillgrove. The species studied were mainly plants that have been identified for use in rehabilitation and included endemic species such as the Hillgrove Gum (*E. Michaeliana*).

Results from the metals uptake project showed that the endemic species used to date in rehabilitation are efficient in excluding metals from their biomass. That is that the metals present in their root system do not significantly transfer to stems and leaves. This means that any metals present in the soil will not become more bio-available. The results also show that by adding soil ameliorants (e.g. fertilisers) the exclusion mechanism was inhibited and thereby allowed metals to become bioavailable in those species.

The impact on the approach to rehabilitation has been to not use soil ameliorants, if possible, where there may be residual metals present. In addition, the research showed that using these endemic species is appropriate for the area.

In 2016 another Honours project was completed which focused on looking for plant species that may be deemed as hyper-accumulators of antimony. None were identified but the project has provided additional information on various species that can be avoided in rehabilitation due to their ability to make metal bioavailable.

In preparation for rehabilitation works on the Bakers Creek Waste Dump, an Analogue Site Baseline study was undertaken by ELA during August 2020. The purpose of the study was to assess the likely vegetation communities within proximity of the site and to support the development of a seeding plan to use within the rehabilitation phase. Rapid Data Points were used to note features such as dominant species, landform pattern, exotic species, vegetation structure and condition.

9.2 Future Rehabilitation Research, Modelling, and Trials

Hillgrove Mine will continue to work closely with researchers and students from University of New England and will continue consultation with EcoLogical Australia.

The Halls Peak Laydown rehabilitation site will require further studies prior to additional rehabilitation works planned for the following reporting period. This work will require a comprehensive soil analysis to identify the issues with lack of vegetation. A plan will be devised, based on the results, to improve soil conditions and re-seed the site with native grass and shrub species.

10. INTERVENTION AND ADAPTIVE MANAGEMENT

Table 18 is the TARP for rehabilitation. It will be updated with further details following as the various specialist studies committed to in this Rehabilitation Plan are completed.

Table 18: Trigger, action, response plan (TARP)

Rehabilitation Threat	Potential Adverse Outcome	Trigger	Action / Response	TARP Ref. no
Failure to remove infrastructure	Unable to complete rehabilitation and establish final land use			1
Failure to remove hazardous material	Unable to complete rehabilitation and establish final land use	Inspection identifies hazardous material is found onsite	Removed identified hazardous materials	2
Failure to address contamination and is not non-polluting	Contaminated land present	Contamination assessment identifies contaminated land is present within the site	- Implement actions from assessment report - Repeat assessment until contamination is removed	3
	Waste rock, adits or similar are source of leachate	Monitoring indicates that leachate does not comply with trigger values	- Re-assess feature to determine source of leachate - Implement actions from assessment	4
	Tails Storage Facility is source of leachate	Monitoring indicates that leachate does not comply with trigger values	- Mgm't plan review and update by dam engineer - Implement recommended remedial actions	5
	Landform is unacceptable source of sediment	Water monitoring or visual inspection indicates that the final landform is subject to erosion and causing sedimentation	- Remediate erosion and review - Increase inspection frequency until remediation is deemed complete	6
Final landform is not safe, stable and secure	Geotechnical instability of TSF	Inspection identified unacceptable instability – cracks, subsidence etc.	- Mgm't plan review and update by dam engineer - Implement recommended remedial actions	7
	Geotechnical instability of adits, roads, mines, shafts	Inspection identifies geotechnical issues	- Review by a Geotechnical Engineer - Implement recommendations of review	8
	Public access to mines, shafts roads is possible	Inspection identifies risk of entry by public	- Review risk and develop plans to restrict access - Implement plan	9

Rehabilitation Threat	Potential Adverse Outcome	Trigger	Action / Response	TARP Ref. no
Topsoil or growth medium does not conform with relinquishment criteria	Insufficient soil available for rehabilitation	Stockpiles of soil are found to be less than sufficient	- Suitable source of additional material to be sourced - Investigate ways to use other materials e.g. Mix organics with other soils	10
	Soil not adequate to establish vegetation	Topsoil if found to be adequate to sustain vegetation	- Engage a soil scientist to review the soil and provide recommendations - Implement recommendations	11
Inappropriate species established during revegetation works	The mix of species on final landform does not conform with the approved community	Monitoring shows that the species mix does not match the proposed mix	- Engage qualified ecologist or similar to review the reasons for divergence and recommended remedial actions - Implement actions in consultation with DRE	12
Vegetation community is not established	Vegetation community is not established	Monitoring indicate that revegetation has failed or partly failed	- Engage qualified ecologist or similar to review the reasons for failure and recommended remedial actions - Implement actions in consultation with DRE	13
Weeds and pest management fails	Weeds and pest are established and become significant management resources	Monitoring indicates that weed infestations and pest are present	- Implement weed control using a qualified person/contractor - Review effectiveness of weed control.	14
Vegetation community is not self-sustaining	Vegetation requires management and does not sustain itself	Monitoring indicate that additional management is required on a routine basis	- Engage ecologist or similar to review the reasons for divergence and recommended remedial actions - Implement actions in consultation with DRE	15
Incomplete removal of Bakers Creek Waste Dump	Waste material remains in the location and rehabilitation (flora) does not establish.	Material remains that is not consistent with the surrounding ground level, indicating that removal of the material associated with the Bakers Creek Waste Dump is incomplete.	- Geologist or Geotech will be used to spot the final horizon to confirm complete removal - Materials identified as remaining will be removed. - Samples collected to confirm metal concentrations are comparable to the surrounding areas	16

11. REVIEW, REVISION, AND IMPLEMENTATION

11.1 Review and Revision of the RMP

The RMP will be reviewed on an annual basis in line with the Annual Rehabilitation Report and will be amended in the following circumstances:

- As a consequence of an amendment made to the rehabilitation objectives, rehabilitation completion criteria or final landform and rehabilitation plan.
- As alterations are made to the risk control measures in the RMP that are identified in a rehabilitation risk assessment
- At any time, there is a change in mining operations at Hillgrove Mine
- At any time, when there has been an update of the Form and Way completed by the NSW Resources Regulator and we at Hillgrove Mine are instructed to update the document.

11.2 Implementation

Table 19 indicates the roles and responsibilities of staff relating to the RMP.

Table 19 Roles and responsibilities for RMP implementation

Role	Responsibility
Director/s	• Ensure resources are available to implement the RMP
General Manager	• Accountable for overall environmental performance • Monitor and review environmental performance reports
Environmental Officer	• Ensure the plan is implemented • Report non-compliances with the RMP and implementation of improvements • Ensure employees are trained and aware of environmental responsibilities

