



Plan

Rehabilitation Management Plan

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Figure 1 – Locality Plan

Figure 2 – Site Layout

Figure 3 – Land Ownership

Figure 4 – Land Use

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Summary Table	
Name of Mine	Hunter Valley Operations
RMP Commencement Date	2 July 2022
RMP Version Number	1.0
Mining Authorisations (Lease/Licence No.)	Contained within Table 10 (Section 1.2.2)
Name of Authorisation / Authorisation holder(s)	Contained within Table 10 (Section 1.2.2)
Name of Mine Operator (if different)	HVO Operations Pty Ltd
Date of Publication	1 July 2022

1 Introduction

This Rehabilitation Management Plan (RMP) outlines the proposed rehabilitation and final land use considerations at Hunter Valley Operations (HVO). HVO comprises Hunter Valley Operations North (HVO North) and Hunter Valley Operations South (HVO South). HVO North and HVO South are separated by the Hunter River and are located approximately 24 kilometres (km) north-west of Singleton in New South Wales (NSW) (see **Figure 1**).

HVO is owned by subsidiary companies of Yancoal and Glencore, as participants in the unincorporated HVO Joint Venture. The HVO Joint Venture is jointly controlled through a Joint Venture Management committee, with HV Operations Pty Ltd as the appointed manager. Coal & Allied Operations Pty Ltd (wholly owned subsidiary of Yancoal) holds 51% of interest in the Joint Venture, and Anotero Pty Ltd (wholly owned subsidiary of Glencore) holds 49%.

HVO North includes the Carrington Pit, West Pit (which includes the Mitchell Pit and Wilton Pit), North Pit Tailings Storage Facility (TSF), Dam 6W TSF, Cumnock Void TSF (under agreement with GCAA), Newdell Coal Preparation Plant (NCP), Hunter Valley Coal Preparation Plant (HVCPP), Howick Coal Preparation Plant (HCPP), and the stockpiling/train loading facilities at Newdell Load Point (NLP) and Hunter Valley Load Point (HVLP) (see **Figure 2**).

HVO South includes Cheshunt Pit, Riverview Pit and Lemington South Pit (see **Figure 2**).

This RMP has been prepared in accordance with the NSW Department of Regional NSW – Resources Regulator's (RR) Form and Way: Rehabilitation management plan for large mines (2021). This document has also been developed to satisfy the requirements for a Rehabilitation Management Plan under Schedule 3, Condition 62C of Development Consent DA 450-10-2003 for HVO North and Schedule 3, Condition 36 of Project Approval PA 06_0261 for HVO South.

1.1 History of Operations

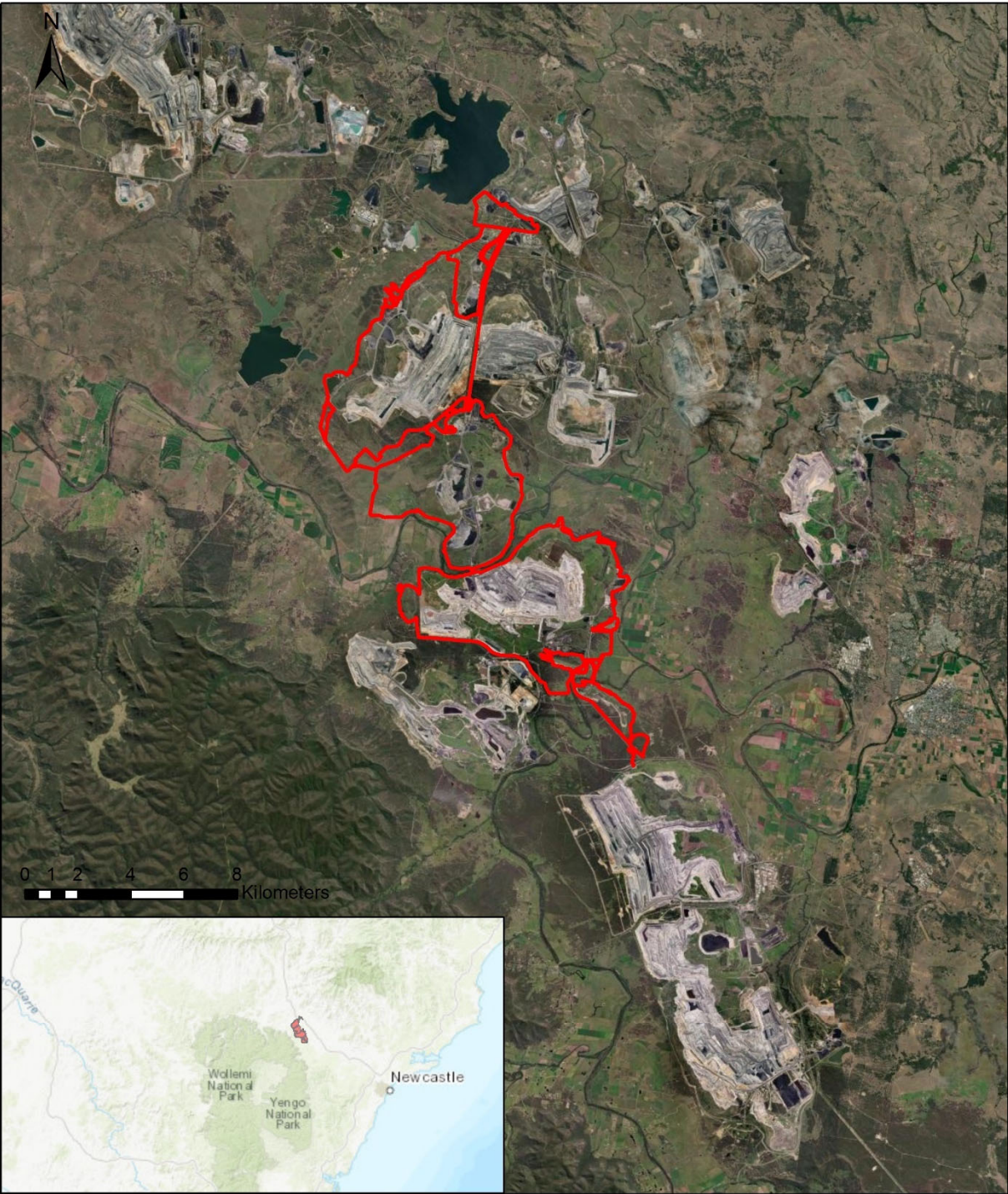
The history of mining at HVO is summarised in **Tables 1 to 5**.

Table 1 West Pit Development, Mining and Associated Approvals

Year	Details
1949	Mining in the area around West Pit commenced when the operating arm of the Joint Coal Board, the New South Wales Mining Company, started mining leases at Foybrook Open Cut. The New South Wales Mining Company subsequently constructed the NCP.
1952	Mining at West Pit (which was then known as Howick) commenced when Construction Pty Limited, under contract to the New South Wales Mining Company started operating on the Howick lease in the Pikes Gully Cut.
1968-1974	Title to some of the Howick lease was granted to Clutha Development Pty Limited in 1968 with additional titles granted in 1973 and 1974. A dragline operation started in 1971.
1981	Operations purchased by BP Coal.
1986	Approval granted to increase production at West Pit to 3.5 Mtpa of ROM coal and construct the HCPP to supply coal to the Bayswater and Liddell Power Stations as well as other domestic markets.
1989	An extension towards the south-east was granted with a corresponding increase to 7 Mtpa. At the end of 1989, the operation was purchased by Kembla Coal and Coke, a wholly owned subsidiary of Conzinc Rio Tinto of Australia Ltd (CRA), and operated by Novacoal, a newly established business unit of CRA.

Hunter Valley Operations

Figure 1 - Locality



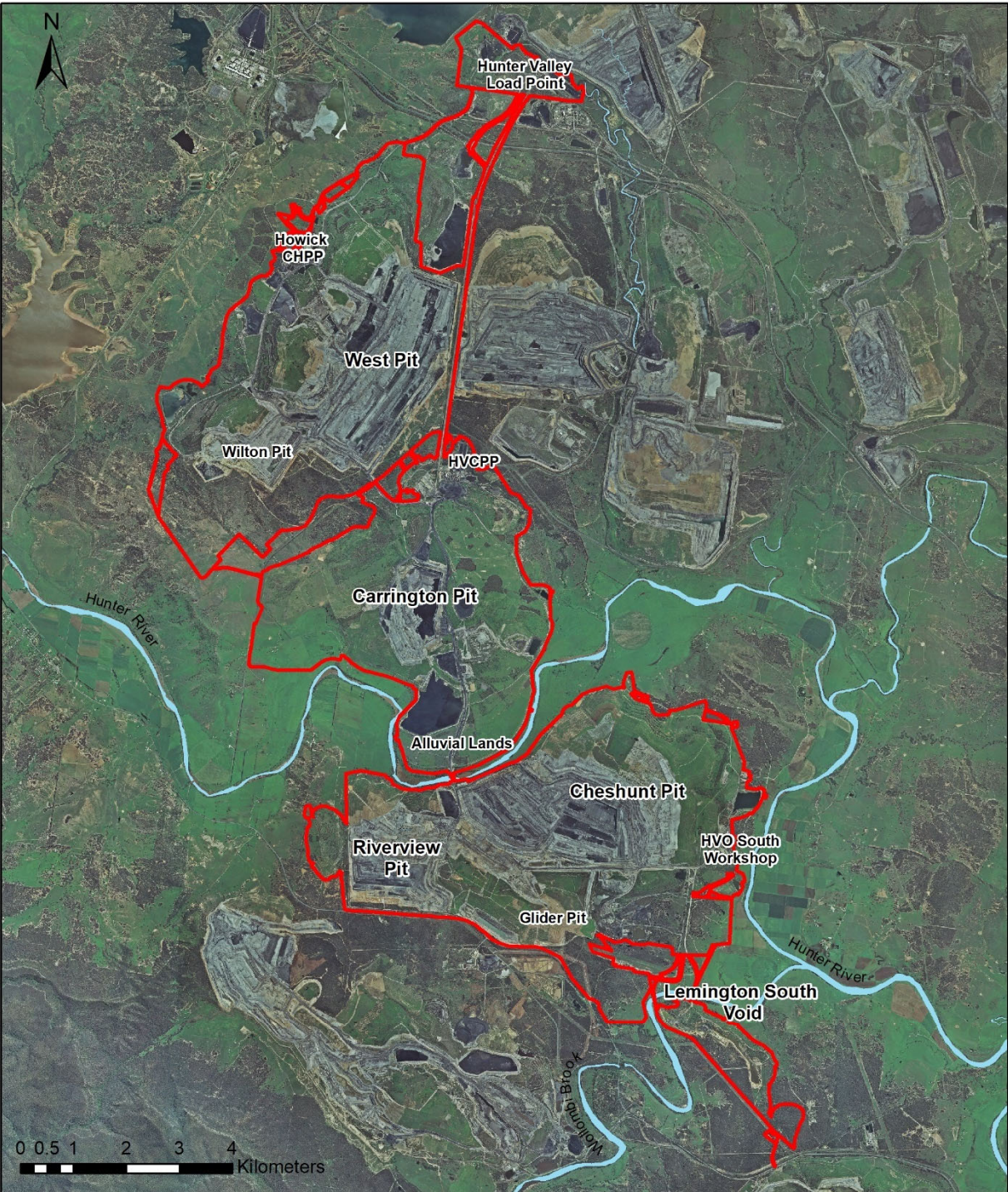
Legend

 Approved Disturbance Boundary

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Hunter Valley Operations

Figure 2 - Site Layout



Legend

Approved Disturbance Boundary

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Year	Details
1996	Consent was granted for the Howick Coal Mine Expansion Project which included mining Mitchell Pit located to the south west of the original mine. This consent allowed coal production to increase to 12 Mtpa ROM coal and also allowed augmentation of the HCPP and construction of a conveyor to NCPP.
1998	Novacoal and Coal & Allied merged and West Pit became part of HVO.
2000	Consent issued for construction of Western Haul Road and bridge over Lemington Road. Modification to the 1996 consent to permit the transport of up to 8 Mtpa of coal from West Pit to HVCPP. NCPP ceased operations with disused parts of NCPP placed on a care and maintenance plan. Newdell coal receival, stockpiling and train loading facilities continued to be used for coal from HCPP.
2004	Development Consent DA 450-10-2003 granted for HVO North – West Pit Extension and Minor Modifications. For an extension of existing operations at West Pit, increased production capacity at Carrington Pit and consolidation of 15 existing development approvals.
2016	Commonwealth approval EPBC 2016/7640 granted for vegetation clearing in areas with previous State approvals. Modification to consent DA 450-10-2003 granted for HVL sediment basin and HVO North Communications Towers.
2017	Modification to consent DA 450-10-2003 granted to amend the development consent boundary.

Table 2 Carrington Pit Development, Mining and Associated Approvals

Year	Details
1991	Coal & Allied granted original exploration Authorisation (AUTH) 435, covering the Carrington Pit Area.
1997	Exploration Licence (EL) 5417 granted to determine extent of coal seam to the west.
1997	EL 5418 granted to test and monitor groundwater to the south-east.
1999	Exploration boundaries have been extended to the north into Mining Lease (ML) 1428, joint venture with Howick Coal.
2000	Development Consent DA 106-6-99 granted for Carrington Pit.
2004	Carrington Pit integrated into West Pit Extension and Minor Modifications consent, DA 450-10-2003.
2006	Statement of Environmental Effects (SEE) for extension to Carrington Pit approved by the former NSW Department of Planning.
2013	Modification to consent DA 450-10-2003 granted for Carrington West Wing (CWW) Extension (CWW Extension will not commence during MOP term).
2014	Modification to consent DA 450-10-2003 granted for HVO North Fine Reject Emplacement.
2017	Modification to consent DA 450-10-2003 granted for HVO North Carrington In-pit Fine Reject Emplacement.
2017	Modification to consent DA 450-10-2003 granted to amend the development consent boundary.
2019	In-pit tailings commenced at Carrington Pit.

Table 3 North Pit Development, Mining and Associated Approvals

Year	Details
1979	Coal production commenced at Hunter Valley No. 1 Mine following the granting of Coal Lease (CL) 193 over an area of approximately 992 hectares (ha). Initial coal production was 1.5 Mtpa. All coal was washed in Liddell CHPP.
1980	Approved production was increased to 4 Mtpa. Construction of HVCPP.

Year	Details
1991	Operations commenced in the former Hunter Valley No. 2 Mine (now known as Cheshunt/Riverview Pit) on the southern side of the Hunter River, with all coal being transported to HVCPP via a dedicated bridge over the Hunter River (constructed in 1990).
1991	Mining commenced in the Southern Extension Area (200 ha) with the granting of Consolidated Coal Lease (CCL) 755 including revocation of CL 193. Production was increased to 6.4 Mtpa.
1995	Mining commenced in the ALRP with an average continued production of 4 Mtpa in the combined North Pit operations.
2003	Approved to receive tailings.
2004	North Pit integrated into West Pit Extension and Minor Modifications consent – DA 450-10-2003.
2017	Modification to consent DA 450-10-2003 granted to amend the development consent boundary.
2018	The receipt of tailings to the North Pit TSF ceased.

Table 4 Cheshunt and Riverview Pits Development, Mining and Associated Approvals

Year	Details
1986	Approval gained for Hunter Valley No. 2 Mine.
1990	Approval granted for Western out of pit emplacement of overburden in conjunction with development of Hunter Valley No. 2 Mine, rescheduling of mining of Riverview Pit and permanent re-alignment of Jerrys Plains Road.
1997	Approval granted for small extension (56 ha) to the south west of South Mine (formerly Hunter Valley No. 2 Mine) to re-orientate mining strips to increase mining efficiency.
2000	Approval granted to increase rate of mining to 8 Mtpa and development of the Cheshunt Pit with mining to progress south west through Riverview Pit; out of pit emplacement of overburden on the Lemington Mine site; and overland conveyor from HVO South to HVCPP (not yet commenced).
2001	Modification to approval to allow change in mining schedule to seven day operations from year one rather than year nine.
2002	Approval granted for altered mine plan including concurrent mining at Cheshunt and Riverview Pits; operation of dragline at Riverview Pit; and haulage of coal from Cheshunt and Riverview Pits to either or both the Lemington Coal Preparation Plant (LCPP) or the HVCPP.
2006	Approval granted for extension of open cut coal mining from the Cheshunt Pit through the Barry Property enabling the extraction of approximately 8 Mtpa of ROM coal; and extension of open cut coal mining to the south west of the Riverview Pit.
2009	<p>PA 06_0261 was granted to replace all existing HVO South approvals and to allow:</p> <ul style="list-style-type: none"> • Extension of open cut and highwall mining (increasing the approved mining surface disturbance footprint by 250 hectares); • Mining of all coal seams within HVO South to unlimited depth; • Mining up to 16 Mtpa ROM coal by a combination of draglines, shovels, excavators and associated haul trucks; • Modification, upgrades and / or reconstruction of existing infrastructure including increase of processing capacity of the Lemington Coal Preparation Plant to 16 Mtpa, additional stockpiles and new coal loading infrastructure; and relocation of Comleroi Road and other infrastructure across HVO South; • Infrastructure to facilitate transfer of product coal to the Wambo rail spur via either a rail spur and loop, overland conveyor (OLC) or trucks, or any combination; • The full integration of operations at HVO South related to new activities as well as upgrades and modifications to approved operations, mining and processing rates, equipment use and relocation, water, reject and tailings disposal and coal handling; and • Relocation or reconfiguration of the Hunter Valley Gliding Club (HVGC) airstrip and facilities (if agreed with the Club), to accommodate the integration of the Riverview Pit with South Lemington Pit 2. <p>Subsequent modification to approval to allow raising of Lake James Dam.</p>

Year	Details
2012	Modification to approval to allow transfer of biodiversity offset for HVO South from Archerfield to Goulburn River Biodiversity Area.
2016	Commonwealth approval EPBC 2016/7640 granted for vegetation clearing in areas with previous State approvals.
2018	Modification to the State development consent to enable: <ul style="list-style-type: none"> Cheshunt Pit to progress and extract the Bayswater Seam below Riverview Pit by open cut methods; Amendment to the approved overburden emplacement strategy to enable an 80m increase in height in some areas up to a maximum height of 240m Australian Height Datum AHD; Increase the rate of extraction to 20 Mtpa ROM coal; and Update the Statement of Commitments within PA 06_0261 to remove redundant commitments and conditions or those inconsistent with measures prescribed in the approved management plans.
2021	Modification to State development consent to enable onsite manufacturing of Ammonium Nitrate Emulsion.
2022	Modification to State development consent to enable storage of water in the Lemington Underground Workings

Table 5 Lemington South Pit Development, Mining and Associated Approvals

Year	Details
1971	Approval gained to establish open cut mine and No. 1 underground mining complex with 1 Mtpa ROM coal limit; and construct LCPP No. 1
1976	Approval granted to extend mining into No. 2 underground mining complex area and increase ROM coal to 2 Mtpa; and construct second LCPP rated at 440 tph of ROM coal.
1980	Approval granted to extend open cut and underground mining operations within Buchanan-Lemington Colliery; construct haul road from South Lemington to Lemington across Wollombi Brook; and increase capacity of LCPP No. 2 to 660 tph ROM coal.
1981	Approval gained to increase product coal production to 3 Mtpa.
1985	Approval gained to allow northern extension of open cut mining within Buchanan-Lemington Colliery Holding; and north west extension of Lemington Mine.
1987	LCPP No. 1 closed and decommissioned
1993	Approval granted to install a coarse reject transport conveyor to facilitate filling and progressive rehabilitation of underground mine No. 2 portal using coarse reject from LCPP (over 4-5 years).
1998	Approval granted to establish mining in South Lemington – two open cut pits, a scraper slot and trench, supplemented by highwall mining operations to 0.6 Mtpa product; total combined product limit of 3 Mtpa; and removal of 82 ha of Warkworth Sands Woodland (not listed under the former Threatened Species Conservation Act (TSC Act) at that time). South Lemington Pit 2, scraper slot and trench and highwall mining have not yet commenced.
1999	Approval gained to increase production to 3.5 Mtpa of product coal (North Lemington to 2.9 Mtpa and South Lemington to 0.6 Mtpa).
2001	Approval gained to increase saleable production to 4.4 Mtpa (North Lemington to 3.2 Mtpa and South Lemington to 1.2 Mtpa). Mining in South Lemington Pit 1 suspended. Approval granted for temporary crossings of Wollombi Brook to allow dragline and electric shovel relocation.
2003	Coal processing at LCPP No. 2 suspended and plant placed into care and maintenance.
2011	Infrastructure removal and site decontamination completed for LCPP No. 2.
2018	Modification to the State development consent to enable the South Lemington Pit 2 to mine to the base of the Vaux Seam below the Bowfield Seam.

1.2 Current Development Consents, Leases and Licences

1.2.1 Development Consents

Table 6 summarises the development consents and modification history, including key features approved. Additionally, HVO holds an Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Approval for the clearing of 61 ha of Central Hunter Valley Eucalypt Forest (CHVEF).

Table 6 Development Consents

Consent	Details	Issue Date	Expiry Date
HVO North			
DA 450-10-2003	West Pit Extension	12 June 2004	12 June 2025
	MOD 1 — S96(1A) modification of West Pit Extension – Upgrade of Hunter Valley Loading Point	16 August 2005	
	MOD 2 — Carrington Pit Extension	25 June 2006	
	MOD 3 — CWW Modification	19 March 2013	
	MOD 4 — HVO North Fine Reject Emplacement Modification	16 January 2014	
	MOD 5 — HVLP Sediment Basin and HVO North Communication Towers	9 December 2016	
	MOD 6 — Fine Rejects Carrington In-Pit	25 January 2017	
	MOD 7 — Extension of mining at West Pit	28 July 2017	
HVO South			
PA 06_0261	Granted to replace all existing HVO South approvals	24 March 2009	24 March 2030
	MOD 1 – Amending approval boundary and discharge at Lake James	17 December 2009	
	MOD 2 – Biodiversity offset amendments	3 February 2012	
	MOD 3 – Goulburn River biodiversity offset area amendments	31 October 2012	
	MOD 4 – Goulburn River biodiversity offset area amendments	31 October 2012	
	MOD 5 – Extend mining of Cheshunt Pit into Riverview Pit and down to Vaux Seam at South Lemington Pit 2	28 February 2018	
	MOD 6 – Manufacture of Ammonium Nitrate Emulsion	26 November 2021	
	MOD 7 – Storage of Water in Lemington Underground Workings	27 May 2022	
HVO North and South			
EPBC 2016/7640	State Approved Mining	10 October 2016	31 December 2030

As described above, this document has been prepared to satisfy the requirement for a Rehabilitation Management Plan in both development consents. The specific requirements from each of these consents, and where they are addressed in this document are shown in **Table 7** and **8** below. This document also satisfies the requirement for the Landscape and Rehabilitation Management Strategy Condition 32), and flora and fauna procedures (parts of Condition 35) within the HVO North development consent (DA 450-10-2003). These are shown in **Table 9** below.

Table 7 RMP Requirements in PA 06_0261

Consent Requirement	Section within this document
36. The Proponent must prepare a Rehabilitation Management Plan for the project to the satisfaction of the DRG. This plan must:	12.1
(a) be prepared by suitably qualified expert/s;	
(b) be prepared in consultation with the Department, CLWD, and Council by a suitably qualified and experienced person/s;	4.3
(c) be submitted for approval within 3 months of the determination of Modification 5, unless otherwise approved by the Secretary;	N/A
(d) be prepared in accordance with any relevant DRG Guideline;	1.0
(e) describe how the rehabilitation of the site would achieve the objectives identified in Table 16 and be integrated with the measures in the Biodiversity Management Plan;	4.1
(f) include detailed performance and completion criteria for evaluating the performance of progressive and final rehabilitation and include triggers for remedial action, where these performance or completion criteria are not met;	4.2, 10.2
(g) describe the measures to be implemented to meet the performance and completion criteria, to ensure compliance with the relevant conditions of this approval and to address all aspects of rehabilitation including mine closure, final landform (including the final void), final land use/s, and water management in the final landform;	6.0, 7.0
(g) include procedures for the use of interim stabilisation and temporary vegetation strategies, where reasonable to minimise exposed areas;	6.2.3.6
(h) include a program to monitor, independently audit and report on the effectiveness of the rehabilitation measures, and progress against the performance and completion criteria;	8.0, 9.0
(i) identify the potential risks to the successful implementation of rehabilitation, and include a description of the contingency measures to be implemented to mitigate against these risks; and	3.0
(j) include details of who would be responsible for monitoring, reviewing, and implementing the plan.	11.3
The Proponent must implement the Rehabilitation Management Plan as approved by the Secretary.	N/A

Table 8 RMP Requirements in DA 450-10-2003

Consent Requirement	Section within this document
62C. The Applicant must prepare a Rehabilitation Management Plan for the HVO North mine to the satisfaction of DRE. This plan must:	4.3
(a) be prepared in consultation with the Department, DPI Water, OEH, Council and the CCC;	

Consent Requirement	Section within this document
(b) be submitted to DRE by the end of September 2013;	N/A
(c) be prepared in accordance with any relevant DRE guideline;	1.0
(d) include an Agricultural Land Reinstatement Management Plan;	Addressed in the separate Agricultural Land Reinstatement Plan
(e) include detailed performance and completion criteria for evaluating the achievement of the rehabilitation objectives in Table 17 and the overall rehabilitation of the site, and triggering remedial action (if necessary);	4.2
(f) include proposals to offset the flora and fauna impacts of the development (including proposals resulting from condition 31 above), and an outline of how the plan would integrate with existing and planned corridors of native vegetation in areas surrounding the development;	Addressed in the HVO Integrated Biodiversity Management Plan
(g) describe the measures that would be implemented to ensure compliance with the relevant conditions of this consent, and address all aspects of rehabilitation including mine closure, final landform and final land use;	2.0, 5.0, 6.0, 7.0
(h) outline how the proposed plan would be integrated with the landscape management and rehabilitation of the other operations within Hunter Valley Operations (both north and south of the Hunter River) and other coal mines in the vicinity;	5.0
(i) include interim rehabilitation where necessary to minimise the area exposed for dust generation;	6.2.3.6
(j) include a program to monitor, independently audit and report on the effectiveness of the measures, and progress against the detailed performance and completion criteria; and	8.0
(k) build to the maximum extent practicable on the other management plans required under this consent.	Entire document
The Applicant must implement the approved management plan as approved from time to time by the Secretary.	N/A

Table 9 Additional Requirements in DA 450-10-2003

Consent Requirement	Section within this document
32. By 30 June 2007, the Applicant must prepare a conceptual Landscape and Rehabilitation Management Strategy, in consultation with affected agencies, to the satisfaction of the Secretary. The strategy must:	
a) include objectives for landscape management and rehabilitation of the site and a justification for the proposed strategy;	4.0
b) present a conceptual plan for a landscape management and rehabilitation of the site;	5.0
c) be integrated with the relevant requirements of the Mining Operations Plan;	MOP replaced by this RMP
d) describe the measures that would be implemented to achieve the objectives (including an indicative timetable for mine closure);	6.0

Consent Requirement	Section within this document
e) include proposals to offset the flora and fauna impacts of the development (including proposals resulting from condition 31 and 31A above), and an outline of how the strategy would integrate with existing and planned corridors of native vegetation in areas surrounding the development; and	Addressed in the HVO Integrated Biodiversity Management Plan
f) outline how the proposed strategy would be integrated with the landscape management and rehabilitation of the other operations within Hunter Valley Operations (both north and south of the Hunter River) and other coal mines in the vicinity.	6.2.3
35. The Applicant must prepare procedures for the management of flora and fauna for the development. These procedures must:	
a) provide details on: <ul style="list-style-type: none"> delineating areas of disturbance 	6.2.1.2
<ul style="list-style-type: none"> protecting areas outside of the disturbance areas; 	Addressed in the HVO Integrated Biodiversity Management Plan
<ul style="list-style-type: none"> identifying when pre-clearance surveys are required for fauna; 	Addressed in the HVO Integrated Biodiversity Management Plan
<ul style="list-style-type: none"> determining the best time to clear vegetation to avoid nesting/breeding activities of threatened fauna; 	Addressed in the HVO Integrated Biodiversity Management Plan
<ul style="list-style-type: none"> capturing and releasing fauna; 	Addressed in the HVO Integrated Biodiversity Management Plan
<ul style="list-style-type: none"> relocating bat roosts; 	Addressed in the HVO Integrated Biodiversity Management Plan
<ul style="list-style-type: none"> salvaging habitat resources and collecting seed; 	6.2.1.2
<ul style="list-style-type: none"> controlling weeds in regeneration/rehabilitation areas; and 	6.2.5, 6.2.6
<ul style="list-style-type: none"> controlling access to the regeneration/rehabilitation areas; 	6.2.6
b) describe how the land in regeneration areas would be revegetated;	Addressed in the HVO Integrated Biodiversity Management Plan
c) describe how the mined areas would be rehabilitated for grazing and biodiversity values;	6.0
d) identify actions to minimise the potential impacts of the development on threatened fauna;	Addressed in the HVO Integrated Biodiversity Management Plan
e) describe how the performance of the revegetation/rehabilitation strategies would be monitored over time including, as a minimum, the parameters in Table 18; and	8.0
f) identify who is responsible for monitoring, reviewing, and implementing the procedures.	11.0

1.2.2 Mining Tenements

Table 10 lists the mining titles applicable to both HVO North and HVO South. While not subject to the RMP at time of submission Mining Lease Applications (MLA's) are listed for completeness.

Table 10 Mining Tenements

Title	Titleholder	Grant Date	Expiry Date	Status
AL 32	Coal & Allied Pty Ltd and Anotero Pty Ltd	04/11/2020	03/11/2026	Granted
AL 33	Coal & Allied Pty Ltd and Anotero Pty Ltd	04/11/2020	03/11/2026	Granted
AL 34	Coal & Allied Pty Ltd and Anotero Pty Ltd	04/11/2020	03/11/2026	Granted
AUTH72	Coal & Allied Pty Ltd and Anotero Pty Ltd	08/03/1977	24/03/2018	Renewal Pending
EL 5291	Coal & Allied Pty Ltd and Anotero Pty Ltd	28/04/1997	28/04/2023	Granted
EL 5292	Coal & Allied Pty Ltd and Anotero Pty Ltd	28/04/1997	27/04/2020	Renewal Pending
EL 5417	Coal & Allied Pty Ltd and Anotero Pty Ltd	23/12/1997	08/05/2018	Renewal Pending
EL 5418	Coal & Allied Pty Ltd and Anotero Pty Ltd	23/12/1997	08/05/2017	Renewal Pending
EL 5606	Coal & Allied Pty Ltd and Anotero Pty Ltd	11/08/1999	10/08/2019	Renewal Pending
EL 8175	Coal & Allied Pty Ltd and Anotero Pty Ltd	23/09/2013	23/09/2018	Renewal Pending
EL 8821	Coal & Allied Pty Ltd and Anotero Pty Ltd	13/02/2019	13/02/2025	Granted
(Part) CCL 708	Liddell Tenements Pty Ltd	17/05/1990	29/12/2023	Granted
CCL 714	Coal & Allied Pty Ltd and Anotero Pty Ltd	23/05/1990	30/08/2030	Granted
CCL 755	Coal & Allied Pty Ltd and Anotero Pty Ltd	24/01/1990	05/03/2030	Granted
CL 327	Coal & Allied Pty Ltd and Anotero Pty Ltd	06/03/1989	06/03/2031	Granted
CL 359	Coal & Allied Pty Ltd and Anotero Pty Ltd	21/05/1990	21/05/2032	Granted
CL 360	Coal & Allied Pty Ltd and Anotero Pty Ltd	29/05/1990	29/05/2032	Granted
CL 398	Coal & Allied Pty Ltd and Anotero Pty Ltd	04/06/1992	04/06/2034	Granted
CL 584	Coal & Allied Pty Ltd and Anotero Pty Ltd	01/01/1982	31/12/2023	Granted
CML 4	Coal & Allied Pty Ltd and Anotero Pty Ltd	02/03/1993	03/06/2033	Granted
ML 1324	Coal & Allied Pty Ltd and Anotero Pty Ltd	19/08/1993	19/08/2035	Granted
ML 1337	Coal & Allied Pty Ltd and Anotero Pty Ltd	01/02/1994	01/02/2034	Granted
ML 1359	Coal & Allied Pty Ltd and Anotero Pty Ltd	01/11/1994	31/10/2015	Renewal Pending
ML 1406	Coal & Allied Pty Ltd and Anotero Pty Ltd	27/02/1997	10/02/2027	Granted
ML 1428	Coal & Allied Pty Ltd and Anotero Pty Ltd	15/04/1998	14/04/2019	Renewal Pending

Title	Titleholder	Grant Date	Expiry Date	Status
ML 1465	Coal & Allied Pty Ltd and Anotero Pty Ltd	21/02/2000	21/02/2021	Expired
ML 1474	Coal & Allied Pty Ltd and Anotero Pty Ltd	24/11/2000	23/11/2021	Expired
ML 1482	Coal & Allied Pty Ltd and Anotero Pty Ltd	19/03/2001	14/04/2019	Renewal Pending
ML 1500	Coal & Allied Pty Ltd and Anotero Pty Ltd	21/12/2001	20/12/2022	Granted
ML 1526	Coal & Allied Pty Ltd and Anotero Pty Ltd	03/12/2002	02/12/2023	Granted
ML 1560	Coal & Allied Pty Ltd and Anotero Pty Ltd	28/01/2005	27/01/2026	Granted
ML 1589	Coal & Allied Pty Ltd and Anotero Pty Ltd	02/11/2006	01/11/2027	Granted
ML 1622	Coal & Allied Pty Ltd and Anotero Pty Ltd	22/10/2010	10/03/2027	Granted
ML 1634	Coal & Allied Pty Ltd and Anotero Pty Ltd	31/07/2009	31/07/2030	Granted
ML 1682	Coal & Allied Pty Ltd and Anotero Pty Ltd	16/12/2012	15/12/2033	Granted
ML 1704	Coal & Allied Pty Ltd and Anotero Pty Ltd	05/12/2014	05/12/2035	Granted
ML 1705	Coal & Allied Pty Ltd and Anotero Pty Ltd	17/12/2014	17/12/2035	Granted
ML 1706	Coal & Allied Pty Ltd and Anotero Pty Ltd	09/12/2014	09/12/2035	Granted
ML 1707	Coal & Allied Pty Ltd and Anotero Pty Ltd	09/12/2014	09/12/2035	Granted
ML 1710	Coal & Allied Pty Ltd and Anotero Pty Ltd	22/12/2016	10/03/2027	Granted
ML 1732	Coal & Allied Pty Ltd and Anotero Pty Ltd	06/04/2016	06/04/2037	Granted
ML 1734	Coal & Allied Pty Ltd and Anotero Pty Ltd	06/04/2016	06/04/2037	Granted
ML 1748	Coal & Allied Pty Ltd and Anotero Pty Ltd	05/12/2016	04/12/2037	Granted
ML 1753	Coal & Allied Pty Ltd and Anotero Pty Ltd	19/04/2017	19/04/2038	Granted
ML 1810	Coal & Allied Pty Ltd and Anotero Pty Ltd	04/11/2020	04/11/2041	Granted
ML 1811	Coal & Allied Pty Ltd and Anotero Pty Ltd	04/11/2020	04/11/2041	Granted
MLA495	Coal & Allied Pty Ltd and Anotero Pty Ltd	Mining Lease Application lodged 12th May 2015		Application Pending
MLA496	Coal & Allied Pty Ltd and Anotero Pty Ltd	Mining Lease Application lodged 12th May 2015		Application Pending
MLA520	Coal & Allied Pty Ltd and Anotero Pty Ltd	Mining Lease Application lodged 23rd December 2015		Application Pending
MLA535	Coal & Allied Pty Ltd and Anotero Pty Ltd	Mining Lease Application lodged 28th October 2016		Application Pending
MLA542	Coal & Allied Pty Ltd and Anotero Pty Ltd	Mining Lease Application lodged 27th July 2017		Application Pending
MLA543	Coal & Allied Pty Ltd and Anotero Pty Ltd	Mining Lease Application lodged 27th July 2017		Application Pending

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Title	Titleholder	Grant Date	Expiry Date	Status
MLA562	Coal & Allied Pty Ltd and Anotero Pty Ltd	Mining Lease Application lodged 21st December 2018		Application Pending

1.2.3 Other Approvals

Licences

Current licences applicable to HVO are summarised in **Table 12**.

Table 11 Licences

Licence / Permit No.	Description	Expiry Date
HVO North and South		
EPL 640	Environmental Protection Licence	1 April (anniversary) 10/09/2025 (Review due date)
RML 5085293	Radiation Management Licence	14/11/2022
HVO North		
NDG 037852	Dangerous Goods Notification (for the storage and handling of hazardous chemicals)	No expiry date
HVO South		
RR12709	Licence to Store Dangerous Good/Explosives	06/07/2022
1423636	Road Occupancy Licences – Golden Highway	30/06/2023
-	Road Closure Approval – Lemington Road	30/06/2023

Water Licences

The water approvals and licences applicable to HVO are listed in **Table 12** and **Table 13**.

Table 12 Water Approvals

Licence Number	Type of Licence	Purpose	Legislation	Description	Expiry Date
20BL030566	Bore	Well	Part 5 Water Act 1912	East Open Cut	Perpetuity
20BL141584	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – Carrington Work Licence	Perpetuity
20BL166637	Bore	Monitoring Bore	Part 5 Water Act 1912	No Current Bores	Perpetuity
20BL168820	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – Bores: CGW39, CGW45a, CGW46, CGW47, CGW47a, CGW48, CGW49, P50/38.5, CGW56, 4036C, 4035P, 4032P, 4034P, 4033P,	Perpetuity

Licence Number	Type of Licence	Purpose	Legislation	Description	Expiry Date
				4053P, 4052P, 4051C, 4040P, 4038C, 4037P Destroyed: CGW7, CGW50, CGW57, CGW58, CGW59, CGW60, CGW61, CGW62, CGW63	
20BL169241	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – Bores: DM1, HF3, HF7 Destroyed: DM2	Perpetuity
20BL169641	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – Bores: CGW5, CGW51A, CGW52, CGW53, CGW54, CGW55A, CGW53A, CGW52A, CGW54A, CGW6, CFW55, CFW57, CFW57A, CFW59, CFW55R Destroyed: CGW1, CGW2, CGW3, CGW5, CGW8, CGW9, CGW10, CGW12, CGW13 CGW14, CGW30,CGW33, CGW34,CGW35, CGW36, CGW37, CGW38,CGW40, CGW41,CGW42, CGW43, CGW44, CFW56, CFW56A, CFW58	Perpetuity
20BL170496	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: BZ10 (CHPZ 2A), BZ11 (CHPZ 3A), BZ18 (CHPZ 10A), BZ20 (CHPZ 12A), BZ21 (CHPZ 13D), BZ21A (CHPZ 13A), BZ20A (CHPZ 12D), BZ11A (CHPZ 3D) Destroyed: AP50/47.5, AQ52, AV50/56.5, AS50/62.5, AR55, Bunc 3, BZ25 (Bunc 12), BZ23 (Bunc 14), BZ24 (Bunc 13),	Perpetuity
20BL170497	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: BZ15 (CHPZ 7A), BZ16 (CHPZ 8D), BZ17 (CHPZ 9A), BZ19 (CHPZ 11A), BZ16A(CHPZ 8A), Bunc 46D Destroyed: Bunc 39 (Shallow & Deep), Bunc44D	Perpetuity

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Licence Number	Type of Licence	Purpose	Legislation	Description	Expiry Date
20BL170498	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: BZ12 (CHPZ 4A), BZ13 (CHPZ 5A), BZ14, BZ9 (CHPZ 1A), BC1, BC1a, BZ8-1, BZ8-2, BZ8-3, HG1, HG2, HG2a, HG3, S4, S6, BZ22 (CHPZ14D), BZ22A (CHPZ 14A), BZ5-1, BZ5-2 Destroyed: S2, S3, S9,S11	Perpetuity
20BL171423	Bore	Monitoring Bore	Part 5 Water Act 1912	E1.5	Perpetuity
20BL171424	Bore	Monitoring Bore	Part 5 Water Act 1912	Destroyed: GW9711	Perpetuity
20BL171425	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: GW9701, GW9710	Perpetuity
20BL171426	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: GW9702 Destroyed: D2(WH236)	Perpetuity
20BL171427	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: C335, C630 (BFS)	Perpetuity
20BL171428	Bore	Monitoring Bore	Part 5 Water Act 1912	D807	Perpetuity
20BL171429	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: B925 (BFS), C122 (BFS), C122 (WDH)	Perpetuity
20BL171430	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: C613 (BFS), C809 (GM/WDH)	Perpetuity
20BL171431	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: B631 (BFS), B631 (WDH)	Perpetuity
20BL171432	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: C130 (AFSH1), C130 (ALL), C130(BFS), C130 (WDH)	Perpetuity
20BL171433	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bore B334 (BFS)	Perpetuity
20BL171434	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: C317 (BFS), C317 (WDH)	Perpetuity
20BL171435	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: BZ3- 1, BZ3-2, BZ3-3	Perpetuity
20BL171436	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: BZ4A(1), BZ4A(2), BZ4B	Perpetuity
20BL171437	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: WG1, WG2, WG3	Perpetuity

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Licence Number	Type of Licence	Purpose	Legislation	Description	Expiry Date
20BL171439	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: BRN, E012	Perpetuity
20BL171492	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: C1(WJ039), GW9704, North, GWA981	Perpetuity
20BL171681	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: Bunc 45A, Bunc 45D	Perpetuity
20BL171725	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: B425 (WDH), BRS, C621 (BFS), C919 (ALL), D317 (BFS), D317(ALL), D317(WDH) Destroyed: D420, D425, D621, PB02	Perpetuity
20BL171726	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: SR002, SR003, SR004, SR005, SR006, SR007	Perpetuity
20BL171727	Bore	Monitoring Bore	Part 5 Water Act 1912	SR001	Perpetuity
20BL171728	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: BZ2B, BZ1-1, BZ1-2, BZ1- 3, BZ2-1, BZ2-2	Perpetuity
20BL171762	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: C817, D010 (BFS), D214 (BFS), D406 (BFS) (AFS), D510 (BFS), PB01 (ALL), D510 (AFS), D010 (GM), D010 (WDH), D406 (BFS) (AFS), D612 (AFS), D612 (BFS)	Perpetuity
20BL171851	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North/South – Bores: HV2, PZ1CH200, PZ2CH400, PZ3CH800, 4118P, 4119P	Perpetuity
20BL171852	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – PZ4CH1380	Perpetuity
20BL171853	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – DM3	Perpetuity
20BL171854	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – Bores: DM5, PZ6CH2450	Perpetuity
20BL171855	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – PZ5CH1800	Perpetuity
20BL171433	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bore B334 (BFS)	Perpetuity
20BL171434	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: C317 (BFS), C317 (WDH)	Perpetuity
20BL171435	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: BZ3- 1, BZ3-2, BZ3-3	Perpetuity
20BL171436	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: BZ4A(1), BZ4A(2), BZ4B	Perpetuity
20BL171437	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: WG1, WG2, WG3	Perpetuity

Licence Number	Type of Licence	Purpose	Legislation	Description	Expiry Date
20BL171439	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: BRN, E012	Perpetuity
20BL171492	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: C1(WJ039), GW9704, North, GWA981	Perpetuity
20BL171681	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: Bunc 45A, Bunc 45D	Perpetuity
20BL171725	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: B425 (WDH), BRS, C621 (BFS), C919 (ALL), D317 (BFS), D317(ALL), D317(WDH) Destroyed: D420, D425, D621, PB02	Perpetuity
20BL171726	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: SR002, SR003, SR004, SR005, SR006, SR007	Perpetuity
20BL171727	Bore	Monitoring Bore	Part 5 Water Act 1912	SR001	Perpetuity
20BL171728	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: BZ2B, BZ1-1, BZ1-2, BZ1- 3, BZ2-1, BZ2-2	Perpetuity
20BL171762	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO South – Bores: C817, D010 (BFS), D214 (BFS), D406 (BFS) (AFS), D510 (BFS), PB01 (ALL), D510 (AFS), D010 (GM), D010 (WDH), D406 (BFS) (AFS), D612 (AFS), D612 (BFS)	Perpetuity
20BL171851	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North/South – Bores: HV2, PZ1CH200, PZ2CH400, PZ3CH800, 4118P, 4119P	Perpetuity
20BL171852	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – PZ4CH1380	Perpetuity
20BL171853	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – DM3	Perpetuity
20BL171854	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – Bores: DM5, PZ6CH2450	Perpetuity
20BL171855	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – PZ5CH1800	Perpetuity
20BL171856	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – Bores: HV6, HV3, DM6, HV2 (2), 4113P, 4114P, 4116P, 4117P	Perpetuity
20BL171857	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: HV4, HV4 (2) (GA3), GA3,	Perpetuity

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Licence Number	Type of Licence	Purpose	Legislation	Description	Expiry Date
20BL171858	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO North – DM4	Perpetuity
20BL171895	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO West – Destroyed: NPZ4	Perpetuity
20BL171896	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO West – NPZ2	Perpetuity
20BL171897	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO West – Bores: NPZ1 Destroyed: NPZ5	Perpetuity
20BL171898	Bore	Monitoring Bore	Part 5 Water Act 1912	HVO West – NPZ3	Perpetuity
20BL173062	Bore	Monitoring Bore	Part 5 Water Act 1912	RC14	Perpetuity
20BL173065	Bore	Monitoring Bore	Part 5 Water Act 1912	HQ11	Perpetuity
20BL173063	Bore	Monitoring Bore	Part 5 Water Act 1912	RC07, RC08	Perpetuity
20BL173064	Bore	Monitoring Bore	Part 5 Water Act 1912	RC06	Perpetuity
20BL173069	Bore	Monitoring Bore	Part 5 Water Act 1912	RC11	Perpetuity
20CA201247	Works Approval	Pumping Plant	Water Management Act 2000	Associated with WAL965	Perpetuity
20CA212713	Works Approval	Pumping Plant	Water Management Act 2000	Associated with WAL36190	30/05/2025
20FW213280	Flood Work Approval	Levee	Water Management Act 2000	HVO North – Carrington Levee 5	21/09/2027
20FW213281 Formerly 20CW802613	Flood Work Approval	Levee	Water Management Act 2000	HVO South – Barry Levee	21/09/2027
20FW213277 Formerly 20CW802603	Flood Work Approval	Block Dam	Water Management Act 2000	HVO South – Hobden Gully Levee	21/09/2027
20FW213278 Formerly 20CW802604	Flood Work Approval	Levee	Water Management Act 2000	HVO North – North Pit Levee 3	21/09/2027
20WA210991 (See WAL 18307) Formerly 20SL050903	Stream Diversion	Stream Diversion	Water Management Act 2000	HVO West – Parnells Creek Dam	09/01/2023

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Licence Number	Type of Licence	Purpose	Legislation	Description	Expiry Date
20WA211427 Formerly 20SL061290	Stream Diversion	Cutting (Diversion Drain)	Section 10 Water Act 1912	Pikes Gully Creek Stream Diversion	07/09/2023
20WA210985 (See WAL 18327) 20SL042746	Diversion Works	Industrial	Water Management Act 2000	HV Loading Point Pump Bayswater Creek	08/09/2022
20WA211428 20SL061594	Stream Diversion	Cutting (Diversion Drain)	Water Management Act 2000	HVO North – Carrington Stream Diversion	31/07/2022
20WA201238 (see WAL 962)	Diversion Works	Pumping Plant	Water Management Act 2000	HVCPP River Pump	16/03/2028
20WA201257 (see WAL 970)	Diversion Works	Pumping Plant	Water Management Act 2000	HVO South – LCPP River Pump	Perpetuity
20WA201338 (See WAL 1006)	Diversion Works	Pumping Plant	Water Management Act 2000	HVO South – LCPP River Pump	Perpetuity
20WA201501 (See WAL 1070)	Diversion Works	Pumping Plant	Water Management Act 2000	HVO South – LCPP River Pump	Perpetuity
20WA201685 (See WAL 13387)	Diversion Works	Pumping Plant	Water Management Act 2000	HVO West – "Lake Liddell" Licence	Perpetuity
20FW213274	Flood Work Approval	Levee	Water Management Act 2000	Riverview	26/10/2028

Table 13 Water Access Licences

Licence Number	Description	Water Source	Water Sharing Plan	Water Source – Management Zone	Approved Extraction (ML)
WAL867	Comleroi, farming & irrigation	Hunter River	Hunter Regulated River WSP	Zone 2a (Hunter River from Glennies Creek Junction to Wollombi Brook Junction)	486
WAL962	HVO North – HVCPP River Pump – Water Access Licence	Hunter River	Hunter Regulated River WSP	Zone 1b (Hunter River from Goulburn River Junction to Glennies Creek Junction)	3,165
WAL969	HVO South – Former Riverview pump	Hunter River	Hunter Regulated River WSP	Zone 1b (Hunter River from Goulburn River Junction to Glennies Creek Junction)	39

Licence Number	Description	Water Source	Water Sharing Plan	Water Source – Management Zone	Approved Extraction (ML)
WAL970	HVO South – LCPP River Pump – Water Access Licence	Hunter River	Hunter Regulated River WSP	Zone 2a (Hunter River from Glennies Creek Junction to Wollombi Brook Junction)	500
WAL1006	HVO South – LCPP River Pump – Water Access Licence	Hunter River	Hunter Regulated River WSP	Zone 2a (Hunter River from Glennies Creek Junction to Wollombi Brook Junction)	500
WAL1070	HVO South - LCPP River Pump – Water Access Licence	Hunter River	Hunter Regulated River WSP	Zone 2a (Hunter River from Glennies Creek Junction to Wollombi Brook Junction)	500
WAL13387	Macquarie Generation Hunter River Pump Station	Hunter River	Hunter Regulated River WSP	Zone 1b (Hunter River from Goulburn River Junction to Glennies Creek Junction)	20
WAL 13391	HVO North – Alluvial Rehabilitation Irrigation.	Hunter River	Hunter Regulated River WSP	Zone 1b (Hunter River from Goulburn River Junction to Glennies Creek Junction)	420 (908 ML after transfers)
WAL18127	Carrington BB1	Hunter River Alluvium	Hunter Unregulated and Alluvial Water Sources WSP	Hunter Regulated River Alluvial Water Source – Upstream Glennies Creek management zone	383
WAL18158	Ollenberry	Hunter River Alluvium	Hunter Unregulated and Alluvial Water Sources WSP	Hunter Regulated River Alluvial Water Source – Upstream Glennies Creek management zone	65
WAL18307	HVO West – Parnells Creek Dam (Diversion Works By wash)	Unregulated River	Hunter Unregulated and Alluvial Water Sources WSP	Jerrys Water Source; Jerrys Management Zone	500
WAL18327	HV Loading Point Pump Bayswater Creek (Diversion Works)	Unregulated River	Hunter Unregulated and Alluvial Water Sources WSP	Jerrys Water Source; Jerrys Management Zone	150
WAL23889	Greenleek	Wollombi Brook	Hunter Unregulated and Alluvial Water Sources WSP	Low er Wollombi Brook Water Source	144
WAL36190	HVO North, old farm bore	Hunter River Alluvium	Hunter Unregulated and Alluvial Water Sources WSP	Hunter Regulated River Alluvial Water Source – Jerrys Management Zone	120

Heritage Permits

The Section 90 Heritage Permits applicable to HVO South are listed in **Table 15**.

Table 14 Section 90 Permits

Permit No.	Location Description	Authority	Expiry Date
C0001890	Care Agreement	OEH	3 June 2036
C0002193	Aboriginal Heritage Impact Permit	OEH	6 December 2026

Tailings Emplacement Area Approvals

Tailings emplacement approvals held for active or un-capped facilities at HVO North are listed in **Table 16**. Additionally a portion of the GCAA-owned Cumnock Void TSF is utilised under agreement by HVO for the storage of tailings from the HCPP.

Table 15 Tailings Emplacement Area Approvals

Approval	Approval Date	TSF Status
Central TSF	17 April 1998	Inactive
South-East TSF	5 October 2001	Inactive - Partly capped and rehabilitated
Bobs Dump TSF – Stage 2	23 December 2003	Inactive
North Pit TSF	13 June 2003	Inactive
Dam 6W TSF	18 August 2011	Inactive
Carrington In-Pit TSF	25 January 2017	Active

1.3 Land Ownership and Land Use

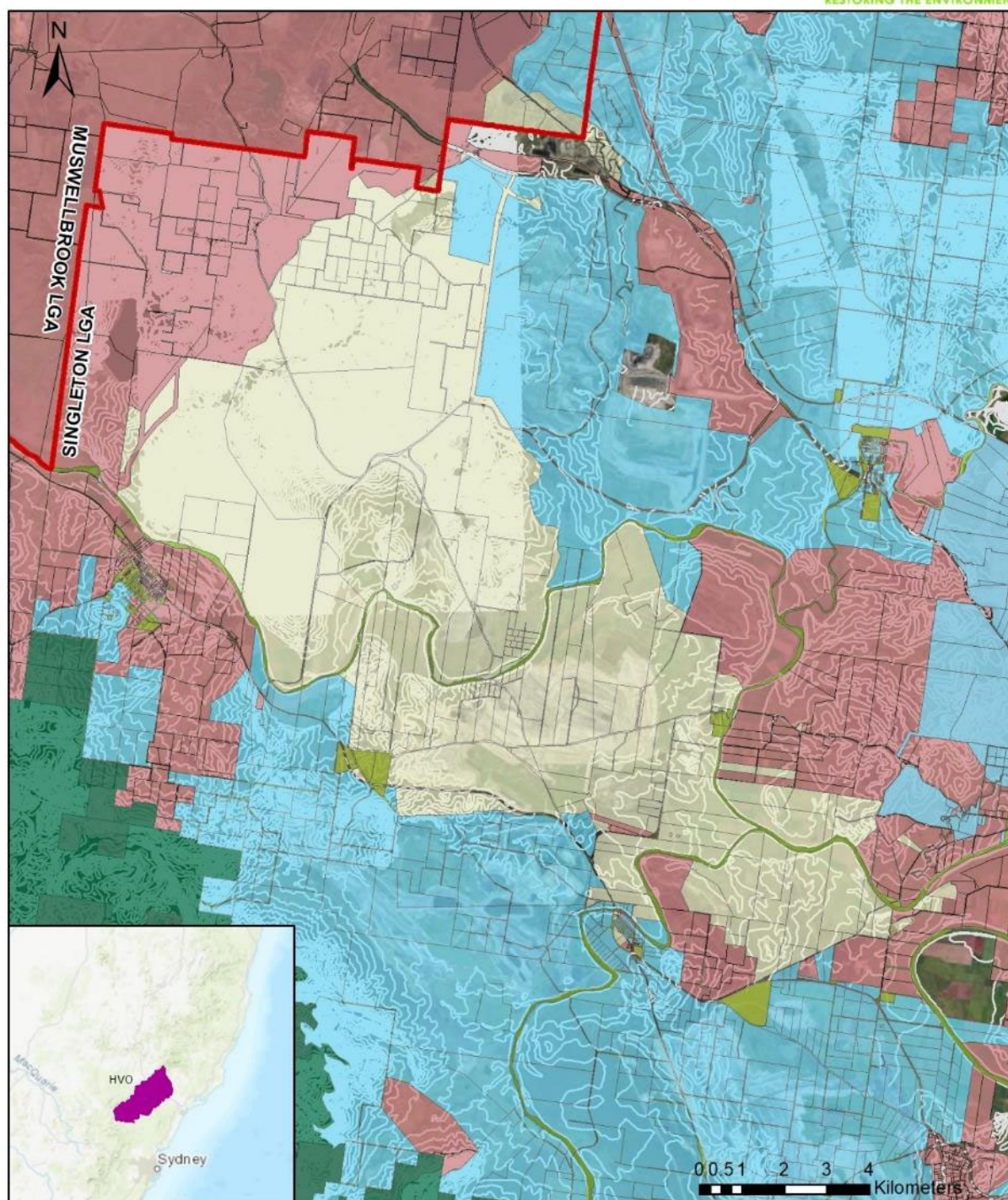
1.3.1 Historic and Current

HVO owns the majority of the lands within the existing leases area. A schedule of HVO land ownership on and adjacent to HVO coal leases is attached as **Appendix B** (as reproduced from Appendix A of DA 450-10-2003 and PA 06_0261) and is shown on **Figure 3**.

HVO is situated in a landscape that is characterised by mining land, grazing land, more intensive agriculture on the Hunter River alluvial zone (cropping and dairying) and some private and public woodland (**Figure 4**). HVO is adjoined by Bayswater Power Station to the north, Ravensworth Operations to the north east, grazing land to the east and west, grazing properties, residences and Mount Thorley Warkworth mining operations to the south east, and United Wambo Open Cut to the south west.

Hunter Valley Operations

Figure 3 - Land Ownership



Legend

 LGA Boundary	 Mine Owned Land (Other)
 10m contour	 National Park
 HVO Owned Land	 Private Land
 Crown Land	

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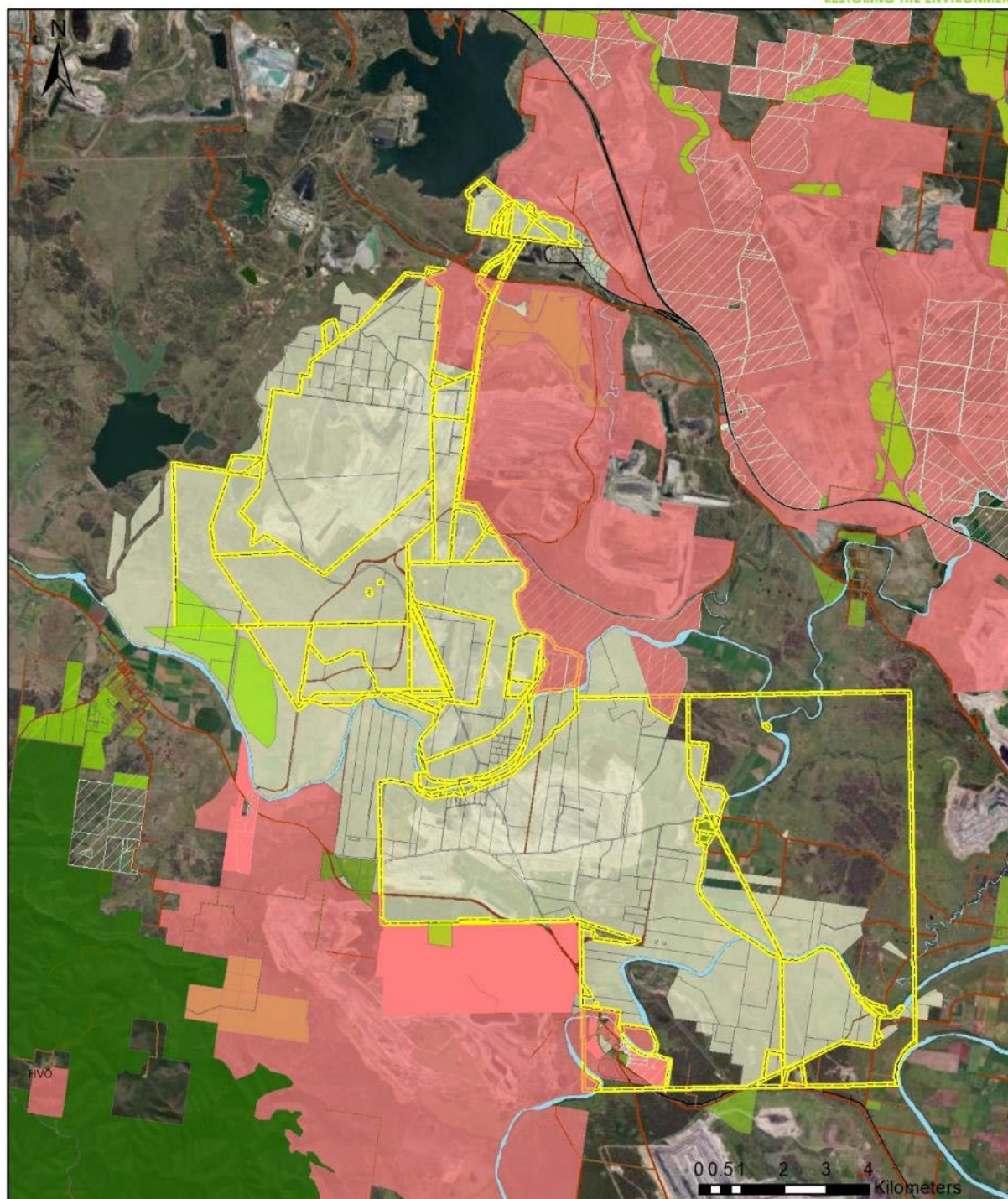
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Hunter Valley Operations

Figure 4 - Current Land Use



Legend

HVO Owned Land	Crown Land	Railway
HVO Mining Leases	National Park	Public Road
Leased Land (agriculture)	Biodiversity Offsets	
Mine Owned Land (other)	Major River / Creek	

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1.3.2 Final Land Use

The proposed final land use for HVO is discussed in detail in **Section 2** below.

2 Final Land Use

2.1 Regulatory Requirements for Rehabilitation

The regulatory requirements related to rehabilitation and the final land use for the site are described in **Section 1.2**.

2.2 Final Land Use Statement

The approved final land use for the operation is a mixture of grazing land and woodland for biodiversity and native habitat.

For HVO North, 70% of rehabilitation will be restored for grazing on native or introduced pastures, which will provide some biodiversity values for native fauna species that are able to persist in grazed or disturbed areas. The remaining 30% of the landscape will be restored to a woodland community with a more diverse native suite of species. This will include overstorey strata to provide habitat and encourage native fauna populations and threatened species that are known to occur, or traverse, in and around HVO.

In regard to HVO South, 60-70% of rehabilitation will be restored for grazing with native or introduced pasture. The remaining 30-40% will be rehabilitated to a woodland community.

Additionally, the Carrington West Wing (CWW) Extension, which was approved in 2013 by Modification 3 of DA 450-10-2003 requires the following (subject to the proposed mining occurring):

- Reinstatement of 65ha of Class II land;
- Reinstatement of 65ha of Class III land; and
- Rehabilitation of 4ha of land that is consistent with the Central Hunter Grey Box Ironbark Woodland community.

Plan 1 in **Appendix A** provides a conceptual final rehabilitation plan showing the proposed location of these final land uses.

2.3 Final Land Use and Mining Domains

2.3.1 Final Land Use Domains

Final land use domains are defined as land management units characterised by similar final land use objectives. Each final land use domain will require specific decommissioning and rehabilitation methods. The final land use domains have been selected to be consistent with those specified in *Form and Way: Rehabilitation management plan for large mines* (RR, 2021), and are listed with their descriptions below in **Table 17**. The final land use domains are shown on **Plans 1** and **2** in **Appendix A**.

Table 17– Final Land Use Domains

Domain	Description	Code
Native Ecosystem	Areas to be rehabilitated with woodland species commensurate with adjacent remnant vegetation. Approximately 30% (HVO North) and 30-40% (HVO South) of mined land will be returned to woodland. This will also include a network of tree corridors to ensure connectivity of woodland community areas, as well as 4ha of land consistent with the Central Hunter Grey Box Ironbark Woodland ¹ .	A
Agricultural - Grazing	Areas to be rehabilitated with selected native and exotic grasses and pasture species. Approximately 70% (HVO North) and 60-70% (HVO South) of mined land will be returned to pasture. Includes 65ha of Class II and 65ha of Class III land ¹ .	B
Water Management Area	A network of dams and surface water management structures are planned to be retained to assist in ongoing water and land management (e.g. stock watering).	F
Water Storage (excluding final voids)	Two large water storage dams (Parnells Dam and Lake James) are proposed to remain in the final landform.	G
Final Void	Three final voids are planned to remain in place at completion of mining at HVO North. Two separate voids will remain in West Pit and a single final void in Carrington Pit. One final void is planned to remain in place at HVO South following the cessation of mining. This is located in the south-western corner of the Riverview Pit. Final voids will create permanent water bodies. Landforms above pit water level will be vegetated where practical with woodland vegetation communities.	J

¹ Subject to proposed mining occurring and triggering this rehabilitation requirement

2.3.2 Mining Domains

Mining domains have been defined as the set of discrete areas that have a particular operational or functional purpose. All areas previously disturbed by mining have been assigned to an appropriate mining domain (as per *Form and Way: Rehabilitation management plan for large mines*), as listed in **Table 18** below. The current footprint of each mining domain is also depicted on **Plan 3**.

Table 168 – Mining Domains

Domain	Description	Code
Infrastructure	Existing infrastructure and facilities including the pit top, workshops, administration buildings, access roads, haul roads, hardstand/laydown areas, topsoil stockpiles, unsealed boreholes and monitoring equipment.	1
Tailings Storage Facility	The footprint of current tailings emplacement areas (fine rejects).	2
Water Management Area	This domain includes the network of dams and associated water management structures at HVO.	3
Overburden Emplacement Areas	The footprint of all in-pit and out of pit waste rock emplacements (overburden and coarse rejects).	4
Active Mining	The footprint of the HVO active mining areas, including:	5

	Pre-strip areas ahead of mining; Active mining areas; and Voids and inactive in-pit areas prior to commencement of backfilling.	
Beneficiation Facility	The footprint of the coal washing facilities, and associated infrastructure.	7
Other	Includes all areas that don't fall into the above categories including: Existing pasture and woodland rehabilitation areas; Temporary rehabilitation areas; and Topsoil stockpiles.	8

3 Rehabilitation Risk Assessment

Risks to achieving rehabilitation completion have been identified and assessed in accordance with the GCAA Risk Management Standard (GCAA-625378177-2844) and Clause 7 of Schedule 8A of the Mining Regulation 2016.

The first rehabilitation risk assessment for HVO was undertaken on 7 February 2022 and was used in the development of this RMP. A total of 37 risks were identified during the process of the risk assessment. Of these risks, 31 were ranked as low and six were ranked as medium risks. There were no risks identified as being high risk to the establishment of rehabilitation. The six medium risks were:

- Limited biological resources available for salvage;
- Soil (topsoil and/or subsoil) deficit for rehabilitation activities;
- Soils inadequate to support revegetation or agricultural land capability;
- Weed infestation limiting target species / community;
- Weather and climatic influences (drought, flood) during initial establishment; and
- Insufficient establishment of target species and limited species diversity.

A table outlining all of the risks identified, their risk ranking, controls and where the controls are included in this RMP is included as **Appendix C**.

4 Rehabilitation Objectives and Rehabilitation Completion Criteria

4.1 Rehabilitation Objectives

Final land use and mining domains require specific management objectives to realise the desired final land use outcome, due to the distinct geophysical features associated with the current land function. The rehabilitation objectives for the domains identified in Section 2.3 are defined in **Tables 19** and **20** below.

Table 1917 – Final Land Use Domain Rehabilitation Objectives

Domain	Rehabilitation Objective
Domain A – Native Ecosystem	<ul style="list-style-type: none"> Approximately 30% (HVO North) and 30-40% (HVO South) of mined land re-established as woodland areas. Rehabilitated woodlands are reproducing and sustainable, of dimensions able to support ecosystem biodiversity (habitat), provide transport corridor for fauna, and function consistently with neighbouring remnant ecosystems. Mined lands are rehabilitated to their original land capability class or to a quality and condition suitable to the intended land use and based on local analogue/reference sites. Rehabilitate 4 ha of mined land in the CWW Extension area to Central Hunter Grey Box Ironbark Woodland if/when the CWW Extension project commences. Noting the CWW Extension has not commenced and is not planned during the MOP term.
Domain B – Agricultural Grazing	<ul style="list-style-type: none"> Approximately 70% (HVO North) and 60-70% (HVO South) of mined land re-established as stable, productive pasture areas. Reinstatement of 63 ha of Class I and II lands in the North Pit Alluvial Lands Reinstatement Project (ALRP) area. Reinstatement of 65 ha of Class II and 65 ha of Class III lands in the CWW Extension Area – if/when the CWW Extension project commences. Noting the CWW Extension has not commenced and is not planned during the MOP term. Reinstated ALRP and CWW areas to achieve a Lucerne hay productivity yield to be at least equivalent to the average crop productivity yields for the Upper Hunter Region for three consecutive years. Mined lands are rehabilitated to their original land capability class or to a quality and condition suitable to the intended land use and based on local analogue/reference sites.
Domain F – Water Management Area (e.g. creek realignments, constructed wetlands, significant final landform drainage features)	<ul style="list-style-type: none"> Where structures are to be retained, all hazardous materials and/or contaminated materials will be removed, as required. Structures will be consistent with the surrounding landscape and will be stable. Water quality within EPL criteria and rehabilitation completion criteria.
Domain G – Water Storages (includes dams retained for the final land use, but excludes any anticipated permanent water body in the final void)	<ul style="list-style-type: none"> Remaining water storages will have all hazardous materials and/or contaminated material and sediments removed Dam walls and spillways will be assessed stable Water quality within the storages will be consistent with rehabilitation completion criteria
Domain J – Final Void	<ul style="list-style-type: none"> Final voids will be constructed in accordance with an approved Final Void Management Plan. Final voids will be made safe, profiled for long term stability, and non-polluting. All open cut mining infrastructure removed. All hazardous materials and contaminated materials removed. Risk of coal seam spontaneous combustion minimised. Risk of acid rock drainage is minimised. Landform generally blends in with surrounding landscape and is stable. Final voids will be used for water storage post-mining.

Table 180 – Mining Domain Rehabilitation Objectives during Operations

Domain	Rehabilitation Objectives
Domain 1 – Infrastructure	<ul style="list-style-type: none"> Built infrastructure (including administration buildings and workshops), fixed plant and services will be progressively decommissioned and sites rehabilitated if no longer required. Once any drill hole ceases to be used the land and its immediate vicinity is to be rehabilitated to its former condition, and sealed, surveyed and marked in accordance with relevant guidelines. All hazardous and/or contaminated materials will be identified and removed or appropriately remediated. Disturbed areas will be re-graded to produce free draining landforms. Drainage structures will be designed and constructed in accordance with site specific requirements and recognised engineering design standards including 'Blue Book'. Vegetation communities will be established on infrastructure areas generally in accordance with the conceptual final landform depicted on MOP Plan 4.
Domain 2 – Tailings Storage Facility	<ul style="list-style-type: none"> All tailings pumping infrastructure will be decommissioned and removed. Tailings emplacements will be back filled, capped and rehabilitated to produce a geotechnically stable, free draining, and non-polluting landform. Tailings will be backfilled and capped with at least: <ul style="list-style-type: none"> 2 m of select material (clays and/or select weathered rock); and 100 mm of topsoil or suitable topdressing medium (unless otherwise agreed following geotechnical assessments and detailed capping design). The tailings capping will be designed and constructed to minimise the potential for Acid Rock Drainage or spontaneous combustion. Progress of rehabilitation and restoration will be monitored as part of the Rehabilitation Monitoring Program for HVO. The rejects and tailings emplacement area will be rehabilitated to pasture and woodland, comparable to appropriate reference sites. Rehabilitated TSFs will be integrated into the final landform and revegetation strategy.
Domain 3 – Water Management Area	<ul style="list-style-type: none"> Clean water will be diverted around operational areas, where practical. Mine water and sediment laden (dirty) water runoff from disturbance areas will be captured and diverted to mine water and dirty water dams. Mine water and dirty water will be preferentially used for operational requirements such as dust suppression and coal processing. Landform generally blends in with surrounding landscape and is stable. The drainage pattern of the final landform will be designed to integrate with the surrounding catchments and will be revegetated to achieve long term stability and erosion control and also to harmonise with more general rehabilitation and revegetation strategies.
Domain 4 – Overburden Emplacement Area	<ul style="list-style-type: none"> Safe, stable and non-polluting. Final landform will be developed to be compatible with surrounding landscape features but with recognition of existing historical rehabilitated landforms. Active emplacement areas will be progressively dumped to the final design height, shaped and rehabilitated to minimise the disturbance footprint to the maximum extent practical. Overburden emplacements will be designed and constructed to be geotechnically stable and compatible with the surrounding landscape. Overburden emplacement areas will be adequately drained and incorporate drainage structures designed and constructed in accordance with site specific requirements and recognised engineering design standards including the 'Blue Book'. Overburden emplacements will be designed and constructed to drain away from final voids.

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Domain	Rehabilitation Objectives
	<ul style="list-style-type: none"> Vegetation communities will be established on overburden emplacements generally in accordance with the conceptual final landform depicted on MOP Plan 4.
Domain 6 – Active Mining	<ul style="list-style-type: none"> Areas disturbed for open cut mining will be progressively backfilled and rehabilitated. Open cut pit shells will be backfilled to the maximum extent possible to minimise the area and depth of final voids. Mine sequencing will be designed to optimise the opportunities to progressively backfill and rehabilitate open cut areas. Open cut pit highwalls will be benched and stabilised progressively in accordance with geotechnical design (as required).
Domain 7 – Beneficiation Facility	<ul style="list-style-type: none"> Built infrastructure, fixed plant and services will be progressively decommissioned and sites rehabilitated if no longer required. All hazardous and/or contaminated materials will be identified and removed or appropriately remediated. Coal stockpiles will have all carbonaceous material removed or appropriately capped. Disturbed areas will be re-graded to produce free draining landforms. Drainage structures will be designed and constructed in accordance with site specific requirements and recognised engineering design standards including 'Blue Book'. Vegetation communities will be established on infrastructure areas generally in accordance with the conceptual final landform depicted on MOP Plan 4.
Domain 8 - Other	<ul style="list-style-type: none"> Rehabilitated areas will be designed and constructed to be geotechnically stable and compatible with the surrounding landscape. Rehabilitated areas will be adequately drained and incorporate drainage structures designed and constructed in accordance with site specific requirements and recognised engineering design standards including the 'Blue Book'. The final landform will be shaped to minimise the surface water catchment draining to the void. Revegetation works will utilise either native and suitable exotic pasture species, or suitable native woodland species to achieve the desired final land use community. Topsoil stockpiles will be managed and maintained to preserve topsoil resources and improve topsoil quality over time.

4.2 Rehabilitation Completion Criteria

The completion criteria are objective target levels or values assigned to a variety of indicators (i.e. slope, species diversity, groundcover etc.), which can be measured to demonstrate progress and ultimate success of rehabilitation. They provide a defined end point, at which point in time rehabilitation can be deemed successful and the lease relinquishment process can proceed.

The rehabilitation completion criteria for HVO are provided in **Appendix D**. Completion criteria have been developed considering site specific issues, objectives and regulatory requirements (refer **Section 2.1**).

4.3 Stakeholder Consultation

Consultation on rehabilitation objectives and completion criteria for HVO's operations has been undertaken over many years and for numerous purposes, including:

- Consultation for the HVO South Environmental Assessment (Modification 5)
- Consultation for the HVO North Environmental Assessment (Modification 7)
- Consultation with the RR on the HVO Mining Operations Plan 2020-2022

A brief outline of this consultation is provided in the sections below.

HVO MOP / RMP

Representatives from HVO, SLR and the RR met to discuss the development of the previous MOP on 24 October 2018. On 12 June 2020, HVO requested approval from the Secretary to undertake targeted consultation with regulators during the preparation of this MOP. The DPIE approved this request on 6 October 2020 given that the MOP did not involve material changes to rehabilitation, disturbance or landforms. The DPIE required that the MOP be prepared in consultation with the Resources Regulator.

HVO has previously met with Singleton Council who expressed that their concerns lie with ensuring sufficient detail regarding the identified final land use within the various domains. This is consistent with discussions that HVO has had with the Resource Regulator and, as such, specific rehabilitation objectives and completion criteria that clearly define the final land uses were emphasised in the previous MOP and have also been included in this RMP.

Environmental Assessments

Government Agency Summary of Consultation	
HVO South Modification 5 Environmental Assessment	
DPIE	Three meetings were held in March and September 2015 and April 2016. Items discussed during the consultation process included a project briefing, planning pathway and matters requiring consideration.
Community	Community consultation included meetings with the HVO CCC, 25 near neighbours and two open community BBQ events. Matters raised during this consultation relevant to the RMP included visual amenity and the final landform (specifically, the height of overburden emplacements relative to nearby operations) and the mining of existing rehabilitation. These issues were considered were addressed within the Modification 5 Environmental Assessment document.
HVO North Modification 6 Environmental Assessment	
DPIE	Two meetings held in September and October 2016 which included discussion on the preferred final land use
HVO North Modification 4 Environmental Assessment	
DPIE	One meeting in July 2012 to discuss a project briefing, the need to document alternatives considered and additional key matters requiring consideration.
DRE	Two meetings held in July and December 2012 regarding fine reject management and the sites rehabilitation strategy

5 Final Landform and Rehabilitation Plan

In accordance with the requirements of the Form and Way: Rehabilitation Objectives, Rehabilitation Completion Criteria and Final Landform and Rehabilitation Plan for Large Mine (NSWRR, 2021), two Final Landform and Rehabilitation Plans (**Plans 1 and 2, Appendix A**) have been prepared to show the proposed final land use and final landform at the end of mine life.

Final landform slopes in West Pit will vary according to erosion hazard, stability and drainage requirements. Maximum external slopes will be less than 10°. Internal slopes may be steepened to grades up to 18° (with regulatory approval). Slopes above 10° would typically be covered by woodland. Final landforms at Carrington Pit, CWW Extension, North Pit and the Alluvial Lands will reflect pre mining landscapes of undulating hills, and flat and gently sloping areas. The rehabilitation objective with DA 450-10-2003 requires the mine site to be safe, stable and non-polluting.

The proposed final landform for HVO North will include three final voids across West Pit North, West Pit South, and Carrington and operating as a mix of evaporative sinks and pit lakes. HVO South will include an evaporative basin in the south-western corner of the Deep Cheshunt Pit (currently Riverview Pit).

HVO South will incorporate micro-relief and natural landform drainage lines that are consistent with surrounding topography and the approved final landform, noting that historical rehabilitation areas were constructed using traditional landforms and slopes in accordance with the approvals applicable at the time.

6 Rehabilitation Implementation

6.1 Life of Mine Rehabilitation Schedule

All areas disturbed as part of the operation will be progressively rehabilitated throughout the life of the mine. Each year HVO prepares an Annual Rehabilitation and Closure Plan which identifies all available rehabilitation and required closure / decommissioning activities.

Progressive rehabilitation includes the decommissioning and rehabilitation of tailings storage facilities. The status and proposed decommissioning schedule for each of the remaining storages is provided in **Table 21** below.

Table 191 – Tailings Storage Facility Rehabilitation Schedule

Site	Status	Average Depth (m)	Storage (Mm ³) and Volume (ML)	Start	Finish	Estimated Capping Volume (kBCM)	Capping Source	Estimated Rehabilitation Timeframe
South East TSF	Inactive Capping in progress	10	1.46 Mm ³	1997	Jun 2004	0	N/A	2017-2023
Central TSF	Inactive	12	1.9 Mm ³	2001	Mar 2009	500	Carrington out of pit dump	Est. 2026-2029
Bob's Dump TSF	Inactive	8	1.84 Mm ³	2001	Dec 2012	1,000	Mitchell and Wilton Pits	Est. 2023-2026
Dam 6 TSF (Stage 2)	Inactive (full, consolidating)	24	4.4 Mm ³	Jan 2013	Dec 2021	1,000	Mitchell and Wilton Pits, stockpiled	Est. 2031-2035
North Void TSF	Inactive (consolidation, void filling permitted annually)	26	19.5 Mm ³	Jan 2004	Feb 2019	5,000	Carrington out of pit dump	Est. 2030-2040
Carrington In-Pit	Active	30	11.83Mm ³	Feb 2019	Mar 2030	4,000	Carrington out of pit dump	Est. 2038-2040
Lemington 1 TSF (Cell A&B)	Capped and Rehabilitated							
Lemington 4 TSF (Cell A&B)	Capped and Rehabilitated							
Eastern TSF	Capped and Rehabilitated							
Western TSF (Cell A&B)	Capped and Rehabilitated							
Lemington 2	Capped and Rehabilitated							
Lemington 3	Capped and Rehabilitated							
Lemington 5	Capped and Rehabilitated							
Howick TSF	Capped and Rehabilitated							
Pykes Gully TSF	Capped and Rehabilitated							

Further details regarding the tailings storage facilities is provided in the HVO Life of Mine Fine Reject Management Strategy (LOMFRMS). Additionally, HVO undertakes an annual tailings risk assessment to identify any emerging tailings risks and the appropriate critical controls required.

The proposed rehabilitation schedule for the life of the mine is outlined on **Plans 3 – 9 in Appendix A**. It should be noted that this rehabilitation schedule is based on the current approved mining timeframes in DA 450-10-2003 and PA 06-0261. HVO is currently developing a continuation project which if approved will extend both mining and rehabilitation activities beyond these dates and will be reflected in future updates to this RMP.

6.2 Phases of Rehabilitation and General Methodologies

The ultimate rehabilitation objective for HVO is to create stable, non-polluting post mining landforms that are cognisant of site constraints and allow the achievement of the agreed post mining land uses. This will be achieved by demonstrating completion of a series of conceptual phases of rehabilitation which are described as:

1. Active Mining – stripping and salvaging, stockpiling and ongoing management of topsoil resources including testing and characterisation and weed management;
2. Decommissioning – decommissioning of all on-site infrastructure, including the CPP's, administration buildings and train loading facilities; removal of haul road, rail crossings and hard stand areas, the completion of contamination studies for relevant areas and subsequent decontamination where required, removal of hazardous materials;
3. Landform Establishment – incorporates slope, aspect, drainage, substrate material characterisation and morphology;
4. Growth Medium Development – incorporates physical, chemical and biological components of the growing media and ameliorants that are used to optimise the potential of the media to support the preferred vegetative cover;
5. Ecosystem and Land Use Establishment – incorporates revegetating lands, habitat augmentation, species selection, species presence and growth together with weed and pest animal control /management and establishment of flora;
6. Ecosystem and Land Use Sustainability – incorporates components of floristic structure, nutrient cycling recruitment and recovery, community structure and function which are the key elements of a sustainable landscape; and
7. Land Relinquishment – completion criteria for rehabilitation are met and the land is determined to be suitable to be relinquished from the mining tenement.

6.2.1 Active Mining

Environmental mitigation and management strategies will be implemented during the active phase of the operation to minimise environmental impacts. A number of activities will be undertaken during the active mining phase which will be specifically aimed at enhancing rehabilitation outcomes. Activities undertaken in this regard are summarised below.

6.2.1.1 Topsoil Management

Topsoil Stripping

Topsoil will be stripped and salvaged correctly to maximise its value for re-use in rehabilitation. Where possible, the topsoil is directly transported from stripping to rehabilitation areas. If this is not possible, topsoil is stockpiled for later reuse.

Areas that are planned to be mined are stripped of soil prior to commence of mining. Excessive advance clearing and soil removal is kept to a minimum to reduce dust generation and potential impacts on fauna species. However, this is balanced with clearing a large enough area to aid flexibility in the scheduling of stripping activities to enable works to occur in favourable conditions and outside of fauna breeding periods. Soil is stripped using appropriately sized earthmoving equipment, generally bulldozers. Where practicable, soil is stripped when moist, but not saturated. Prior to stripping of soil, appropriate sediment controls are installed to prevent off-site loss of soil sediments.

Soil Management and Handling

Stripped topsoil and subsoil needs to be managed to prevent erosion and weed infestation, and to ensure that the maximum soil reserves are retained for reuse during rehabilitation works.

Where feasible, soil is transferred directly from stripping to re-spreading operations, eliminating the need for storage. However, mine scheduling dictates that soil storage will be necessary on occasion for extended periods. Where stockpiling is required, the following principles are sought to be adopted:

- stockpiles are preferentially located away from heavily trafficked or active mining areas, watercourses and are placed on areas of flat topography or along the contour to minimise erosion;
- soils are stockpiled separately according to source, nature and history, and characterisation, and records maintained;
- soil stockpiles are identified, volume recorded, and management inspections are undertaken;
- stockpiles are constructed to a height of approximately 3 m, or less;
- where necessary and/or practical, bunding, sediment fencing or other appropriate sediment controls are installed around the base of the stockpile to minimise soil loss;
- stockpiles are sown with cover crop to help maintain topsoil viability and minimise erosion and weed infestation if not being reused for prolonged periods; and
- topsoil stockpiles are scalped, if necessary, prior to re-spreading onto rehabilitation areas to prevent the spread of weed seed into new rehabilitation.

Soil Treatment

Where topsoil quality data is not available, soil testing is undertaken to inform if soil treatment is required. Soil ameliorants, such as gypsum, compost, and fertilisers are applied where required to improve soil condition. The ameliorant type and application rate are confirmed by characterisation testing of topsoils at appropriate times during the stripping and reuse cycle and, generally, reference to specialist agronomic advice.

Where appropriate topsoil resources are not available, alternate growth mediums such as subsoils and mine spoil may be used, typically with amelioration and informed by characterisation of the planned growth medium. Organics such as green waste or composted municipal waste materials may be used in place of chemical fertilisers to enhance soil nutrient and organic levels and improve soil or growth medium structure. Revegetation can then be undertaken progressively as surface preparation and amelioration is completed.

6.2.1.2 Flora and Fauna

Clearing protocols are implemented before and during disturbance activities to mitigate impacts and to salvage appropriate resources, namely the Ground Disturbance Permit (GDP) approval process. The GDP process ensure that:

- key stakeholders are notified of work which will disturb land;
- works are assessed for potential impacts (on threatened and non-threatened flora and fauna);
- appropriate controls are identified and implemented, including delineation of disturbance areas; and
- resources that may be useful for rehabilitation (topsoil, seeds, hollow trees, woody debris) are identified and salvaged.

6.2.1.3 Rock and Overburden Emplacement

All overburden and interburden material generated from mining operations at HVO is either road hauled to, or directly emplaced by the dragline on current emplacement areas behind the active mining operation.

All mining waste emplacements will be reshaped as required to construct the approved final landform. The method and height of emplacement areas will be in accordance with the final approved landforms and HVO procedures for dumping. The heights of emplacement at HVO will be generally in accordance with the proposed final landform levels and as shown on **Plan 2: Final Landform Contours**.

6.2.1.4 Waste Management

Recycling and disposal of waste at HVO focuses on the correct handling, storage, segregation and reuse of materials. HVO recycles waste wherever possible, to reduce the amount of waste destined for landfill.

Waste will be managed in accordance with the following waste management hierarchy principles:

- Waste avoidance;
- Waste re-use;
- Waste recycling; and
- Waste removal and disposal.

6.2.1.5 Geology and Geochemistry

HVO extract coal seams within the Permian aged Jerrys Plains Subgroup of the Hunter Coalfields. The Jerrys Plains Subgroup comprises economic coal seams, along with overburden and interburden consisting of sandstone, siltstone, tuffaceous mudstone and conglomerate. The Permian coal measures are stratified (layered) sequences that have undergone deformation resulting in strata dipping at a shallow angle of 2° to 5° to the south-west at HVO North. Regionally, the stratigraphy dips in a general south-westerly direction, towards the Hunter River from Carrington Pit void.

Overburden material varies in physical and geochemical properties, in accordance with the geology of the area and the extent of exposure to weathering. Chemical analysis of HVO spoil material indicates that, in general, the overburden is slightly sodic and alkaline, but within acceptable ranges for use as a plant growth medium.

Further discussion on the potential impacts of geology and geochemistry on the rehabilitation (spontaneous combustion and acid mine drainage) is provided in the sections below.

6.2.1.6 Material Prone to Spontaneous Combustion

HVO has procedures for managing spontaneous combustion in mine and rehabilitation areas. The objectives of HVO spontaneous combustion management is to:

- Ensure that spontaneous combustion outbreaks are minimised;
- Endeavour to identify potential areas that may be prone to spontaneous combustion before an outbreak occurs;
- Ensure that all carbonaceous material is placed in such a manner that reduces the possible occurrence of spontaneous combustion; and
- Where longer term spontaneous combustion problems occur, develop and implement a management plan to address until resolved.

Any spontaneous combustion will be managed in accordance with the *Spontaneous Combustion Principal Hazard Management Plan* (HVO 2021).

6.2.1.7 Material Prone to Generating Acid Mine Drainage

Mineral wastes may pose an environmental risk because of acid drainage, however the potential for acid mine drainage (AMD) at HVO is low. The EIS prepared by EMGA (2010) as part of Mod 3 to DA 450-10-2003 states that as with most Hunter Valley coal seams, the coal measures within the site have a high buffering capacity and relatively low sulphur content, so there is no significant risk from acid rock drainage.

The Archerfield Sandstone, tailings and coarse rejects are materials most likely to present the highest AMD risk and are managed in accordance with internal mine planning procedures.

Existing management processes are in place to ensure AMD material is managed appropriately. In accordance with Schedule 3, Condition 62A of DA 450-10-2003, potentially acid forming interburden material is not emplaced at elevations within the pit shell or out of pit emplacement areas where they may promote acid or sulphate species generation and migration beyond the pit shell or out of pit emplacement areas.

6.2.1.8 Ore Beneficiation Waste Management (Reject and Tailings Disposal)

Coarse Rejects

Coarse reject consists predominantly of fine-grained sedimentary rock types with minimal quantities of carbonaceous material. The reject contains no energy, is of no current commercial use and has low potential for spontaneous combustion. This material has similar properties to overburden in contact with coal seams, and is generally saline and alkaline.

Coarse rejects are transported by truck and buried below the final surface level in overburden emplacements as part of the final landform design. The depth of cover is determined by a suitably qualified engineer in accordance with the approved management plans applicable to the location to ensure that potential acid mine drainage matters are mitigated.

Tailings

Fine reject (tailings) is thickened into a solid density of approximately 20% to 30% by weight and is predominantly fine rock and clay with some coal and flocculent. The tailings are wet with moderate conductivity.

Tailings are currently transported to the following emplacement areas:

- Carrington In-Pit TSF; and
- Cumnock Void TSF – under an agreement with Glencore (Ravensworth) to utilise 25% of the void capacity.

Intermittent deposition of tailings will occur at North Pit TSF, Dam 6W TSF and Central TSF as part of ongoing management towards decommissioning, subject to approval from the Regulator. TSF locations are shown on **Figure 2**, and **Section 6.1** provides information on the plans for capping and rehabilitation of TSFs for the life of the operation.

6.2.1.9 Erosion and Sediment Control

Erosion and sedimentation at HVO is managed in accordance with the Water Management Plan (HVO 2018).

During and following ground disturbance, structures such as sediment dams, sediment fences and catch drains will be utilised as appropriate to manage runoff water and manage erosion and sedimentation. Inspections will be carried out to ensure the effectiveness of erosion and sediment control structures. Additional stabilisation works for these areas may include reshaping, amelioration of dispersive soil, revegetation, fencing and weed control.

6.2.1.10 Ongoing Management of Biological Resources for use in Rehabilitation

All risks and mitigation measures associated with the management of topsoil, seeds and other biological resources are discussed in **Section 6.2.1.1** and **Section 6.2.1.2**.

6.2.1.11 Mine Subsidence

The former Lemington Underground Mine operated from 1971 to 1992 using bord and pillar mining methods in the Mount Arthur Seam, with areas of longwall extraction. The former Lemington Underground Mine was acquired and merged into HVO South in 2001. The underground workings are located south-east of the current mining areas at HVO South, below the South Lemington Pit 1, and north-west of Warkworth Mine. The Mount Arthur Seam floor in the former workings ranges from approximately 40 metres Australian Height Datum (mAHD) to approximately -205 mAHD, generally dipping from the north-east to the south-west.

HVO will continue to store and extract water from the Lemington Underground Mine workings, but there is not expected to be any subsidence impacts on current or future operations or rehabilitation.

6.2.1.12 Management of Potential Cultural and Heritage Issues

Aboriginal cultural heritage is managed in accordance with the HVO North Aboriginal Heritage Management Plan (HVO 2020a) and the HVO South Aboriginal Cultural Heritage Management Plan (HVO 2020b). HVO works closely with the local Aboriginal community on all aspects of cultural heritage management. Regularly community consultation occurs via the HVO Aboriginal Cultural Heritage Working Group on matters pertaining to Aboriginal cultural heritage at HVO.

HVO has also constructed and maintains Cultural Heritage Databases and a Geographical Information System (GIS) to better manage and protect sites. The GDP system has also been implemented at HVO and must be authorised by cultural heritage staff and completed prior to any disturbance of HVO outside current mining operations.

There are no cultural heritage features associated with the final landform.

There are no listed items of European Heritage in planned rehabilitation areas at HVO and therefore no management measures are required.

6.2.1.13 Exploration

Exploration drilling will be undertaken within the HVO mining lease areas to obtain further information regarding the resources to be mined as well as define geological and geotechnical information relevant to the mining and construction activities that will be undertaken. Additional drill holes to install groundwater and gas monitoring bores may also be required.

Construction, sealing and abandonment of boreholes will be in accordance with relevant standards and guidelines published by the DPIE-RR and in force at the time.

6.2.2 Decommissioning

As part of the mine closure process, infrastructure which is not able to be utilised by subsequent approved land uses will be removed. Soils within and surrounding former infrastructure areas will be assessed for potential contamination. Any contamination present will be remediated, and contaminated material will be treated or appropriately disposed of. As with other disturbed areas, former infrastructure areas will be revegetated unless proposed for other land uses.

As part of the mine closure process, dams forming part of the mine water management system will be removed unless they are to be utilised for habitat purposes, are associated with long-term stability and water management, or are beneficial to subsequent land uses (e.g. stock dams). Removal of sediment from mine water dams will occur as required as part of the closure and rehabilitation processes regardless of the suitability of the dams for other purposes.

A Phase 1 Contamination Assessment has been completed across the operation, with a Phase 2 assessment also completed at the former Lemington CHPP location. The operation, in particular infrastructure areas, will be further assessed prior to decommissioning or demolition.

6.2.2.1 Site Security

Site security measures will be implemented for the duration of the operation. These measures will be maintained during closure, decommissioning and demolition activities to prevent unauthorised access and to ensure public safety. Security measures will include:

- fencing and sign posting of the site;
- security patrols;
- all personnel, contractors and visitors will be required to undertake a relevant site induction and sign in and out of the site; and
- all visitors will be required to be accompanied by a site representative at all times.

6.2.2.2 Infrastructure to be Removed or Demolished

Building and Fixed Plant

All buildings, fixed plant and other infrastructure that are not required as part of the post-closure land use will be demolished and removed from the site. Where appropriate, the materials recovered during demolition will be sold for reuse or recycled. This includes ROM and product stockpiling and transport infrastructure such as bins and conveyors.

Concrete footings and pads, along with other inert building waste, will be broken up and buried with overburden in the pit area or used in rehabilitation where appropriate. Footings and pads will be removed to a depth of 0.5m below the ground surface and covered with inert material. It is noted that an EPL variation will be required to permit the disposal of this inert waste on site.

Where they do not pose a constraint to the proposed final land use, structures such as footings, underground water pipelines and disconnected power cables may be left in situ. This may include where it is not practical to retrieve the structures or where their removal may lead to environmental damage. These remaining structures will be surveyed and recorded on a plan.

Equipment Storage Areas

Any redundant plant or equipment will either be sold or disposed of at an appropriate landfill facility.

Storage areas will be assessed for potential contamination (e.g. hydrocarbons) and remediation undertaken as required.

Hardstand Areas, Roadways and Car Parks

Hardstand areas, roadways and car parks will be removed (unless required for a post mining land use) with inert waste material (e.g. bitumen, concrete) being placed and capped in the tailings/overburden emplacement areas or incorporated into the final voids.

6.2.2.3 Buildings, Structures and Fixed Plant to be Retained

At this stage, no buildings, structures or fixed plant are proposed to be retained as part of the final landform. However this will be reviewed during the detailed mine closure planning process which will be undertaken as the operation approaches mine closure.

6.2.2.4 Management of Carbonaceous / Contaminated Material

Excess coal material remaining at closure will be scraped up and either reprocessed or disposed of within the tailings/coarse reject emplacement areas on site.

Any remaining carbonaceous material (e.g. coal reject) on the base of the coal stockpile area will be either capped with inert material in accordance with relevant guidelines or scraped up, removed and disposed of with tailings or as coarse reject within the emplacement area.

Where there is potential that contamination may have occurred as a result of site activities (e.g. refuelling areas, workshops, etc), investigations will be undertaken to determine the presence and extent of any contamination. Where identified, contaminated material will be bioremediated on site or disposed of offsite at an authorised waste facility.

If applicable, a suitable qualified contamination expert will be engaged to verify that any contamination has been adequately managed.

6.2.2.5 Hazardous Material Management

Hazardous materials and dangerous goods used at HVO include sealed radiation sources, gases for cutting and welding, explosive precursors and diesel fuels. Dangerous goods and explosives are managed in accordance with relevant legislation.

HVO manages hazardous material through the ChemAlert system whereby all chemicals used on site are registered through a central database. The central database contains all information contained in the Safety Data Sheets (SDS) and an inventory of chemicals held onsite.

Radiation sources at the CPP are fully sealed and managed by an appointed radiation safety officer in accordance with radiation licences issued under the Radiation Control Act 1990.

HVO implements procedures and controls to minimise the potential for land and water contamination from the handling, storage and disposal of hazardous substances. These controls include storage within properly sealed containers and controlled areas, banded for medium to long-term storage requirements.

6.2.2.6 Underground Infrastructure

There is no underground mining currently undertaken at HVO, or planned to be undertaken, and therefore there is no requirement for the removal or decommissioning of underground infrastructure. HVO has approval for storage of water in the closed Lemington underground workings via boreholes and any existing or planned water infrastructure will be decommissioned, surface infrastructure removed and boreholes rehabilitated.

6.2.3 Landform Establishment

6.2.3.1 Water Management Infrastructure

Drainage patterns on rehabilitated areas are designed to be compatible with the surrounding drainage network, and report rehabilitation catchments of similar size to pre-mining catchments to the approximate location of the pre-mining flow lines.

The approach to drainage from rehabilitation areas at HVO can be split into two main categories: traditional drainage and natural drainage. Traditional drainage methods will be used on rehabilitation areas in the West Pit and Carrington Pit areas in accordance with approval commitments for these areas. Some older rehabilitation areas within HVO South will also incorporate traditional drainage, where they were constructed before the HVO South PA 06_0261 approval. Natural drainage methods will be utilised for all rehabilitation areas constructed in HVO South following this approval.

The traditional drainage approach is achieved using a combination of controls such as graded banks, designed channels and where necessary, water course reinforcement. Diversion drains to collect surface runoff are designed with an approximate slope of 1 – 1.5% to minimise erosion.

The key aspects of the natural drainage design include:

- the drainage density of the final landform is to reflect the nature of the drainage patterns in surrounding landforms;
- steeper slopes are to be located higher in the catchment (where water flows are smallest), with slope gradients flattening out downstream;
- drainage lines will have both channel and floodplain components to provide stability during high rainfall events; and
- gentle flow transitions which emulate natural transitions and maintain a balance between scour risk and sedimentation.

Drainage depressions, attenuation basins, and sedimentation dams are incorporated into the final landform where appropriate to collect water runoff and allow suspended sediment to settle out. At present, base of system sediment basins are generally dewatered to site storages to prevent turbid waters flowing to the offsite environment. However, once an adequate vegetation cover is established and the slope is stable, this water can be released from site following a period of sampling that indicates suitable water quality. Sedimentation dams will be designed in accordance with HVO's approved Water Management plan and consistent with Managing Urban Stormwater: Soils and Construction (Blue Book) design criteria.

Drainage from Carrington rehabilitation will be reinstated to the adjacent Carrington Billabong once the rehabilitation is safe, stable and non-polluting.

The proposed water management infrastructure that will remain at mine closure is outlined on **Plan 1: Final Landform Features**. All dams that will remain post-closure will be appropriately designed and constructed in accordance with the relevant design standard at the time.

6.2.3.2 Final Landform Design

The final landform design for HVO was prepared as part of the EIS for HVO North (ERM 2003) and HVO South (ERM 2008), and subsequent modifications. The proposed final landform has been designed in consideration of the surrounding landscape and includes stable, natural profiles, as shown on **Plan 2: Final Landform Contours**.

Overburden is shaped to be generally compatible with adjacent land surfaces and the final landform. The final landscape will consist of a series of hills, ridges and minor valley systems. Final landform slopes vary according to erosion hazard, stability and drainage requirements. Overburden emplacement external slopes will generally be regraded to less than 10°. Internal slopes may be steepened to grades up to 18°.

6.2.3.3 Reject Emplacement Areas and Tailings Dams

Tailings and fine rejects at HVO are managed in accordance with the *Life of Mine Fine Reject Management Strategy* (ATC Williams 2018) and Operation and Maintenance Manuals. The Strategy is a requirement of the HVO North Development Consent (DA 450-10-2003) and outlines the tailings deposition schedule, status and design parameters of each TSF, estimated capping volumes, rehabilitation methodology and controls associated with potential ground and surface water impacts of each facility.

HVO's current tailings disposal strategy satisfies the predicted HVO tailings storage requirements to March 2030. HVO South currently has no active tailings storage facilities as all previously active facilities have been closed, capped and rehabilitated.

Capping and rehabilitation will continue at the South-East TSF in accordance with the *South East Tailings Storage Facility Stage 3 Capping Strategy Design Report* (ATC Williams 2017) and any associated reports and approvals. Preparatory works will commence towards capping Bobs Dump TSF following development of a capping design and submission of a High Risk Activity notification to the Resource Regulator. The placement of tailings at the North Pit TSF ceased in 2019 and is being managed to limit the size of the decant pond to promote solar drying and consolidation. Capping of this facility will be subject to adequate surface strength being gained. The current proposal to achieve this is via deposition of thin layers of tailings, however, this method is yet to receive approval from the EPA pending satisfactory demonstration of seepage mitigation. In-pit tailings emplacement commenced at Carrington Pit during 2019. Tailings will continue to be emplaced within the Cumnock Void in accordance with a management agreement with Ravensworth Operations to utilise a defined capacity of Cumnock Void as a TSF. Under the agreement, the responsibility to rehabilitate Cumnock Void TSF will lie with Ravensworth Operations.

The main elements of the closure and rehabilitation strategy for TSF's include:

- where possible, reducing tailings deposition rate (towards end of filling) to provide for development of a 5 m thick tailings crust to support closure activities;
- provide supplementary tailings in thin layers to fill areas of settlement within the TSF prior to capping;
- developing a capping and landform design and submission of a High Risk Activity notification;
- placement of layers of capping fill materials, comprising typically mine overburden material, at a minimum of 2 m thick; and
- revegetation to the final land use as shown on **Plan 1: Final Landform Features**.

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To assist with desiccation and stabilisation of the TSFs, HVO have adopted a tailings disposal strategy that utilises secondary (or Pipe Head) flocculation for all active storages. Along with beach management and thin layer deposition as the facilities near the end of their capacity, secondary flocculation will assist with the desiccation and consolidation of the tailings to a suitable depth. Upon ceasing to use a TSF, sporadic deposition of tailings may be required to consolidate voids arising from settlement during the drying phase. This will assist to maintain a positive surface drainage underlying the capping material and contribute to the long-term stability of the facility.

Material deemed suitable for capping is identified and, if necessary, stockpiled in proximity to each TSF. Where this has not occurred to date, sufficient material will be identified ahead of the closure of each facility (as part of the capping design) and will be reserved for that use. The volume of capping material takes into account ongoing settlement of the consolidating tailings to provide a free-draining surface. Volumes of material required and stockpile locations are detailed in the Fine Reject Management Strategy. Sampling of capping materials will be undertaken as part of material selection to ensure adequacy for structural, water management and vegetation aspects.

Existing rehabilitated TSFs are revegetated primarily with pasture species and light woody vegetation. HVO considers a 2 m thick cap of overburden material¹ to be an adequate growth medium for woodland vegetation without risk of compromising the integrity of the cap and exposing tailings. Long term scientific monitoring of the rehabilitation will provide data to confirm this. HVO will monitor any new research or industry findings that explore capping depth requirements for long-term stability.

Potential water impacts associated with active and capped tailings are managed in accordance with HVO's Water Management Plan and Water Monitoring Programme. Management of potential surface and groundwater impacts associated with TSF's is assessed as part of the EIS process and also summarised in the Fine Reject Management Strategy.

6.2.3.4 Final Voids, Highwalls and Low Walls

The proposed final landform for HVO North will include three final voids across West Pit North, West Pit South, and Carrington and operating as a mix of evaporative sinks and pit lakes. HVO South will include an evaporative basin in the south-western corner of the Deep Cheshunt Pit (currently Riverview Pit).

The final voids will be constructed in accordance with the objectives and criteria for voids outlined in **Sections 4.1** and **4.2**. Further detailed information will be developed as part of a Detailed Mine Closure Plan for the operation.

6.2.3.5 Creek / River Diversions

A number of Creeks have been diverted in sections to enable the passage of mining and siting of infrastructure. These diversions include sections of Parnells Creek, Pikes Creek, Farrells Creek and an unnamed creek in Carrington. The diversions were constructed in accordance with best practice methods at the time. HVO will undertake erosion and geomorphic reviews of the diversion prior to closure to confirm that the diversion meets the closure criteria provided in **Section 4.2**.

¹ It has been common practice in the past to utilise coarse rejects for the development of an initial cap followed by placement of mine overburden. Existing rehabilitated TSF's will likely include a coarse reject layer as part of the 2m cap.

6.2.3.6 Temporary Stabilisation

Where progression to final rehabilitation is significantly delayed overburden areas may be shaped to an interim or final landform and suitable cover crops or other surface stabilisation applied to minimise dust generation and erosion. Temporary stabilisation may also be undertaken on unshaped overburden dumps and other disturbed areas. Temporary stabilisation of these areas is primarily designed to control fugitive dust emissions however can also improve visual amenity.

Temporary stabilisation by seeding with sterile cover crops may be undertaken on disturbed areas during construction activities or during the staging of construction works.

6.2.4 Growth Medium Development

Surface preparation activities for rehabilitated areas will commence as soon as practicable following the completion of mining activities and landform establishment.

If topsoil characterisation has not previously been undertaken, sampling of the topsoil stockpile to be used for a rehabilitation area will be conducted prior to spreading to determine whether specific amelioration techniques (e.g. addition of gypsum or organic matter) are required (refer to **Section 6.2.1.1**).

The general surface preparation activities to be undertaken for rehabilitation areas include:

- Install contours or drainage structures in accordance with site standards and project approval conditions;
- Deep rip overburden;
- Rock rake;
- Spread topsoil (topsoil management is detailed further in **Section 6.2.1**);
- Spread gypsum and/or other ameliorants at rate determined by soil analysis;
- Spread timber or other habitat features in selected locations;
- Final rock rake; and
- Scarify/light rip or aerate the final surface ahead of sowing.

6.2.5 Ecosystem and Land Use Establishment

Following ground preparation and growth medium development works, revegetation activities will commence as soon as possible.

HVO is rehabilitating its lands with a combination of pasture and woodland. Pasture areas consist of a range of both native and introduced pasture species and are designed to sustain animal productivity. Native vegetation areas utilise local native species and are designed to provide biodiversity values. Rehabilitation of shelter belts are designed to provide shelter for stock and link native bush areas. Shelter belts can consist of a mixture of native and exotic species.

To achieve diversity targets, long-term seed mixes will contain species to achieve the following:

- Plant structure and form (e.g. tree vs. shrub);
- Floristics (e.g. spread over a range of plant genera); and
- Life cycle (e.g. short lived primary coloniser vs. long lived understory shrubs).

6.2.5.1 Pasture Rehabilitation

Typical pasture species and rates of application are shown in **Appendix E**. Lightly scattered groups of native trees, shrubs and groundcovers will also be planted in pastures to give shade and shelter for livestock, to provide native forests for wildlife habitat and possible future commercial timber operations. Fertiliser is added based on soil testing results.

6.2.5.2 Native Woodland Rehabilitation

Native woodland rehabilitation within HVO, aimed at enhancing biodiversity, will be promoted by:

- Using native endemic seeds (to match those already found on the subject site) where possible, for seeding and replanting programmes;
- Rehabilitating groundcover, understorey and canopy species by seeding and planting (planting understorey and tree species will be undertaken where grass competition restricts the use of direct seeding);
- Planting a variety of species as opposed to a monoculture, especially species that flower at different times of the year or that provide foraging resources for affected species;
- Creating a diversity of landforms and habitats such as woodland, regrowth and open forest on ridgetops and lower slopes;
- Placement of habitat features such as logs, rocks, drainage depressions, and dams; and
- Linkage of areas rehabilitated with trees with adjacent remnant vegetation to promote regional corridors.

Woodland areas to be seeded during this MOP term will continue to include native understorey species with seed mixes being assembled in accordance with **Appendix E**. This table includes diversity targets for seed mixes with targets set for minimum number of species/genera to be included for the functional groups in each strata of the target vegetation community.

6.2.6 Ecosystem and Land Use Development

Activities associated with the Ecosystem and Land Use Development Phase of rehabilitation are generally ongoing maintenance and land management activities and rehabilitation monitoring.

The requirement for maintenance works is assessed on an ongoing basis through the rehabilitation monitoring program (refer to **Section 8**) and by routine inspections. Key issues covered by the maintenance program are outlined in the sections below.

6.2.6.1 Weed and Feral Animal Control

Weeds can limit tree growth and out compete emerging native plants, particularly in the early stages after seeding. The rehabilitation process at HVO has been designed to limit the growth of weeds over the longer term, by maximising the number of trees and shrubs in native woodland areas.

Targeted weed control campaigns will be undertaken on an ongoing basis to manage and limit the spread of weeds within rehabilitation areas. The scope of these campaigns will be determined by regular inspections and annual monitoring programmes (refer to **Section 8**). Weed control programs will be prioritised based on the size and severity of the infestation, along with the probability of it spreading to adjacent rehabilitation or remnant vegetation areas. Weed control works in rehabilitation areas will be undertaken by experienced contractors so that there is minimal to no impact on trees, shrubs and other native plants.

Weed infestations identified during various inspections and monitoring programs will be recorded in GIS so that their location and status can be monitored over time.

Similarly, the need for feral animal control programs will be determined by annual monitoring programs. Any targeted shooting, baiting or trapping programs will be conducted by a licensed contractor in consultation with NSW Local Land Services (LLS).

6.2.6.2 Erosion and Drainage Controls

Erosion features that are identified during monitoring programs that may require repair include rill and gully erosion, tunnelling, slumping or ponding. Repair methods may include hand seeding (to limit additional disturbance), ripping and re-seeding, re-grading of contour banks or re-construction of failed structures.

Erosion and drainage repairs will be prioritised on the likelihood of the erosion worsening or developing into adjacent rehabilitation areas, and the potential for failures to report to the clean water management system.

6.2.6.3 Re-seeding / Re-planting of Rehabilitation Areas

If rehabilitation monitoring programs identify areas of rehabilitation that have failed, or do not contain the required species composition or diversity, re-seeding or re-planting works will be planned and scheduled. These works may include:

- Spraying, ground preparation and re-seeding of a full targeted seed mix
- Hand seeding of specific species that are not represented in the rehabilitation area, either across the whole area or in specific pockets of the rehabilitation;
- Over-sowing of pasture grass species where total biomass or palatable species are lacking to support grazing activities; or
- Planting of tube-stock to increase overall species diversity or to improve species composition.

6.2.6.4 Maintenance Fertilising

The need for maintenance fertilising will be assessed during regular rehabilitation monitoring programs, particularly in agricultural final land use areas where grazing is occurring or planned to occur. The application method (e.g. tractor spreader or aerial spreading) will be determined based on the existing vegetation, landform and timing of application.

6.2.6.5 Repair of fence lines, access tracks and other general land management activities

The condition of fence lines, access tracks and other features (e.g. dams, troughs) will be assessed during the Annual Rehabilitation Walkover (**Section 8.2**) and targeted agricultural or pastoral assessments completed as part of grazing activities conducted by leases.

The requirement for fencing, access and water points for future agricultural activities within rehabilitation areas will be assessed as part of HVO's ongoing budget process, and when establishing lease agreements.

6.2.6.6 Environmental Monitoring and Management

HVO maintains an Environmental Management System (EMS) as a means to facilitate compliance with environmental standards and requirements. The EMS provides a framework for managing all environmental and community aspects, impacts and performance of the mining operations. As part of the EMS, management plans, procedures and standards have been developed to meet statutory requirements, manage activities on site to minimise risk to the environment and to continually improve the performance of operations. These management plans and their controls apply to all rehabilitation areas and will continue to apply and be implemented until rehabilitation relinquishment.

6.3 Rehabilitation of Areas Affected by Subsidence

The Lemington Underground Mine operated from 1971 to 1992 using bord and pillar mining methods in the Mount Arthur Seam, with areas of longwall extraction. The former Lemington Underground Mine was acquired and merged into HVO South in 2001. The underground workings are located south-east of the current mining areas at HVO South, below the South Lemington Pit 1.). The Mount Arthur Seam floor in the former workings ranges from approximately 40 metres Australian Height Datum (mAHD) to approximately -205 mAHD, generally dipping from the north-east to the south-west.

The underground operation was decommissioned and all surface infrastructure rehabilitated. Subsidence occurred during the operation of the mine and the likelihood of further ground movement has been assessed and estimated to be very low.

7 Rehabilitation Quality Assurance Process

HVO will implement a rehabilitation quality assurance process for each phase of rehabilitation. These processes will ensure:

- rehabilitation is being implemented in accordance with the nominated methodologies;
- identification of those responsible for implementation; and

- identified risks to rehabilitation are being adequately addressed at each phase of rehabilitation

The specific processes for each phase are outlined in the sections below.

7.1 Active Mining

The quality assurance and documentation processes that will be implemented during the active mining phase include:

- maintenance of up to date mine plans by the sites survey department;
- completion of GDP's, including inspections during and post works, and documentation of pre-clearance surveys;
- maintenance of a topsoil register which includes an inventory of stockpiles and their original location, characterisation results, condition and inspection results;
- surface water monitoring and regular review of trigger levels;
- regular inspections of temporary and permanent erosion and sediment controls;
- regular inspections to identify potential weed infestations;
- documentation of all weed management and eradication programs and follow-up inspections; and
- waste tracking and recording of volumes removed from site.

7.2 Decommissioning

Quality assurance processes will be identified during the development of the sites closure plan. However, these are likely to include the following as a minimum:

- inspections and demolition reports to confirm all infrastructure has been removed;
- validation testing to ensure any contamination has been appropriately remediated and/or removed;
- updates to mine plans and record tracings; and
- waste tracking to confirm removal of all hazardous wastes from site.

7.3 Landform Establishment

To facilitate efficient and accurate handover of rehabilitation areas between departments and phases, HVO has developed a *Rehabilitation Design and Bulk Shaping Handover Checklist*. The checklist includes:

- confirmation the landform design complies with approval requirements;
- consideration of drainage requirements; and
- confirmation that bulk shaping has been completed adequately and to design.

The checklist includes a sign-off by relevant department managers to certify the work has been completed.

7.4 Growth Medium Development

In addition to the landform establishment elements described above, the *Rehabilitation Design and Bulk Shaping Handover Checklist* includes the following elements:

- confirmation that drainage structures have been constructed to design;
- confirmation ground preparation elements such as deep ripping and rock removal have been completed; and
- confirmation that topsoil stockpiles have been scalped, topsoil has been placed at the appropriate depth and ameliorants have been applied at the correct rate.

7.5 Ecosystem and Land Use Establishment

Documentation of seeding or planting activities is completed in the *GCAA Rehabilitation Establishment and Methodology Record Form* and includes:

- date of planting;
- weather conditions;
- seed mix;
- seeding rate (kg/ha) and/or planting rate (tubestock/ha);
- fertiliser or ameliorant rate (kg/ha);

In addition to the above records, rehabilitation monitoring will commence during this phase and will primarily include initial establishment monitoring and an Annual Walkover Inspection which will document rehabilitation condition and maintenance requirements.

7.6 Ecosystem and Land Use Development

Quality control processes during the ecosystem and land use development phase involve the sites ongoing rehabilitation monitoring program which is detailed in **Section 8**. Monitoring program results will feed into HVO's rehabilitation maintenance schedule which includes:

- detailed maintenance requirements for each rehabilitation block including weed control, erosion repairs and re-seeding or planting requirements;
- indicative schedules for completion of required maintenance; and
- indicative costs and resources required to complete maintenance activities.

Completion of maintenance activities will be documented by contractors completing the works, and reported in the Annual Rehabilitation Report and Forward Program (ARRFP) and Annual Review.

8 Rehabilitation Monitoring Program

HVO has developed a rehabilitation monitoring program to confirm rehabilitation areas are trajectory towards meeting the rehabilitation objectives, and performance and closure criteria. Monitoring will be undertaken in accordance with GCAA's *Completion Criteria and Rehabilitation Monitoring Procedure* (2020) which includes:

- an annual rehabilitation walkover inspection;
- initial establishment monitoring; and
- long term rehabilitation monitoring (including analogue sites).

8.1 Analogue Site Baseline Monitoring

GCAA has developed a shared rehabilitation reference site monitoring program for its NSW operations following advice from University of Queensland's Centre for Mined Land Rehabilitation (CMLR, 2020) and ERR Australia (ERR, 2020). The combined reference program ensures adequate spatial and temporal coverage for each target vegetation community, as well as sufficient replication to enable statistical analysis of monitoring results to ensure completion criteria have been met. In accordance with this program, HVO has established three woodland reference sites which are monitored biennially as per the program schedule.

In addition, HVO has established two permanent pasture reference sites which will be used to develop completion criteria for pasture final land use rehabilitation blocks.

8.2 Rehabilitation Establishment Monitoring

The *Completion Criteria and Rehabilitation Monitoring Procedure* requires rehabilitation blocks less than three years old to be monitored using the Initial Establishment Monitoring (IEM) method which is a rapid style assessment principally to determine germination success and landform stability. Each monitoring site is assessed twice within the first three years, and includes the following parameters:

- Erosion – presence and depth of erosion gullies or rills;
- Bare ground – visual estimate of bare ground percentage;
- Ground cover – visual estimate of ground cover percentage;
- Weed cover – rapid assessment of High Threat Exotics and Priority Weeds;
- Pasture species composition – foliage cover of desirable pasture species (pasture rehabilitation sites only);
- Native species richness – rapid assessment of native species present; and
- Tree stem density – number of tree stems within plot area.

Once rehabilitation blocks become older than three years, they are amalgamated where possible (i.e. adjacent blocks with the same final land use) and monitoring sites move into the next phase of monitoring.

8.3 Measuring Performance Against Rehabilitation Objectives and Rehabilitation Completion Criteria

Rehabilitation blocks that are older than three years are subject to the Long Term Monitoring (LTM) methodology in accordance with the *Completion Criteria and Rehabilitation Monitoring Procedure*. The LTM methods include more detailed assessments of rehabilitation performance, and are targeted towards evaluating progress of rehabilitation towards fulfilling completion criteria and, ultimately, the targeted post-mining land use.

Rehabilitation monitoring reports include an assessment of results against both the Trigger Action Response Plan (TARP) (**Section 9.2**) and the closure criteria. Where rehabilitation areas are not progressing towards the criteria, recommendations will be made to improve rehabilitation performance.

In addition, each year HVO undertakes an Annual Walkover Inspection of rehabilitated areas to provide a general assessment on rehabilitation health and potential emerging issues that require maintenance (e.g. weeds, erosion, poor growth rates). The walkover inspection does not review rehabilitation areas against the closure criteria, but provides management recommendations to assist the rehabilitation in moving towards the criteria.

9 Rehabilitation Research, Modelling and Trials

9.1 Current Rehabilitation Research, Modelling and Trials

No current rehabilitation research, modelling or trials are currently being undertaken.

9.2 Future Rehabilitation Research, Modelling and Trials

HVO currently has no plans to conduct any rehabilitation research, modelling or trials. HVO will continue to keep abreast of current rehabilitation best practice methods through collaboration with other Hunter Valley sites and through industry forums.

10 Intervention and Adaptive Management

Where rehabilitation monitoring indicates that rehabilitation outcomes are not trending toward the nominated completion criteria, HVO will instigate early intervention and adaptive management to minimise the potential for rehabilitation failure. Identification of threats to rehabilitation and the subsequent intervention is discussed in the following sections.

10.1 Threats to Rehabilitation

Threats to rehabilitation may include events such as periods of drought, bushfire events, or pressures from weeds and feral animals. **Table 22** provides key threats to rehabilitation that have been identified at HVO.

Table 22 – Key Threats to Rehabilitation

Threat	Caused by
Erosion and Sediment Control	<ul style="list-style-type: none"> • Rainfall events • Lack of appropriate vegetation cover • Failure of water management structures
Soil Type(s) and Suitability	<ul style="list-style-type: none"> • Inadequate topsoil available • Poor topsoil quality • Weed infested topsoil • Poor recovery of topsoil from currently rehabilitated areas
Water	<ul style="list-style-type: none"> • Saline runoff and erosion resulting in a surface water trend of salinity increase, or pH reduction/increase • Saline seepage of groundwater resulting in localised impacts
Spontaneous Combustion	<ul style="list-style-type: none"> • Poor management of materials with propensity for spontaneous combustion
Flora	<ul style="list-style-type: none"> • Not considering requirements in rehabilitation planning • Failure to manage weeds • Pest species / grazing pressures (kangaroos, rabbits, etc.) • Biodiversity targets (offsets), not maintained
Geotechnical	<ul style="list-style-type: none"> • Geotechnical failure
Acid Mine Drainage	<ul style="list-style-type: none"> • Poor knowledge of material that may result in AMD • Poor management of the materials that have a propensity to AMD
Geology and Geochemistry	<ul style="list-style-type: none"> • Poor knowledge of material and its geochemistry • Inappropriate placement of materials
Contaminated Land	<ul style="list-style-type: none"> • Long term use of the site • Spills, leaks, etc
Bushfire	<ul style="list-style-type: none"> • Proximity to state forest • Regional fire • Lightning strike

10.2 Trigger Action Response Plan

The following TARP for rehabilitation has been developed to identify required management actions in the event of impacts to rehabilitation, or where rehabilitation outcomes are not achieved in an acceptable timeframe. Where necessary, rehabilitation procedures will be amended accordingly with the aim of continually improving rehabilitation standards.

The responses specified within the TARP have been based upon the rehabilitation completion criteria and the rehabilitation monitoring program. Monitoring of the TARP will be undertaken as outlined in the rehabilitation monitoring program (**Section 8**). The monitoring program will trigger response actions as specified in the TARP to ensure that threats to rehabilitation do not become unmanageable.

Following a trigger, the scope and timing of response actions are prioritised and an indicative schedule for implementation is developed. Discrete actions are prioritised and managed on a risk basis within the rehabilitation maintenance program. High risk triggers will be addressed first. Ongoing monitoring of trigger issues occurs to ensure current prioritisation within the maintenance program remains appropriate and issues are escalated as necessary.

The TARP is provided as **Table 23** and will continue to be developed as completion criteria are refined and as new threats to rehabilitation are identified.

Table 203 – Trigger Action Response Plan

Aspect Category / Item	Key Element	Monitoring Program	Trigger Response	Condition Green	Condition Amber	Condition Red	
Landform stability	1	Slope gradient	Annual Walkover	Trigger	Rehabilitation areas have overall slopes that are generally <10°.	Rehabilitation areas have overall slopes >10° but <14° and not approved. Internal slopes <18° and assessed as being safe and stable.	Rehabilitation areas have overall slopes >15° and not approved. Internal slopes may be steepened to grades up to 18°.
			Annual Performance Assessment	Response	No response required. Continue monitoring program.	Undertake regrading and revegetation of the area, if it is not designed to be >10° <14°. If designed to be >10° <14°, seek approval from RR. Internal slopes that are designed to be <18° and assessed as being safe and stable require no further response. Continue monitoring program.	If overall slopes designed to be >15°, seek approval from RR. Otherwise, undertake a review of the landform design, including survey if required. Undertake regrading and revegetation of the area, if required. If internal sloped >18° undertake a review of the landform design, including survey if required. Undertake regrading and revegetation of the area, if required.
	2	Erosion control	Annual Walkover	Trigger	No active gully or tunnel erosion. No active rilling present.	Minor active gully or tunnel erosion present and/or active rilling <300 mm deep.	Significant active gully or tunnel erosion present and/or active rilling >300 mm deep.
			IEM				
			LTM	Response	No response required. Continue monitoring program.	An inspection of the site will be undertaken by a suitably trained person. Investigate opportunities to install water management infrastructure or other controls to address erosion. Remediate as appropriate.	Undertake a review of the drainage of the area and provide recommendations to appropriately remediate the erosion. Remediate as soon as practicable.
	Annual Performance Assessment						
		Inspection Program					
3	Drainage Condition	Annual Walkover	Trigger	Drainage condition is in accordance with the design criteria established within this document.	Landforms exhibiting minor drainage issues but do <u>not</u> threaten to cause rehabilitation failure.	Landforms exhibiting significant drainage issues, threatening or causing rehabilitation failure.	

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Owner: [Owner] Version: [Document Version (Office)] Review: [Planned Review Date]

Aspect / Category	Item	Key Element	Monitoring Program	Trigger Response	Condition Green	Condition Amber	Condition Red
			Annual Performance Assessment	Response	No response required. Continue monitoring program.	An inspection of the site will be undertaken by a suitably trained person. Investigate opportunities to address issues. Remediate as appropriate.	Undertake a review of the drainage design and provide recommendations to appropriately remediate the area. Remediate as soon as practicable.
			Inspection Program				
Water Quality	4	Monitoring parameters	Water Monitoring Program	Trigger	Surface water quality of runoff from rehabilitation areas is within criteria and rehabilitation performance criteria established within this document.	Water quality exceeds performance criteria but does <u>not</u> indicate a long-term rehabilitation issue.	Water quality exceeds criteria, indicating a long term rehabilitation liability.
			Inspection Program	Response	No response required. Continue monitoring program.	Review and investigation of water quality monitoring and management where appropriate. Implement relevant remedial measures where required.	Reporting as per relevant statutory reporting requirements. Implement relevant responses and undertake immediate review to determine source of issues and implement remediation measures identified as soon as practicable.
Soil/spoil Quality	5	Monitoring parameters	Annual Walkover	Trigger	Soil properties meet criteria and no indication of not being able to support vegetation establishment.	Soil properties are not meeting criteria and indication of not being able to support vegetation establishment.	Soil properties have not met criteria and are not supporting vegetation establishment.
			Inspection Program	Response	No response required. Continue monitoring program.	Conduct investigation and take samples of soil/spoil to determine the need for ameliorants or other management options.	Engage a consultant to assist with recommendations to appropriately remediate soil/spoil quality and depth. Remediate as soon as practicable.

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Owner: [Owner] Version: [Document Version (Office)] Review: [Planned Review Date]

Aspect Category / Item	Key Element	Monitoring Program	Trigger Response	Condition Green	Condition Amber	Condition Red
Vegetation (Woodland)	6	Surface cover	Annual Walkover	Trigger	Five years following revegetation to woodland, a minimum of 70% total ground cover (vegetation, leaf litter, mulch) is present within rehabilitated areas.	Five years following revegetation to woodland, total ground cover (vegetation, leaf litter, mulch) is a minimum of 40% within rehabilitated areas.
			LTM	Response	No response required. Continue monitoring program.	A suitably trained person to inspect the site. Investigate use of appropriate management options to remediate. Remediate as appropriate.
	7	Species composition	LTM	Trigger	Five years following revegetation to woodland, species composition comprises native tree and shrub species consistent with reference sites.	Five years following revegetation to woodland, native tree and shrub species composition comprises <75% species diversity of reference sites.
				Response	No response required. Continue monitoring program.	An inspection of the site will be undertaken by a suitably trained person. Investigate remedial options to achieve required species composition.
Vegetation (Pasture)	8	Surface cover	LTM	Trigger	Following rehabilitation to pasture or native grassland, vegetative cover (vegetation, leaf litter, mulch) is within 10-20% of analogue sites.	Following rehabilitation to pasture or native grassland, total ground cover (vegetation, leaf litter, mulch) is more than 40% of the range of analogue sites.
				Response	No response required. Continue monitoring program.	An inspection of the site will be undertaken by a suitably trained person. Investigate use of appropriate management options to remediate. Remediate as appropriate.

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Aspect Category / Item	Key Element	Monitoring Program	Trigger Response	Condition Green	Condition Amber	Condition Red
	9	Species composition	Annual Walkover	Trigger	Two years following revegetation to grassland, species composition consists of grasses and legumes appropriate to the district and recognised as suitable for beef cattle grazing.	Two years following revegetation to grassland, species composition comprises <30% appropriate to the district and recognised as suitable for beef cattle grazing
			IEM	Response	No response required. Continue monitoring program.	An inspection of the site will be undertaken by a suitably trained person. Investigate remedial options to achieve required species composition.
Vegetation (woodland / pasture)	10	Weed presence	Annual Walkover	Trigger	Twelve months following revegetation, no significant weed infestations present.	Twelve months following revegetation, >25% but <50% cover of undesirable species present.
			IEM	Response	No response required. Continue routine maintenance and monitoring program.	Undertake weed control to remove noxious and problematic weeds from the site as soon as practicable. Investigate management measures to assist native plant establishment including use of ameliorants and implement as appropriate. Review relevant site procedures, if required.
			LTM			
			Inspection Program			
Biodiversity	11	Habitat Corridors	LTM	Trigger	Monitoring indicates corridors are successfully established and consistent with the desired vegetation community composition and are suitable for fauna species movement.	Habitat corridors are successfully established however are <u>not</u> suitable for fauna species movement (size, habitat complexity).
						Monitoring indicates that vegetation corridors are not established, have been removed, or are no longer suitable for the movement of fauna species.

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Owner: [Owner] Version: [Document Version (Office)] Review: [Planned Review Date]

Aspect / Category	Item	Key Element	Monitoring Program	Trigger Response	Condition Green	Condition Amber	Condition Red
				Response	No response required. Continue monitoring program.	Investigate whether sufficient habitat features (rock piles, felled hollow bearing trees, nest boxes etc.) are present. Source and incorporate additional habitat features, if required.	Engage ecologist/rehabilitation specialist to recommend remedial rehabilitation works such as additional planting or seeding, soil amelioration, or weed reduction. Ensure sufficient habitat features are available for fauna.
Topsoil Availability	12	Topsoil Quantity	Annual Walkover	Trigger	Sufficient topsoil identified for rehabilitation over the life of the mine.	Topsoil balance indicates a deficiency in topsoil available for rehabilitation over the life of the mine.	Deficiency significant enough to delay rehabilitation progression during the life of the mine
			Annual Topsoil Reconciliation	Response	No response required.	Investigate options and alternatives (e.g. organic ameliorants) to meet future topsoil requirements. Trial methods of rehabilitation that are more topsoil efficient i.e. use of compost on overburden.	Source suitable growth medium for use in rehabilitation. Investigate use of alternatives or subsoil in suitable locations.
Bushfire	13	Fuel Load	Annual Walkover	Trigger	Fuel loads are assessed and managed as required (including maintaining fire-breaks) and there is firefighting access across rehabilitation areas and water resources available for fighting fires.	Monitoring indicates elevated fuel loads.	A fire on site damages rehabilitated areas.
			IEM	Response	No response required. Continue monitoring program.	Assess fuel load reduction options. Reduce fuel loads and ensure access tracks are cleared. Inspect water sources and ensure sufficient water is available.	Review and update (if required) the Bushfire Management Plan to ensure monitoring and maintenance is completed for fuel loads and access tracks.
			LTM				
			Inspection Program				

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Owner: [Owner] Version: [Document Version (Office)] Review: [Planned Review Date]

Aspect Category / Item	Key Element	Monitoring Program	Trigger Response	Condition Green	Condition Amber	Condition Red	
Tailings	14	Inadequate capping	Annual Walkover	Trigger	The capped tailings landform is constructed in accordance with the approved capping design and is free-draining and no ponding is present.	Inspections indicate some temporary ponding on the tailings landform, however settlement is within the range considered in the detailed capping design.	Landform is exhibiting permanent or significant ponding issues.
			IEM / LTM	Response	No response required. Continue monitoring program.	A suitably trained person to inspect the site. Implement survey program to monitor and/or confirm settlement.	Undertake a review of the capping and drainage design and provide recommendations to appropriately remediate the area. Remediate as soon as practicable.
			Annual Performance Assessment				
			Inspection Program				
Groundwater	15	Void water balance	Water Monitoring Program	Trigger	Water balance and groundwater monitoring indicate void water balance is in line with predictions	Groundwater monitoring TARP trigger activated in area of void influence and indicates that inflows into the void may be higher than the water balance assumptions which, in combination with high surface runoff, could result in the voids filling higher than predicted.	Groundwater inflows are significantly higher than predicted in the water balance and, in combination with high surface runoff, could result in overtopping of the voids.
			Annual Groundwater Review	Response	No response required. Continue monitoring program.	Undertake groundwater investigation based upon TARP trigger exceedance.	Engage a qualified groundwater specialist to undertake a risk assessment and develop controls. Assess potential ways to further reduce surface catchment of voids.
	15		Annual Walkover	Trigger	No spontaneous combustion within rehabilitation area	Localised area of spontaneous combustion within rehabilitation area.	Widespread or multiple areas of spontaneous combustion in rehabilitation areas.

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Owner: [Owner] Version: [Document Version (Office)] Review: [Planned Review Date]

Aspect / Category	Item	Key Element	Monitoring Program	Trigger Response	Condition Green	Condition Amber	Condition Red
Spontaneous Combustion		Carbonaceous material near surface	Annual Performance Assessment Inspection Program	Response	No response required. Continue with existing carbonaceous material management practices.	Develop and implement risk based monitoring and/or remediation plan with advice from suitably trained person.	Review carbonaceous material management practices. Develop remediation plan based on advice from suitably qualified person.
Feral Animals	16		Annual monitoring & control program Inspection Program	Trigger	Vertebrate pest populations increasing, and increasing presence or impacts in rehabilitation areas.	Vertebrate pest populations increasing, and increasing presence or impacts in rehabilitation areas.	Vertebrate pest populations significantly impacting in rehabilitation area or areas.
				Response	No response required. Maintain with existing controls.	Assess opportunities for augmentation of existing controls, or implementation of supplementary controls.	Implement additional targeted controls. Engage with external stakeholders. Review ongoing control framework.

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11 Review, Revision and Implementation

11.1 Review of the Rehabilitation Management Plan

Reviews are conducted to assess the effectiveness of the procedures against the objectives of the RMP. The RMP must be reviewed and, if necessary, revised, within 3 months following the submission of the following:

- annual review;
- incident report;
- audit;
- updated or new Management Plans that are relevant to rehabilitation; or
- any modification to the conditions of the Project Approval.
- Additionally, the RMP may also be revised due to:
 - deficiencies being identified;
 - results from the monitoring and review program;
 - recommendations resulting from the monitoring and review program;
 - changing environmental requirements;
 - improvements in knowledge or technology become available;
 - change in legislation;
 - where a risk assessment identifies the requirement to alter the MOP; and
 - significant change in the activities or operations.

Any major amendments to the RMP that affect its application will be undertaken in consultation with the appropriate regulatory authorities and stakeholders. Revised RMP will be submitted within 6 weeks of completing the review.

11.2 Independent Environmental Audit

As required by Schedule 5, Condition 5 of PA 06_0261 and Schedule 5, Condition 10 of DA 450-10-2003, HVO will undertake an Independent Environmental Audit every three years. The audit will include a review of the rehabilitation undertaken during the reporting period, and an assessment of compliance with this RMP.

11.3 Implementation

Table 24 identifies the personnel who are responsible for the monitoring, review and implementation of this RMP.

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Table 214 –Responsibilities for implementation of this RMP

Position	Responsibility
Mine Manager	<ul style="list-style-type: none"> • Implement the procedures referenced in this MOP; • Undertake training in relevant Management Plans and procedures as required; • Provide resources required and support to implement these procedures; • Provide adequate resources for the completion of rehabilitation activities; and • Construct landforms in accordance with this MOP
Technical Services Manager	<ul style="list-style-type: none"> • Implement the procedures referenced in this MOP; • Undertake training in relevant Management Plans and procedures as required; • Provide resources required to implement these procedures; • Develop mine plans to allow for progressive rehabilitation of mined land; and • Liaise with the Environment and Community Department to ensure that regulatory commitments relating to rehabilitation are considered during mine planning processes.
Manager Environment and Community	<ul style="list-style-type: none"> • Ensure the relevant Management Plans are prepared; • Implement, monitor and review the programs and procedures linked to this MOP; • Consult with regulatory authorities as required; • Undertake monitoring as required; • Undertake maintenance as required; • Provide measures for continual improvement to this MOP and procedures; • Ensure all personnel undertaking works in relation to this MOP are trained and competent; • Report the progress of any rehabilitation and monitoring of biodiversity in the Annual Review; • Undertake site based actions to implement this MOP in cooperation with the Mine Manager; • Coordinate the development of Annual Rehabilitation Plans to guide rehabilitation activities; • Coordinate the completion of rehabilitation activities in accordance with this document; • Coordinate the development of the site rehabilitation objectives and closure criteria in consultation with key stakeholders; and • Coordinate the rehabilitation monitoring program and an annual review of monitoring results to provide a continual improvement process for rehabilitation.
Site Commercial Manager	<ul style="list-style-type: none"> • Ensure that there are adequate provisions available for mine closure by implementing and updating an accrual system over the life of mine.

12 Document Information

12.1 Change Information

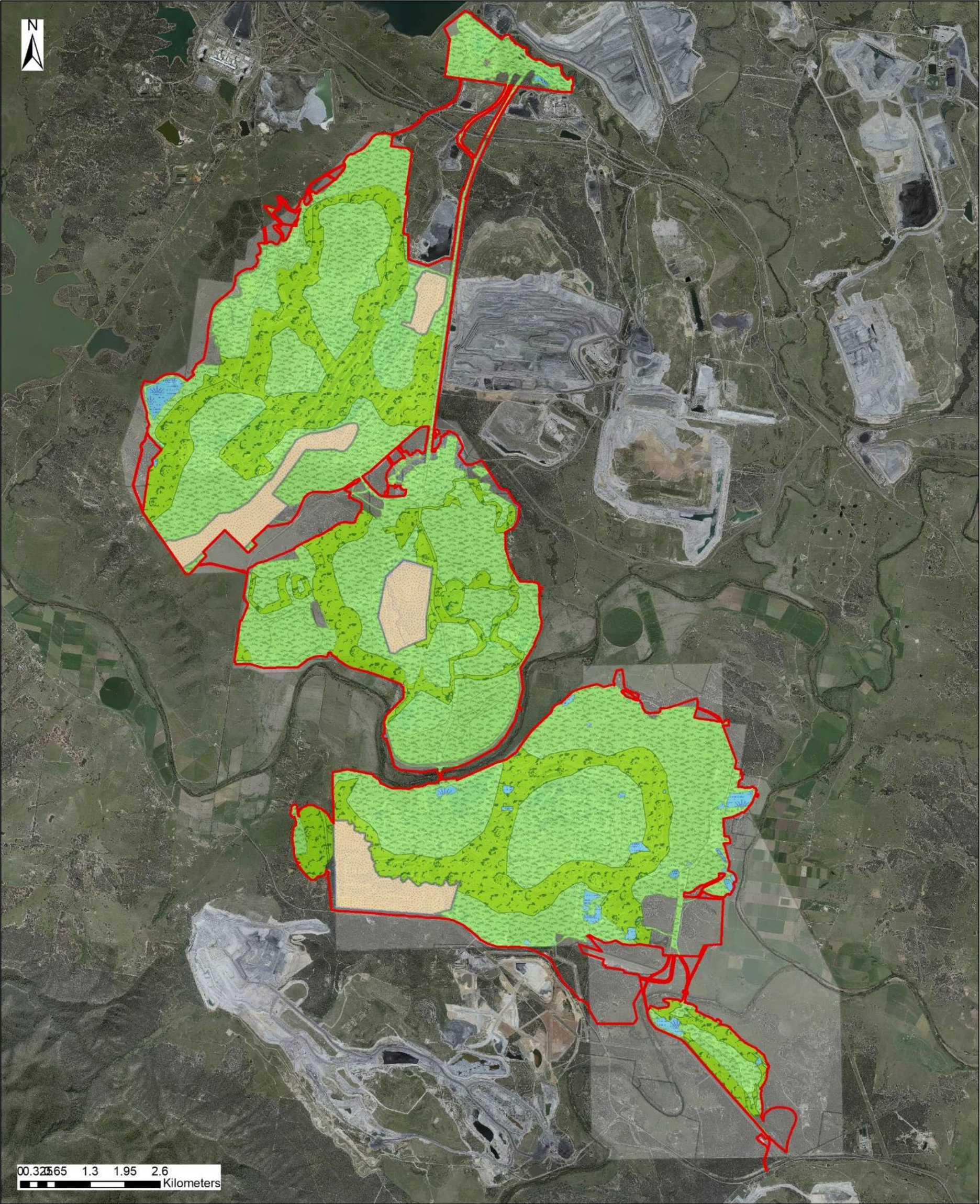
Full details of the document history are recorded in the document control register, by version. A summary of the current change is provided in table below.

Version	Date	Review Team	Details of Change
1.0	July 2022	Tom Scott (ERR Australia), Andrew Speechly (HVO), Greg Peard (HVO)	Original document

Appendix A - Plans

Hunter Valley Operations
Plan 1: Final Landform Features

HUNTER VALLEY
OPERATIONS



Legend

- Project Approval Boundary

Coal Titles

Final Landuse Domains

Agricultural – Grazing

Final Void

Native Ecosystem

Water Management Areas

Final Landform Features
- | | |
|------------------|---------------------------------|
| Mine Name: | Hunter Valley Operations |
| Plan Name: | Plan 1: Final Landform Features |
| Year: | 2022 |
| Theme | 2341, 2343, 2439 |
| Submission No's: | |
| Plan Date: | 28/06/2022 |
- DISCLAIMER
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Hunter Valley Operations
Plan 2: Final Landform Contours

HUNTER VALLEY
OPERATIONS



Legend

- Project Approval Boundary
- Coal Titles
- Final Landform Contours

Mine Name:	Hunter Valley Operations
Plan Name:	Plan 2: Final Landform Contours
Year:	2022
Theme	2342, 2343
Submission No's:	
Plan Date:	16/06/2022

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Hunter Valley Operations
Plan 3: Rehabilitation Schedule 2022

HUNTER VALLEY
OPERATIONS



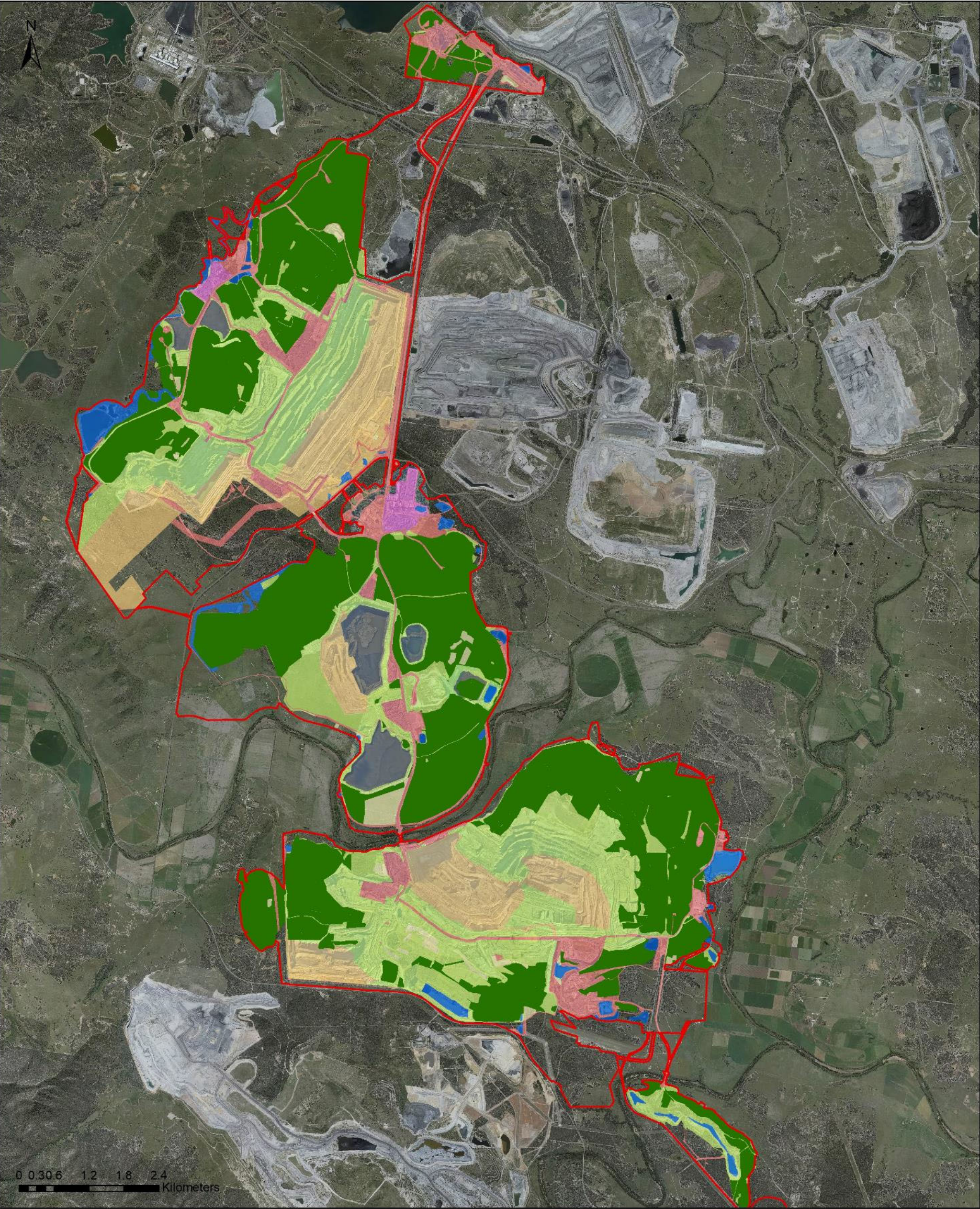
Legend

	Approved Disturbance Boundary	Mining Domains		Other		
	Rehabilitation			Active Mining Area (Open cut void)		Overburden Emplacement Area
				Beneficiation Facility		Tailings Storage Facility
				Infrastructure Area		Water Management Area

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Hunter Valley Operations
Plan 4: Rehabilitation Schedule 2023

HUNTER VALLEY
OPERATIONS



Legend

- Approved Disturbance Boundary

Rehabilitation
- Mining Domains**

Active Mining Area (Open cut void)

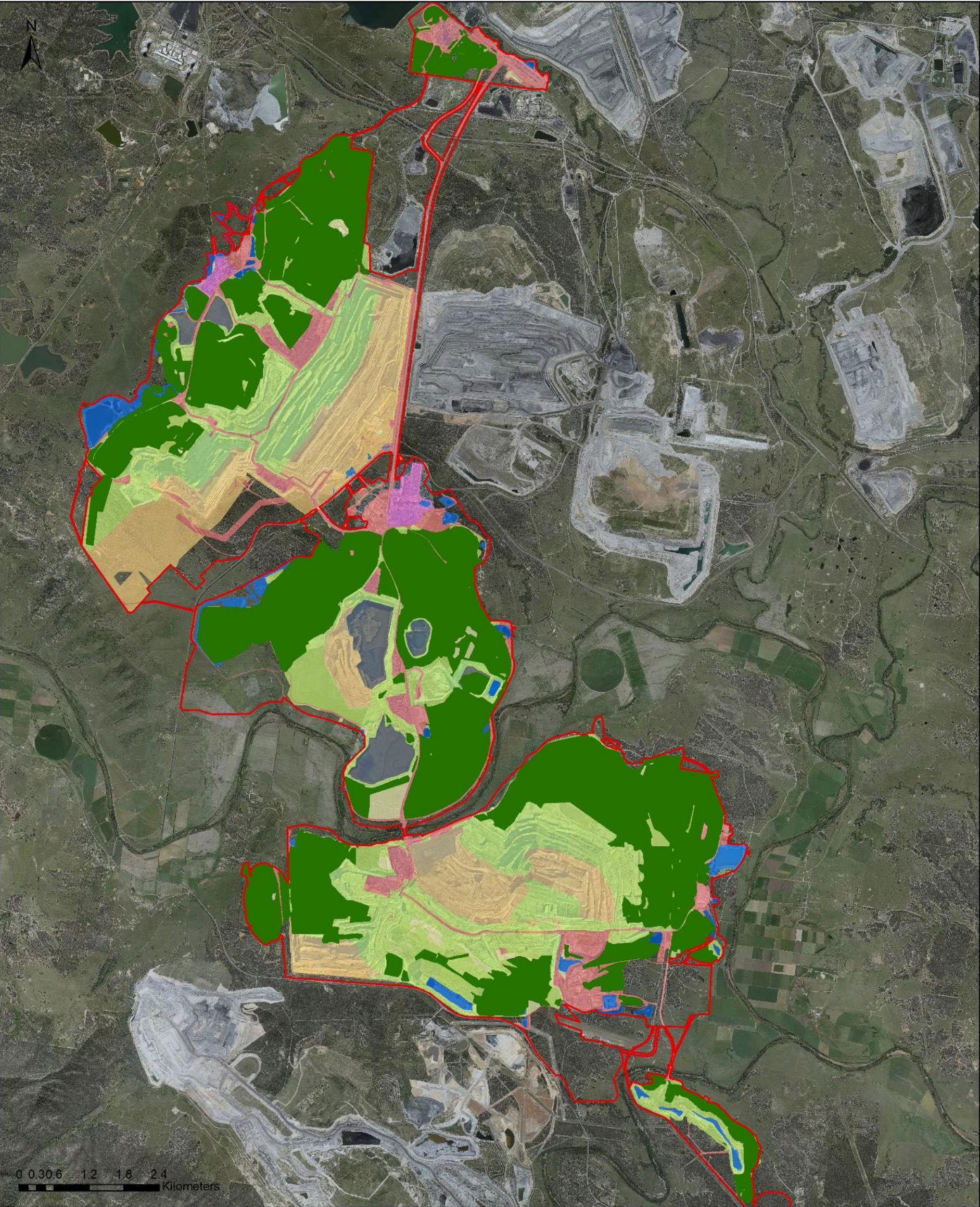
Beneficiation Facility

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

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Hunter Valley Operations
Plan 5: Rehabilitation Schedule 2024

HUNTER VALLEY
OPERATIONS



Legend

- Approved Disturbance Boundary

Rehabilitation
- Mining Domains**

Active Mining Area (Open cut void)

Beneficiation Facility

Infrastructure Area

Other

Overburden Emplacement Area

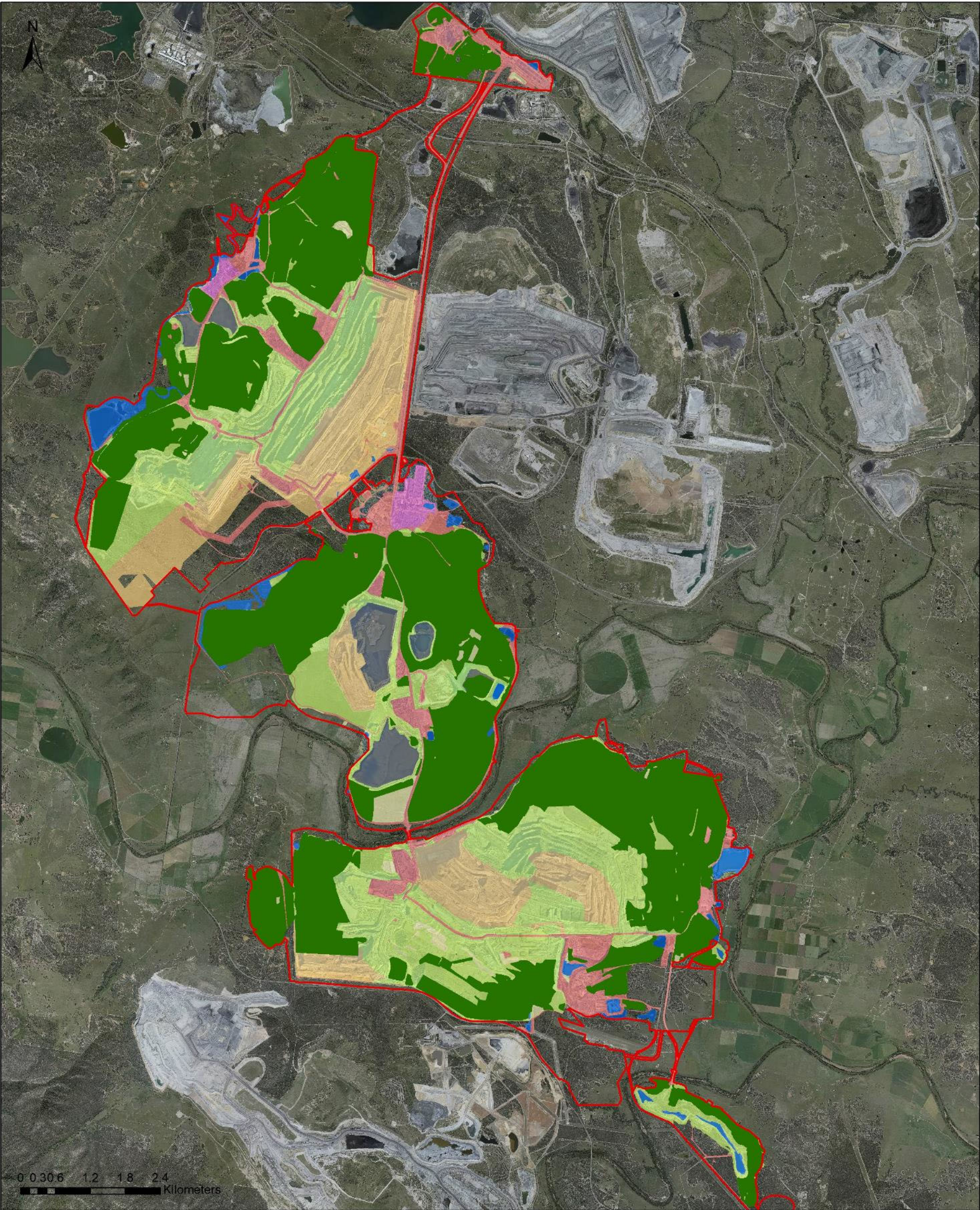
Tailings Storage Facility

Water Management Area

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Hunter Valley Operations
Plan 6: Rehabilitation Schedule 2025

HUNTER VALLEY
OPERATIONS



Legend

- Approved Disturbance Boundary

Rehabilitation
- Mining Domains**

Active Mining Area (Open cut void)

Beneficiation Facility

Infrastructure Area

Other

Overburden Emplacement Area

Tailings Storage Facility

Water Management Area

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Hunter Valley Operations
Plan 7: Rehabilitation Schedule 2030

HUNTER VALLEY
OPERATIONS



Legend

- Approved Disturbance Boundary

Rehabilitation
- Mining Domains**

Active Mining Area (Open cut void)

Beneficiation Facility

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

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Hunter Valley Operations
Plan 8: Rehabilitation Schedule 2035

HUNTER VALLEY
OPERATIONS



Legend

	Approved Disturbance Boundary	Mining Domains		Other		
	Rehabilitation			Active Mining Area (Open cut void)		Overburden Emplacement Area
				Beneficiation Facility		Tailings Storage Facility
				Infrastructure Area		Water Management Area

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Appendix B - Land Ownership Schedule

HVO South

Lot/DP	Owner
3//3005	ES BOWMAN
4//3005	ES BOWMAN
5//3005	ES BOWMAN
6//3005	RUSSELL JOHN & JANELLE SUSAN WENHAM
7//3005	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
8//3005	GREGORY JOHN ERNST
9//3005	GREGORY JOHN ERNST
10//3005	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//48394	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//48591	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//48592	COAL & ALLIED OPERATIONS PTY LIMITED
1//48646	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//48646	Coal & Allied Operations Pty Ltd
3//48646	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//66331	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//70857	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//90052	Telstra Corporation Limited
1//90727	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
7001//93632	The State of New South Wales
1//105943	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//111381	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//111381	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
3//111381	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//113342	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
3//113342	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
4//113342	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//113343	WAMBO COAL PTY LIMITED
2//113343	WAMBO MINING CORPORATION PTY. LIMITED
3//113343	WAMBO MINING CORPORATION PTY. LIMITED
4//113343	WAMBO MINING CORPORATION PTY. LIMITED
5//113343	WAMBO MINING CORPORATION PTY. LIMITED
10//113343	WAMBO MINING CORPORATION PTY LIMITED
1//114966	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//114966	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//123374	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//129808	COAL & ALLIED OPERATIONS PTY LIMITED
1//129811	Warkworth Mining Limited
2//129811	Warkworth Mining Limited
3//129811	Warkworth Mining Limited
1//182139	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//191982	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//195523	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//246201	Warkworth Mining Limited

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5//247239	CONSTRUCTION, FORESTRY, MINING & ENERGY UNION
6//247239	Anthony John Maher and Andrew William Vickers
7//247239	Anthony John Maher and Andrew William Vickers
8//247239	Anthony John Maher and Andrew William Vickers
10//247239	HUNTER VALLEY GLIDING CLUB CO-OPERATIVE LIMITED
12//247239	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
13//247239	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
14//247239	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
15//247239	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
16//247239	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//249327	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
5//251617	COAL & ALLIED OPERATIONS PTY LTD (61.447%) and HVO RESOURCES PTY LTD (29.454%) & GREGORY JOHN ERNST (9.099%)
1//251877	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
202//257063	WAMBO COAL PTY LIMITED
2//300150	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//306421	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
A//386100	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
B//386100	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//532623	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
134//566275	Anthony John Maher and Andrew William Vickers
2//583524	WAMBO COAL PTY LIMITED
1420//586339	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1421//586339	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
11//586639	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
12//586639	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
102//588247	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//592598	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
745//597317	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
300//597726	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
31//610878	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
32//610878	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
33//610878	United Collieries Pty Limited & Wambo Coal Pty Limited
2//617852	Anthony John Maher and Andrew William Vickers
1//619309	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//619309	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//633717	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//633717	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
3//635392	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
4//635392	Anthony John Maher and Andrew William Vickers
1//657394	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//659810	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
152//704486	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
153//704486	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
154//704486	THE STATE OF NEW SOUTH WALES
155//705446	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//710088	THE STATE OF NEW SOUTH WALES
2//710088	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%

1//719879	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//719879	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
5//720643	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//723248	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//723248	COAL & ALLIED OPERATIONS PTY LIMITED
1//723249	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//729048	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
164//729960	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
165//729961	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
166//729962	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
167//729963	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//729984	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//729985	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
91//733895	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
92//733895	HUNTER VALLEY GLIDING CLUB CO-OPERATIVE LIMITED
1//737796	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//737880	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//737880	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//738657	WAMBO COAL PTY LIMITED
2//738657	WAMBO COAL PTY LIMITED
10//740183	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//741544	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
17//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
18//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
21//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
22//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
89//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
98//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
117//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
118//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
119//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
120//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
121//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
122//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
123//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
124//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
125//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
126//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
127//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
164//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
170//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
171//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
12//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
13//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
14//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
15//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
16//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
19//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%

20//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
21//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
22//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
23//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
24//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
25//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
26//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
27//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
28//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
29//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
30//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
31//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
75//753792	Unable to verify ownership in Info Track as says "could not be verified". Narrow residual lot/road inbetween 300//597726 and Crown road
86//753792	WAMBO COAL PTY LIMITED
87//753792	WAMBO COAL PTY LIMITED
88//753792	WAMBO COAL PTY LIMITED
89//753792	WAMBO COAL PTY LIMITED
115//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
120//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
121//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
122//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
130//753792	THE STATE OF NEW SOUTH WALES
140//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
141//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
147//753792	United Collieries Pty Ltd
151//753792	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//755267	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
14//755267	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
40//755267	GLENORE COAL (NSW) PTY LIMITED
41//755267	GLENORE COAL (NSW) PTY LIMITED
43//755267	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
86//755267	WAMBO COAL TERMINAL PTY LTD
88//755267	WAMBO COAL TERMINAL PTY LTD
108//755267	COAL & ALLIED OPERATIONS PTY LIMITED
112//755267	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
114//755267	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
118//755267	COAL & ALLIED OPERATIONS PTY LIMITED
119//755267	COAL & ALLIED OPERATIONS PTY LIMITED
121//755267	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
122//755267	COAL & ALLIED OPERATIONS PTY LIMITED
123//755267	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
128//755267	COAL & ALLIED OPERATIONS PTY LIMITED
135//755267	COAL & ALLIED OPERATIONS PTY LIMITED
142//755267	COAL & ALLIED OPERATIONS PTY LIMITED
143//755267	COAL & ALLIED OPERATIONS PTY LIMITED
145//755267	COAL & ALLIED OPERATIONS PTY LIMITED
171//755267	WAMBO COAL TERMINAL PTY LTD

174//755267	WAMBO COAL TERMINAL PTY LTD
186//755267	GLENCORE COAL (NSW) PTY LIMITED
193//755267	Singleton Council Road
194//755267	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
195//755267	COAL & ALLIED OPERATIONS PTY LIMITED
199//755267	WAMBO MINING CORPORATION PTY. LIMITED
1/1/759053	WAMBO COAL PTY LIMITED
1/2/759053	WAMBO COAL PTY LIMITED
1/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
1/5/759053	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1/6/759053	Singleton Shire Council
1/16/759053	WAMBO MINING CORPORATION PTY. LIMITED
1/17/759053	WAMBO MINING CORPORATION PTY. LIMITED
1/21/759053	WAMBO MINING CORPORATION PTY. LIMITED
1/25/759053	Wanaruah Local Aboriginal Land Council
2/1/759053	WAMBO COAL PTY LIMITED
2/2/759053	WAMBO COAL PTY LIMITED
2/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
2/5/759053	The State of New South Wales
2/6/759053	Singleton Shire Council
2/16/759053	WAMBO COAL PTY LIMITED
2/17/759053	WAMBO MINING CORPORATION PTY. LIMITED
2/21/759053	WAMBO MINING CORPORATION PTY. LIMITED
2/25/759053	Wanaruah Local Aboriginal Land Council
3/1/759053	WAMBO COAL PTY LIMITED
3/2/759053	WAMBO COAL PTY LIMITED
3/4/759053	The State of New South Wales
3/5/759053	The State of New South Wales
3/16/759053	WAMBO COAL PTY LIMITED
3/21/759053	WAMBO MINING CORPORATION PTY. LIMITED
4/1/759053	WAMBO COAL PTY LIMITED
4/2/759053	WAMBO COAL PTY LIMITED
4/3/759053	WAMBO COAL PTY LIMITED
4/4/759053	The State of New South Wales
4/21/759053	WAMBO COAL PTY LIMITED
5/1/759053	WAMBO COAL PTY LIMITED
5/2/759053	WAMBO COAL PTY LIMITED
5/3/759053	WAMBO COAL PTY LIMITED
5/4/759053	The State of New South Wales
5/21/759053	WAMBO COAL PTY LIMITED
6/1/759053	WAMBO COAL PTY LIMITED
6/2/759053	WAMBO COAL PTY LIMITED
6/3/759053	WAMBO COAL PTY LIMITED
6/4/759053	The State of New South Wales
7/1/759053	WAMBO COAL PTY LIMITED
7/2/759053	WAMBO COAL PTY LIMITED
7/3/759053	WAMBO COAL PTY LIMITED
7/4/759053	WAMBO MINING CORPORATION PTY. LIMITED

8/1/759053	WAMBO COAL PTY LIMITED
8/2/759053	WAMBO COAL PTY LIMITED
8/3/759053	WAMBO COAL PTY LIMITED
8/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
9/1/759053	WAMBO COAL PTY LIMITED
9/2/759053	WAMBO COAL PTY LIMITED
9/3/759053	WAMBO COAL PTY LIMITED
9/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
10/1/759053	WAMBO COAL PTY LIMITED
10/2/759053	WAMBO COAL PTY LIMITED
10/3/759053	WAMBO COAL PTY LIMITED
10/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
11/2/759053	WAMBO COAL PTY LIMITED
11/3/759053	WAMBO COAL PTY LIMITED
11/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
12/2/759053	WAMBO COAL PTY LIMITED
12/3/759053	WAMBO COAL PTY LIMITED
12/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
13/2/759053	WAMBO COAL PTY LIMITED
13/3/759053	WAMBO COAL PTY LIMITED
13/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
14/3/759053	WAMBO COAL PTY LIMITED
14/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
15/3/759053	WAMBO COAL PTY LIMITED
15/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
16/3/759053	WAMBO COAL PTY LIMITED
16/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
17/3/759053	WAMBO COAL PTY LIMITED
17/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
18/3/759053	WAMBO COAL PTY LIMITED
18/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
19/3/759053	WAMBO COAL PTY LIMITED
19/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
20/3/759053	WAMBO COAL PTY LIMITED
20/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
21/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
22/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
23/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
24/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
25/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
26/4/759053	WAMBO MINING CORPORATION PTY. LIMITED
1//770904	GLENCORE COAL (NSW) PTY LIMITED
2//770904	GLENCORE COAL (NSW) PTY LIMITED
3//770904	GLENCORE COAL (NSW) PTY LIMITED
4//770904	GLENCORE COAL (NSW) PTY LIMITED
5//770904	GLENCORE COAL (NSW) PTY LIMITED
6//770904	Edward John & Carol Lesley Anne Burley
7//770904	GLENCORE COAL (NSW) PTY LIMITED

1//770905	GLENCORE COAL (NSW) PTY LIMITED
1//782299	Glencore COAL PTY LIMITED
1//783484	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//783484	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
3//783484	COAL & ALLIED OPERATIONS PTY LIMITED
4//783484	COAL & ALLIED OPERATIONS PTY LIMITED
5//783484	COAL & ALLIED OPERATIONS PTY LIMITED
1001//785197	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1002//785197	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//794506	WAMBO COAL PTY LIMITED
2//794506	WAMBO COAL PTY LIMITED
3//794506	WAMBO COAL PTY LIMITED
1//797721	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//808301	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
204//821040	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//821123	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//821127	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//822177	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//823767	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
170//823775	The State of NSW
172//823775	The State of NSW
173//823775 / CL586318	The State of NSW - Access Licence 586318
175//823775	The State of NSW (TSR)
176//823775	Singleton Shire Council
179//823775	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
180//823775	Singleton Shire Council
182//823775	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//835812	Anthony John Maher and Andrew William Vickers
3//835812	Anthony John Maher and Andrew William Vickers
4//835812	Anthony John Maher and Andrew William Vickers
9//835812	Anthony John Maher and Andrew William Vickers
11//843432	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
12//843432	TELSTRA CORPORATION LIMITED
50//848334	WAMBO COAL PTY LIMITED
1//857021	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//876447	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//876447	COAL & ALLIED OPERATIONS PTY LIMITED
1//901179	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//947886	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//963714	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
146//970755	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//997228	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//998117	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//998117	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
854//1000822	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//1041635	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//1043120	GLENCORE COAL (NSW) PTY LIMITED

3//1085145	Wambo Coal Pty Ltd
4//1085145	Wambo Coal Pty Ltd
5//1085145	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
20//1085391	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//1088908	WAMBO COAL TERMINAL PTY LTD
2//1088908	WAMBO COAL TERMINAL PTY LTD
1//1090601	WAMBO COAL PTY LIMITED
1//1102213	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//1103396	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
21//1109631	Warkworth Hall Community Centre Incorporated
84//1124139	Warkworth Mining Limited
33//1125285	AZSA PASTORAL HOLDINGS PTY LIMITED
34//1125285	AZSA PASTORAL HOLDINGS PTY LIMITED
1//1126528	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
350//1135536	Warkworth Mining Limited
360//1135647	Warkworth Mining Limited
2011//1137289	The State of New South Wales
73//1137954	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//1153480	WAMBO COAL TERMINAL PTY LTD
1000//1153575	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//1156393	Singleton Shire Council
11//1262456	Trustee of Church Property for the Diocese of Newcastle
12//1262456	Trustee of Church Property for the Diocese of Newcastle
13//1262456	Trustee of Church Property for the Diocese of Newcastle
3//1171764	Trustee of Church Property for the Diocese of Newcastle
1//1177768	Anthony John Maher and Andrew William Vickers
1//1217808	Janelle Susan Wenham
EP 51200	EP (assume to Coal and Allied Operations Pty Limited)
CL 565353	THE STATE OF NEW SOUTH WALES
Crown Licence 175936	Crown (Coal & Allied Operations Pty Limited) Licence 175936
Various crown and council road reserves	
Bed and banks of the Hunter River	
Bed and banks of Wollombi Brook	

HVO North

Lot/DP	Owner
1//48165	Her most gracious majesty Queen Elizabeth the second
2//48165	Crown
3//48165	Her most gracious majesty Queen Elizabeth the second
4//48165	Crown
5//48165	Her most gracious majesty Queen Elizabeth the second
6//48165	Crown (Lemington Road)
7//48165	Road
8//48165	Her most gracious majesty Queen Elizabeth the second
9//48165	Her most gracious majesty Queen Elizabeth the second
2//48555	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
3//48555	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
4//48555	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
5//48555	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
7//48555	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//90727	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
7001//93617	THE STATE OF NEW SOUTH WALES
1//110662	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//114966	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//114966	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//125406	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//125406	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
3//125406	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
4//125406	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
5//125406	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
6//125406	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
7//125406	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
8//125406	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
9//125406	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
10//125406	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
11//125406	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
4//130831	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//135459	State Rail Authority of NSW
1//191982	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//211043	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
3//252530	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
4//252530	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
5//252530	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
8//252530	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
201//544091	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//574166	AGL MACQUARIE PTY LTD
2//574166	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
300//597726	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//659810	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
100//700429	ALPHA DISTRIBUTION MINISTERIAL HOLDING CORPORATION (Ausgrid)
1//727260	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%

1//729048	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//737796	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
10//740183	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
53//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
54//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
65//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
66//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
68//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
70//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
71//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
80//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
81//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
82//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
83//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
84//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
93//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
94//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
102//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
127//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
156//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
157//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
158//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
159//752468	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
89//752470	TBC
17//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
18//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
21//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
22//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
38//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
58//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
82//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
83//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
89//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
98//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
117//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
118//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
119//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
120//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
121//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
122//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
123//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
124//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
125//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
126//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
127//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
164//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
170//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
171//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%

200//752481	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//776382	Crown Road
4//776382	Crown lands - water course Bayswater Creek
1//779625	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
21//786904	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
22//786904	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//794836	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//808301	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//808431	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//808431	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//823767	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
16//848095	Cumnock No 1 Colliery Pty Limited, ICRA CUMNOCK PTY LIMITED
300//856881	Cumnock No 1 Colliery Pty Limited, ICRA CUMNOCK PTY LIMITED
11//858172	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
304//868175	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
22//869399	Resource Pacific Ltd, Cumnock No.1 Colliery Pty Ltd, Muswellbrook Coal Company Ltd, ICRA Cumnock Pty Ltd
380//869839	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
182//975271	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
183//975271	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
184//975271	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
192//975271	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
193//975271	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
211//975271	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
212//975271	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
217//975271	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
218//975271	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
219//975271	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
221//975271	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
101//1017998	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
601//1019325	AGL MACQUARIE PTY LTD
111//1059007	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//1078618	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
20//1085391	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
102//1103268	LIDDELL TENEMENTS PTY LIMITED, MITSUI MATSUSHIMA AUSTRALIA PTY LIMITED, ENEX LIDDELL PTY LIMITED
103//1103268	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//1113789	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//1113789	Singleton Shire Council
3//1113789	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
4//1113789	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
5//1113789	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
6//1113789	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
7//1113789	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1481//1129164	THE STATE OF NEW SOUTH WALES
3000//1132357	Cumnock No 1 Colliery Pty Limited, ICRA CUMNOCK PTY LIMITED
1//1152619	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//1152619	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
3//1152619	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%

4//1152619	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1000//1153575	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
1//1155775	AGL MACQUARIE PTY LTD
1//1158958	Transport for NSW
2//1167986	AGL MACQUARIE PTY LTD
120//1174907	AGL MACQUARIE PTY LTD
121//1174907	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
122//1174907	Coal & Allied Operations Pty Ltd 51% and Anotero Pty Limited 49%
2//1193186	RAVENSWORTH OPERATIONS PTY LIMITED
Part Crown (Coal & Allied Operations Pty Limited) Licence 175936	
Crown land - Closed road - north side 7001//93617	
Part Crown land South Bank Hunter River	
Old Highway Rd	
Lemington Road	
Liddell Station Rd	
NEW ENGLAND HWY New England HWY	
Railway - Newdell Rail Spur	
Various Crown and Council Roads	
Bed and banks of Hunter River	
Bed and banks of Bayswater Creek	

Appendix C - Rehabilitation Risk Assessment Summary

Operational Phase	Risk Description	Consequence	Controls	Risk Ranking	Section of this document where controls are addressed
General	Insufficient skills and experience of rehab personnel.	Poor quality rehabilitation / failure to meet closure criteria	Long term contract for ground prep and revegetation works Rehabilitation & Disturbance Procedure General Hunter Valley rehab contractor experience	Low	
General	Lack of defined responsibilities.	Poor quality rehabilitation / failure to meet closure criteria	HVO Organisation Chart Rehabilitation Management Plan / MOP Rehabilitation & Disturbance Procedure ARCP	Low	
General	Insufficient funding for or prioritisation of rehabilitation activities	Failure to meet closure criteria	LOM Process Budget process ARCP	Low	
Active Mining	Poor biological resource salvage and maintenance (soil, vegetation, seeds, habitat resources)	Insufficient material for rehabilitation	Rehabilitation & Disturbance Procedure Topsoil Management Plan Vegetation Clearance Plan GDP Process ARCP	Low	
Active Mining	Limited biological resources for salvage (soil, vegetation, seeds, habitat resources)	Insufficient material for rehabilitation	Rehabilitation & Disturbance Procedure Topsoil Management Plan Vegetation Clearance Plan GDP Process	Medium	

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Active Mining	Clearing in adverse seasonal and weather conditions when salvaging biological resources	Poor quality rehabilitation / failure to meet closure criteria	Rehabilitation & Disturbance Procedure Topsoil Management Plan Vegetation Clearance Plan GDP Process Budget planning ARCP	Low	
Active Mining	Adverse geochemical/chemical composition of materials (overburden, soils)	Poor quality rehabilitation / failure to meet closure criteria	Rehabilitation & Disturbance Procedure Topsoil Management Plan Mineral Waste Management Plan Dig and dump checklists (management of ARD/carbonaceous material)	Low	
Active Mining	Poor handling and containment of geochemical and geotechnically unsuitable tailings and reject materials	Failure to meet closure criteria	Specific Tailings Risk Assessment conducted Fine Reject Management Strategy	Low	
Active Mining	Adverse surface and groundwater quality and quantity (outside of expected projections)	Failure to meet closure criteria	Rehabilitation & Disturbance Procedure Topsoil Management Plan Water Management Plan Water Monitoring Program Rehabilitation Monitoring	Low	
Decommissioning	Poor management of material and waste products from demolition activities	Increased / additional costs. Failure to meet closure criteria	Operational Closure Plan EMS - compliance/assurance program Glencore Project Standard	Low	
Decommissioning	Poor management of retained infrastructure (infrastructure not required or dilapidated)	Increased / additional costs. Failure to meet closure criteria	Operational Closure Plan (project management process and monitoring) Budget process	Low	

Decommissioning	Inadequate identification and/or management of contaminated material	Increased / additional costs. Failure to meet closure criteria	Monthly inspections Surface and groundwater monitoring programs Phase 1 & 2 assessments Operational closure plan	Low	
Landform Establishment	Unstable landform due to erosion and/or mass movement associated with inappropriate design and/or quantity assurance during landform construction	Failure to meet closure criteria	Approved / Conceptual final landform Landform design process Expert consultant input (Chris Waygood / SLR) Rehab and Disturbance Procedure (QA Process) Landform sign-off process	Low	
Landform Establishment	Lack of availability of suitable materials for capping of adverse materials	Increased / additional costs. Failure to meet closure criteria	LOM process Tailings Risk Assessment Fine Reject Management Strategy Existing capping stockpile for Carrington Pit area	Low	
Landform Establishment	Final landform unsuitable for final land use (e.g. large rocks affecting cultivation, settlement leading to extended ponding)	Failure to meet closure criteria	Rehabilitation Management Plan / MOP ARCP Rehab and Disturbance Procedure Landform sign-off process Rehabilitation Monitoring	Low	
Landform Establishment	Landform aspect not suitable for intended target plant species	Poor quality rehabilitation / failure to meet closure criteria	Rehabilitation Management Plan / MOP ARCP Rehab and Disturbance Procedure	Low	
Growth Medium Development	Poor / unsuitable physical and structural properties of soils	Poor quality rehabilitation / failure to meet closure criteria	Rehabilitation & Disturbance Procedure Topsoil Management Plan (soil testing) Vegetation Clearance Plan GDP Process	Low	

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Growth Medium Development	Soil (topsoil and/or subsoil) deficit for rehabilitation activities	Increased / additional costs. Failure to meet closure criteria	Topsoil Management Plan Rehab and Disturbance Procedure	Medium	
Growth Medium Development	Soils inadequate to support revegetation or agricultural land capability (e.g. lack of organic matter, nutrient deficiency, adverse chemical properties, weed seed bank)	Poor quality rehabilitation / failure to meet closure criteria	Rehabilitation & Disturbance Procedure Topsoil Management Plan ARCP (maintenance) Rehabilitation Monitoring	Medium	
Ecosystem and Land Use Establishment	Lack of availability and quantity of target seed resources	Poor quality rehabilitation / failure to meet closure criteria	Long term seed contract Seed list designed to allow flexibility based on availability Seed species common across Hunter Valley	Low	
Ecosystem and Land Use Establishment	Poor seed viability	Poor quality rehabilitation / failure to meet closure criteria	Long term seed contract with viability and quality benchmarks Reputable suppliers in Hunter Valley	Low	
Ecosystem and Land Use Establishment	Insect and/or plant disease impacting vegetation (particularly early establishment)	Poor quality rehabilitation / failure to meet closure criteria	Long term seed contract with seed treatment specifications Rehabilitation Monitoring Rehab maintenance schedule Vegetation Clearance Plan (managing plant disease)	Low	
Ecosystem and Land Use Establishment	Lack of availability, or poor quality of tubestock for supplementary planting	Poor quality rehabilitation / failure to meet closure criteria	ARCP Budget process Rehabilitation Monitoring Rehab and disturbance procedure Experienced suppliers / nurseries within Hunter Valley	Low	

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Ecosystem and Land Use Establishment	Weed infestation limiting target species/community	Poor quality rehabilitation / failure to meet closure criteria	Rehabilitation Monitoring Reports Annual Walkover assessment Detailed Maintenance Plans ARCP Budget process Topsoil Management Plan Rehab and disturbance Procedure	Medium	
Ecosystem and Land Use Establishment	Use of inappropriate or inadequate rehabilitation techniques, including equipment fleet	Poor quality rehabilitation / failure to meet closure criteria	Rehabilitation & Disturbance Procedure Rehabilitation / Revegetation works contract	Low	
Ecosystem and Land Use Establishment	Inappropriate revegetation species mix for targeted final land use	Poor quality rehabilitation / failure to meet closure criteria	Rehabilitation Monitoring Reports Annual Walkover assessment Specific rehab seed mixes (recently updated)	Low	
Ecosystem and Land Use Development	Weather and climatic influences (drought, flood) during initial establishment	Poor quality rehabilitation / failure to meet closure criteria	Rehabilitation & Disturbance Procedure (ground prep methods) Native seed mix consists of drought tolerant species Annual Rehab Monitoring Annual walkover assessment	Medium	
Ecosystem and Land Use Development	Availability of areas for revegetation in optimal seasonal conditions (seeding)	Poor quality rehabilitation / failure to meet closure criteria	Budget process ARCP Rehabilitation & Disturbance Procedure (ground prep methods) Native seed mix consists of drought tolerant species	Low	
Ecosystem and Land Use Development	Weather and climatic influences (drought, flood, bushfire) impacting vegetation long term survival	Poor quality rehabilitation / failure to meet closure criteria	Rehabilitation Monitoring Reports Annual Walkover assessment Bushfire Management Plan Native seed mix consists of locally sourced and drought tolerant species	Low	

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Ecosystem and Land Use Development	Long term water quality and quantity issues outside of projections (e.g. acid-drainage, high salinity)	Failure to meet closure criteria	Rehabilitation & Disturbance Procedure Topsoil Management Plan Water Management Plan Water Monitoring Program Rehabilitation Monitoring	Low	
Ecosystem and Land Use Development	Unauthorised damage to rehabilitation (fauna, stock, vandalism, vehicles, unauthorised clearing)	Increased / additional costs. Failure to meet closure criteria	Rehabilitation Management Plan / MOP Vertebrate Pest Control Program Rehabilitation areas fenced off from stock Lease agreements (stock areas) GDP Process Monthly inspections Rehabilitation Monitoring Rehab maintenance/budget ARCP	Low	
Ecosystem and Land Use Development	Re-disturbance of established rehabilitation areas	Increased / additional costs	LOM / Budget planning process ARCP GDP Process Rehab and disturbance procedure	Low	
Ecosystem and Land Use Development	Insufficient establishment of target species and limited species diversity	Failure to meet closure criteria	Rehabilitation Management Plan / MOP Rehabilitation & Disturbance Procedure Detailed / extensive seed mixes Rehabilitation Monitoring Annual Walkover assessment Detailed Maintenance Plans Existing/approved closure criteria	Medium	
Ecosystem and Land Use Development	Limited vegetation structural development and habitat for fauna species	Failure to meet closure criteria	Rehabilitation Management Plan / MOP Rehabilitation & Disturbance Procedure Detailed / extensive seed mixes Rehabilitation Monitoring Annual Walkover assessment Detailed Maintenance Plans	Low	

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Ecosystem and Land Use Development	Erosion and failure of landforms or structures (contours, drop structures, dams)	Increased / additional costs. Failure to meet closure criteria	Rehabilitation Management Plan / MOP Rehabilitation & Disturbance Procedure Rehabilitation Monitoring Annual Walkover assessment Detailed Maintenance Plans Rehab Report Card Landform Design long term modelling	Low	
Ecosystem and Land Use Development	Lack of infrastructure to support intended final land use (e.g. stock dams, fences)	Increased / additional costs. Failure to meet closure criteria	Rehabilitation Management Plan / MOP ARCP Lease agreements for grazing areas (existing fencing/water)	Low	
Mine Subsidence Areas	Unplanned or greater than predicted subsidence impacts (Cheshunt / Newdell)	Resulting in rehab failure / failure to meet closure criteria	Geotech report of subsidence risks for Lemington Geotech PHMP Rehabilitation Monitoring Rehabilitation Maintenance Plans	Low	

Appendix D - Completion Criteria

Table 1 – Infrastructure Criteria

FINAL LAND USE DOMAIN	MINING DOMAIN	REHABILITATION OBJECTIVES	INDICATOR (specific attribute associated with the objective)	COMPLETION CRITERIA (benchmark for the indicator)	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS	SPATIAL REFERENCE	STATUS
Native Ecosystem (CEEC/EEC or non CEEC/EEC) or Agricultural Land Use	<ul style="list-style-type: none"> • Infrastructure Area; • Tailings Storage Facility; • Water Management Area; • Overburden Emplacement Area; • Void (Open Cut void); • Underground Mining Area (subsidence management); • Beneficiation Facility; and • Other 	<u>Infrastructure</u>	All site services have been removed (electricity, telecommunications etc.). Where services are buried (i.e. pipelines, cables etc.) and their retrieval may lead to further disturbance, the infrastructure may be left in situ provided that they don't pose constraints to the post mining land use. In this situation, the location of the services will be surveyed and marked on the record tracings and a suitable caveat developed to provide that they are readily identifiable for future land holders.	Services and utility infrastructure removed.	Statement provided. Survey record tracings	A – all B - all	Proposed
			Removal of all buildings and other infrastructure, unless there is a written agreement with the RR for infrastructure to remain in situ.	Infrastructure removed.	Statement provided Demolition records from certified contractor	A – all B - all	Proposed
			Heritage obligations (e.g. development consent under the <i>Environmental Planning and Assessment Act 1979</i> , approvals under the <i>Heritage Act 1977</i> , etc.) have been met (e.g. archival recording, building retention or building demolition with footings preserved).	Permits and approval documents issued; archival reports (where required) complete and submitted.	Copy of any relevant approval documentation.	A – all B - all	Proposed
			Removal of all plant, equipment and associated infrastructure including processing facilities, stockpile areas, rail infrastructure and loading facilities, underground hydrocarbon storage tanks, office complex, portable offices,	Infrastructure removed.	As-constructed final landform plan, photos etc.	A – all B - all	Proposed

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			exploration core samples, camp facilities, storage racks, samples.				
			Removal of all footings or removal to a certain depth (0.5 metres) OR equivalent depth of cover	Infrastructure removed.	Demolition records from certified contractor Surveyed and marked on the as-constructed final landform plan.	A – all B - all	Proposed
			Removal of all water management infrastructure (including dams, drains, sediment, pumps, pipes and power) not required for final land uses.	Infrastructure removed.	Statement provided and before/after photos.	A – all B - all	Proposed
			All drill cores have been removed and either taken to authorised storage or disposal location.	Cores removed.	Statement provided Waste tracking reports	A – all B - all	Proposed
			All drill holes, excavations, and groundwater monitoring bores are decommissioned and sealed in accordance with RR requirements, excluding those being retained for monitoring purposes.	Sealing complete.	Engineering report/statement Plug and Abandonment log, photos etc.	A – all B - all	Proposed

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Table 2 – Infrastructure to Remain Criteria

FINAL LAND USE DOMAIN	MINING DOMAIN	REHABILITATION OBJECTIVES	INDICATOR (specific attribute associated with the objective)	COMPLETION CRITERIA (benchmark for the indicator)	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS	SPATIAL REFERENCE	STATUS
Native Ecosystem (CEEC/EEC or non CEEC/EEC) or Agricultural Land Use	<ul style="list-style-type: none"> Infrastructure Area; Tailings Storage Facility; Water Management Area; Overburden Emplacement Area; Void (Open Cut void); Underground Mining Area (subsidence management); Beneficiation Facility; and Other 	<u>Infrastructure to Remain</u> All infrastructure that is to remain as part of the final land use is safe.	Where applicable, necessary approvals are in place (e.g. development consent under the Environmental Planning and Assessment Act 1979) where buildings and infrastructure are to be retained as part of final land use	Permits and approval documents issued	Copy of any relevant approvals.	A – all B - all	Proposed
			Potential hazards (e.g. electrical, mechanical) have been effectively isolated.	Hazards isolated.	Statement provided.	A – all B - all	Proposed
			Access tracks that are to remain are in a trafficable condition that is suitable for their intended purposes.	Any required Repairs or Upgrades complete.	Copy of any relevant plans, photos etc.	A – all B - all	Proposed
			Heritage obligations as required under the <i>Environmental Planning and Assessment Act 1979</i> , <i>Heritage Act 1977</i> , etc. have been met (e.g. archival recording, building retention and restoration).	Permits and approval documents issued; archival reports (where required) complete and submitted.	Copy of any relevant approval documentation.	A – all B - all	Proposed

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FINAL LAND USE DOMAIN	MINING DOMAIN	REHABILITATION OBJECTIVES	INDICATOR (specific attribute associated with the objective)	COMPLETION CRITERIA (benchmark for the indicator)	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS	SPATIAL REFERENCE	STATUS
			The structural integrity of the infrastructure has been inspected by a suitably qualified engineer and determined to be suitable and safe as part of the intended final land use.	Structural integrity reports received and confirm structures are safe	Engineering report/statement, photos etc.	A – all B - all	Proposed
			If any underground pipelines or other infrastructure are to remain in situ, they do not pose a hazard for the intended final land use. Note: If any underground pipelines or other infrastructure are to remain in situ in areas to be returned for Agriculture – cropping they are at a depth >0.5m	The location of the infrastructure has been marked on a plan and registered with the relevant local authority (e.g. local Council) and Dial Before You Dig where this is required by the Council or the relevant Authority.	Surveyed and marked on the as-constructed final landform plan. Copy of notification to or correspondence with local Council and Dial Before You Dig	A – all B - all	Proposed

Table 3 – Land Contamination, Landform Stability, Bushfire, Surface Water Quality, Groundwater Quality, Groundwater Regime, Water Approvals

FINAL LAND USE DOMAIN	MINING DOMAIN	REHABILITATION OBJECTIVES	INDICATOR (specific attribute associated with the objective)	COMPLETION CRITERIA (benchmark for the indicator)	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS	SPATIAL REFERENCE	STATUS
Native Ecosystem (CEEC/EEC or non CEEC/EEC) or Agricultural Land Use	<ul style="list-style-type: none"> • Infrastructure Area; • Tailings Storage Facility; • Water Management Area; • Overburden Emplacement Area; • Void (Open Cut void); • Underground Mining Area (subsidence management); • Beneficiation Facility; and • Other 	<u>Land Contamination</u> There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.	Contamination will be appropriately remediated to a condition that does not pose a threat of environmental harm or constrain the final land use	Contamination will be appropriately remediated so that appropriate guidelines for land use are met, e.g. Health Investigation Level of the National Environment Protection (Assessment of Site Contamination) Measure (1999).	Contamination Remediation Report prepared by Land Contamination Consultant Site Contamination Audit Report and Site Audit Statement prepared by EPA Accredited Auditor (where required)	All	Proposed
			Hazardous materials are identified and removed from site including hydrocarbons, chemicals, explosive products, asbestos containing materials (ACMs), lead paints, synthetic mineral fibres (SMFs) and polychlorinated biphenyls (PCBs) (verified by Certificates of disposal).	Waste tracking reports show removal of all hazardous materials	Waste tracking reports	All	Proposed
			Where practical, exposed carbonaceous material will be removed and co-disposed within the mining voids or suitably capped in situ, including coal stockpile areas.	Carbonaceous material removed and no longer present on surface	Rehabilitation monitoring reports Survey records	All	Proposed

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			Exposed coal seams will be capped with at least 3m of benign material where required to prevent spontaneous combustion	Capping completed	Survey records Photos	All	Proposed
			Net acid generating and carbonaceous materials will be capped by a minimum of 5 m of benign material where practical.	Material capped	Capping surveys / Survey record tracings Final landform plan	All	Proposed
			Monitoring records verify that there is no evidence of spontaneous combustion.	Monitoring records verify that there is no evidence of spontaneous combustion.	Aerial surveys Inspections Rehabilitation monitoring reports	All	Proposed
			Residual waste materials stored on site (e.g. tailings dams) will be appropriately contained / encapsulated and free draining so it doesn't pose any threat of environmental harm or constrain the intended final land use	The structural integrity of the infrastructure has been inspected by a suitably qualified engineer and determined to be suitable and safe as part of the intended final land use and does not pose threat of environmental harm.	Engineered capping design with specifications. As-built capping surveys	All	Proposed

FINAL LAND USE DOMAIN	MINING DOMAIN	REHABILITATION OBJECTIVES	INDICATOR (specific attribute associated with the objective)	COMPLETION CRITERIA (benchmark for the indicator)	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS	SPATIAL REFERENCE	STATUS
		<u>Landform Stability</u> The final landform is stable and does not present a risk of environmental harm downstream/down slope of the site or a safety risk to the public/stock/native fauna.	Landform is generally compatible within the context of the local topography	Landform is contiguous with surrounding environment.	Final landform plan	All	Proposed
			Overburden emplacement external slopes will generally be graded to an average of less than 10 degrees. Internal slopes may be steepened to grades up to 18 degrees. Note: localised steepening of slopes will occur due to contour bank construction or natural landform shapes etc.	Slopes generally comply with approval requirements and are stable	Final landform plan	All	Proposed
			Creek diversions are assessed to be stable as defined by the CSIRO Ephemeral Stream Assessment	Creek diversions are assessed to be stable as defined by the CSIRO Ephemeral Stream Assessment	Channel assessment reports	All	Proposed
			Landforms are assessed to be geotechnically stable and free draining to local watercourses	Geotech reports received and confirm landforms are stable	Geotechnical assessment report Rehabilitation monitoring reports Erosion surveys	All	Proposed
			A safety berm and/or security fence is constructed at the void crest (highwalls and endwalls) that provides an adequate engineered barrier for vehicles.	Berm constructed	Survey records Photos	All	Proposed

FINAL LAND USE DOMAIN	MINING DOMAIN	REHABILITATION OBJECTIVES	INDICATOR (specific attribute associated with the objective)	COMPLETION CRITERIA (benchmark for the indicator)	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS	SPATIAL REFERENCE	STATUS
			<p>Minimal erosion that would not require moderate to significant ongoing care and maintenance works.</p> <p>Any areas of active erosion are within the parameters for safe and stable landform.</p> <p>Discharge points from rehabilitated landform to natural channels are stable.</p>	<p>The final landform has been constructed in accordance with the approved Final Landform & Rehabilitation Plan .</p> <p>Signs of erosion and or land instability are recorded, measured and assessed.</p> <p>The average annual soil loss from the final landform at completion is to be equal or less than that specified by the Revised Universal Sediment Loss Equation (or equivalent) for the approved land use.</p> <p>Spillway (where required) of final void and any remaining dams has been constructed in accordance with hydrological design.</p>	<p>Before and after photos</p> <p>Rehabilitation monitoring reports</p> <p>As-constructed surveys</p> <p>Erosion surveys</p> <p>Independent reports that demonstrate long term stability of rehabilitated landform.</p> <p>Depending on the nature, scale and risks associated with a specific site, stability will need to be evaluated over a number of years (e.g. 5 years).</p>	All	Proposed

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		<u>Bushfire</u> The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.	Appropriate bushfire hazard controls (where required) have been implemented on the advice from the NSW Rural Fire Service.	Bushfire controls implemented appropriate to the final land use.	Statement provided and before/after photos.	All	Proposed
		<u>Surface Water Quality</u> Runoff water quality is similar to, or better than the pre-mining disturbance runoff water quality	Runoff water quality from rehabilitation areas represent an acceptable level of change from a background condition (baseline study).	Assessment of runoff water quality against local background water quality including: - EC - TSS - pH - Metals - Biological health in accordance with Australian River Assessment System (AUSRIVAS) or equivalent	Independent surface water assessment report Water quality monitoring reports. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).	All	Proposed
			Water quality in all storages left on site (other than final voids) is suitable for the approved final land use	Assessment of water quality against guidelines for the final land use (e.g. agricultural, industrial, recreational)	Independent surface water assessment report Water quality monitoring reports. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).	All	Proposed

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			Water quality in any approved final voids does not pose a risk to the final land use.	Final void study completed, which includes predicted water quality and assessment of toxicity.	Independent surface water assessment report Water quality monitoring reports. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).	All	Proposed
		<u>Groundwater Quality & Regime</u> The risk to important groundwater assets (GDE's, Alluvial Aquifers, Landholder bores) has been addressed by the rehabilitation.	Groundwater quality and groundwater regime are within range as predicted in environmental assessments and in accordance with water sharing plans and water allocations held by the site.	The measured water quality at important groundwater assets meets predictions. Modelled drawdown and water take is within predictions.	Independent hydro-geological assessment report Monitoring reports Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).	All	Proposed
		<u>Water Approvals</u> Structures that take water are appropriately licensed.	Licenses held, where required.	Hydrological and hydro-geological assessments are undertaken to determine water take at completion from the relevant water sources to confirm that sufficient allocations are held.	Confirmation from relevant Government Agency (e.g. DPI Water) that licences are held.	All	Proposed

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Table 4 – Targeted Ecological Rehabilitation

FINAL LAND USE DOMAIN	MINING DOMAIN	REHABILITATION OBJECTIVES	INDICATOR (specific attribute associated with the objective)	COMPLETION CRITERIA (benchmark for the indicator)	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS	SPATIAL REFERENCE	STATUS
Native Ecosystem (CCEC/EEC)	All domains	Meet approval requirements for establishment of specific ecological communities	Revegetate an area of at least 0.14 ha using trees representative of the Swamp Oak Floodplain Forest community on land that adjoins existing riparian vegetation and is suitable for the establishment of this community.	GIS records and pasture monitoring reports indicate minimum areas have been attained.	Rehabilitation monitoring reports GIS records	A - all	
			Revegetate an area of at least 4 ha using trees representative of the Central Hunter Grey Box Ironbark Woodland community ²	GIS records and pasture monitoring reports indicate minimum areas have been attained.	Rehabilitation monitoring reports GIS records	A - all	
		<u>Ecological Rehabilitation Objective 1</u> The vegetation composition of the rehabilitation is recognisable as the target vegetation community (e.g. plant community type (PCT) contained within the NSW Vegetation Information System) Note: Recognisable is defined as "Diagnostic species present for each Growth form for PCT/TEC using the scientific description of the PCT available on Bionet. Lists of diagnostic species are available through the listing criteria."	Native plant species are characteristic of the target plant community(s)	≥30 native species present and ≥50% of native species of each growth form recorded also occur at analogue sites	Rehabilitation monitoring reports Independent ecological reports (where required). Monitoring in accordance with NSW OEH BAM Methodology.	A - all	

² Subject to mining occurring in Carrington West Wing

		<p><u>Ecological Rehabilitation Objective 2</u></p> <p>The vegetation structure of the rehabilitation is recognisable as, or is trending towards the target plant community (e.g. plant community type (PCT) contained within the NSW Vegetation Information System)</p> <p>Note: "Trending Towards the target plant community" requires use of time series data to show canopy height and cover for each Growth Form against benchmark value range (or successional benchmarks)</p>	Cover and height range of all Growth Forms are characteristic of, or trending towards, the target plant community(s)	Structural attribute score is 75-<100% of minimum analogue site value	<p>Rehabilitation monitoring reports</p> <p>Independent ecological reports (where required).</p> <p>Monitoring in accordance with NSW OEH BAM Methodology.</p>	A - all	
		<p><u>Ecological Rehabilitation Objective 3</u></p> <p>Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustainable</p> <p>OR is trending towards the target plant community (e.g. plant community type (PCT) contained within the NSW Vegetation Information System)</p>	<p>Growing media status is "suitable" for the target plant community(s) establishment, and indicators of nutrient cycling are "suitable" for sustaining the target plant community</p> <p>Also, plant recruitment is "suitable" for sustaining the target plant community(s)</p>	Functional attribute score is 75-<100% of minimum analogue site value	<p>Rehabilitation monitoring reports</p> <p>Independent ecological reports (where required).</p> <p>Monitoring in accordance with NSW OEH BAM Methodology.</p>	A - all	

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FINAL LAND USE DOMAIN	MINING DOMAIN	REHABILITATION OBJECTIVES	INDICATOR (specific attribute associated with the objective)	COMPLETION CRITERIA (benchmark for the indicator)	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS	SPATIAL REFERENCE	STATUS
			Plant competition is “suitable” for sustaining the target plant community(s)	The total cover of exotic plant species is recorded at fixed monitoring plots or transects as per BAM. Cover of High Threat Exotic and Priority Weeds is less than 10%	Rehabilitation monitoring reports Independent ecological reports (where required). Monitoring in accordance with NSW OEH BAM Methodology.	A - all	
			Habitat features (e.g. logs, rocks and nest boxes), including structures suitable for target species are incorporated into rehabilitation areas at required densities, as required by Approvals Native rehabilitation areas provide a range of structural features (e.g. trees, shrubs, ground cover, developing litter layer etc.).	Habitat and structural features recorded	Rehabilitation monitoring reports Independent ecological reports (where required). Monitoring in accordance with NSW OEH BAM Methodology.	A - all	

Table 5 – Non Targeted Native Woodland

FINAL LAND USE DOMAIN	MINING DOMAIN	REHABILITATION OBJECTIVES	INDICATOR (specific attribute associated with the objective)	COMPLETION CRITERIA (benchmark for the indicator)	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS	SPATIAL REFERENCE	STATUS
Native Vegetation (Non CEEC/EEC)	All domains	Approximately 30% (HVO North) and 30-40% (HVO South) of mined land re-established as woodland areas.	Approximately 30% of mined land re-established as woodland areas. Approximately 30-40 % of mined land re-established as woodland areas.	GIS records and pasture monitoring reports indicate minimum percentages have been attained.	Rehabilitation monitoring reports GIS records	A - all	
		Vegetation Composition	Rehabilitation areas contain flora species assemblages characteristic of each Growth Form for the target native vegetation communities.	≥30 native species present and ≥50 to <70% of native species recorded also occur at analogue sites	Rehabilitation monitoring reports Independent ecological reports (where required).	A - all	
			Indicative minimum total tree/shrub densities for seeded areas to be comparable to that of analogue sites (no./area).	250 - 500 stem/ha for native canopy species	Rehabilitation monitoring reports Independent ecological reports (where required).	A - all	
			Weed presence is within range found analogue sites and does not present a risk to the establishment and ongoing health of native species.	Less than 10% cover of High Threat Exotic and Priority Weeds	Rehabilitation monitoring reports Independent ecological reports (where required).	A - all	

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			Total groundcover (vegetation, leaf litter, mulch, rock) is comparable to that of analogue sites (% Cover).	Ground cover (vegetation, leaf litter, mulch, rock) is greater than 60%	Rehabilitation monitoring reports Independent ecological reports (where required).	A - all	
		The rehabilitation is self-sustainable	Evidence of flowering and seeds or second generation juveniles for trees and shrubs or likely to be, based on comparable older rehabilitation sites.	Trees and shrubs are monitored for evidence of second generation juveniles and evidence of flowers and seeds	Rehabilitation monitoring reports Independent ecological reports (where required).	A - all	
		Habitat features incorporated	Habitat features (e.g. logs, rocks and nest boxes), including structures suitable for target species are incorporated into rehabilitation areas at required densities, as required by Approvals Native rehabilitation areas provide a range of structural features (e.g. trees, shrubs, ground cover, developing litter layer etc.).	Habitat and structural features recorded	Rehabilitation monitoring reports Independent ecological reports (where required).	A - all	

FINAL LAND USE DOMAIN	MINING DOMAIN	REHABILITATION OBJECTIVES	INDICATOR (specific attribute associated with the objective)	COMPLETION CRITERIA (benchmark for the indicator)	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS	SPATIAL REFERENCE	STATUS
		Connectivity established	Habitat corridors are established and consistent with target vegetation community compositions, as required by Approvals.	Habitat corridors recorded	Rehabilitation monitoring reports Independent ecological reports (where required).	A - all	
		Target fauna assemblages and habitat in rehabilitation areas	Monitoring confirms target native fauna species are recorded utilising rehabilitation areas or habitat suitable for target species is present, as required by Approvals.	Monitoring for the presence and abundance of target fauna species and habitat	Rehabilitation monitoring reports Independent ecological reports (where required).	A - all	
		Feral animal density	Feral animal species do not pose a threat to final land uses	Feral animals are not impacting on vegetation establishment or health	Rehabilitation monitoring reports Independent ecological reports (where required).	A - all	

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Table 6 – Agricultural Rehabilitation

FINAL LAND USE DOMAIN	MINING DOMAIN	REHABILITATION OBJECTIVES	INDICATOR (specific attribute associated with the objective)	COMPLETION CRITERIA (benchmark for the indicator)	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS	SPATIAL REFERENCE	STATUS
Agricultural Land Use	All domains	Approximately 70% (HVO North) and 60-70% (HVO South) of mined land re-established as stable, productive pasture areas.	70% of disturbed HVO North mining areas returned to productive pasture areas. 60-70% of disturbed HVO South mining areas returned to productive pasture areas.	GIS records and pasture monitoring reports indicate minimum percentages have been attained.	Rehabilitation monitoring reports GIS records	B - All	
		Revegetation is sustainable for the long term and only requires maintenance that is consistent with the intended final land use.	Land and Soil Capability classification or Agricultural Land Classification criteria met.	Land and Soil Capability classification or Agricultural Land Classification assessed against Approval requirements The re-established growth medium substrate (e.g. topsoil / subsoil) is capable of supporting the targeted pasture / cropping regime on a sustained basis.	Rehabilitation monitoring reports Independent agronomist /consultant reports, photos	B - All	
			Rehabilitation areas comprise palatable grasses and legumes appropriate to the district and suitable for cattle grazing.	>50% of herbage biomass comprises pasture species that are representative of species listed in site Approval documents or otherwise species that are perennial, palatable, and productive	Rehabilitation monitoring reports Independent agronomist /consultant reports, photos	B - All	

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			Weed presence is within range found analogue sites and does not present a risk to palatable pasture composition.	Less than 20% cover of High Threat Exotic and Priority Weeds	Rehabilitation monitoring reports Independent agronomist /consultant reports, photos	B - All	
			Cropping / Pasture establishment is in good health and provides adequate cover.	Ground cover (vegetation, leaf litter, mulch) is greater than 70%	Rehabilitation monitoring reports Independent agronomist /consultant reports, photos	B - All	
			Cropping yields from rehabilitated pasture areas is similar to adjacent cropping land.	Biomass >1500kg DM/ha (Green Dry Matter)	Rehabilitation monitoring reports Independent agronomist /consultant reports, photos	B - All	
			Production in tonnes /ha /year of Lucerne hay grown on the Class I and II lands of the ALRP is comparable to the district average.	7.6 to 15 t/ha.	Rehabilitation monitoring reports Independent agronomist /consultant reports, photos	B - All	
			Production in tonnes / ha / year of Lucerne hay grown on the Class II and III lands of the CWW Extension is comparable to the unmined reference sites.	TBD. Criteria to be developed with review of ALRP prior to commencement of CWW Extension.	Rehabilitation monitoring reports Independent agronomist /consultant reports, photos	B - All	

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			Appropriate and reliable access to water for livestock. Appropriate shade and shelter for livestock (i.e. wooded/treed areas) during extreme weather conditions.	Location and density of dams or other watering points appropriate for the intended final land use Location and availability of shade and shelter for livestock appropriate for the intended final land use	Independent agronomist /consultant reports, photos	B - All	

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Appendix E - Seed Mixes

Categories and Species Options	Preferred Seed Mix		
	Species % of category	Sowing rate (kg/ha)	Species Count
Dominant Trees			
<i>Angophora floribunda</i>	20%	0.050	1
<i>Corymbia maculata</i>	0%	0.000	
<i>Eucalyptus albens</i>	0%	0.000	
<i>Eucalyptus blakelyi</i>	0%	0.000	
<i>Eucalyptus crebra</i>	40%	0.100	1
<i>Eucalyptus dawsonii</i>	0%	0.000	
<i>Eucalyptus fibrosa</i>	0%	0.000	
<i>Eucalyptus glaucina</i>	0%	0.000	
<i>Eucalyptus moluccana</i>	40%	0.100	1
<i>Eucalyptus punctata</i>	0%	0.000	
<i>Eucalyptus tereticornis</i>	0%	0.000	
Total - Dominant Trees	100%	0.250	3
Sub-Dominant Trees			
<i>Acacia decurrens</i>	0%	0.000	
<i>Acacia implexa</i>	33%	0.050	1
<i>Acacia lineariifolia</i>	0%	0.000	
<i>Acacia parvipinnula</i>	0%	0.000	
<i>Acacia salicina</i>	67%	0.100	1
<i>Allocasuarina gymnanthera</i>	0%	0.000	
<i>Allocasuarina leuhmanii</i>	0%	0.000	
<i>Allocasuarina verticillata</i>	0%	0.000	
<i>Brachychiton populneus</i>	0%	0.000	
<i>Bursaria spinosa</i>	0%	0.000	
<i>Callitris endlicheri</i>	0%	0.000	
<i>Notelaea microcarpa</i>	0%	0.000	
Total - Sub-Dominant Trees	100%	0.150	2
Shrubs- Acacias			
<i>Acacia amblygona</i>	40%	0.200	1
<i>Acacia brownii</i>	0%	0.000	
<i>Acacia crassa</i>	0%	0.000	
<i>Acacia cultriformis</i>	0%	0.000	
<i>Acacia decora</i>	20%	0.100	1
<i>Acacia elongata</i>	0%	0.000	
<i>Acacia falcata</i>	40%	0.200	1
<i>Acacia paradoxa</i>	0%	0.000	
<i>Acacia spectabilis</i>	0%	0.000	
Total - Shrubs - Acacias	100%	0.500	3
Shrubs- Fabaceaea			

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<i>Daviesia genistifolia</i>	0%	0.000	
<i>Daviesia ulicifolia</i>	0%	0.000	
<i>Daviesia ulicifolia</i> subsp. <i>Stenophylla</i>	0%	0.000	
<i>Hardenbergia violacea</i>	0%	0.000	
<i>Indigofera australis</i>	0%	0.000	
<i>Jacksonia scoparia</i>	0%	0.000	
<i>Podolobium ilicifolium</i>	0%	0.000	
<i>Pultenaea microphylla</i>	0%	0.000	
<i>Pultenaea spinosa</i>	0%	0.000	
Total - Shrubs- Fabaceae	100%	0.000	0
Non-Nitrogen Fixing Shrubs			
<i>Cassinia aculeata</i>	0%	0.000	
<i>Cassinia arcuata</i>	0%	0.000	
<i>Cassinia quinquefaria</i>	0%	0.000	
<i>Dodonaea viscosa</i> subsp. <i>cuneata</i>	100%	0.200	1
<i>Eremophila deserti</i>	0%	0.000	
<i>Hakea sericea</i>	0%	0.000	
<i>Kunzea ambigua</i>	0%	0.000	
<i>Melaleuca decora</i>	0%	0.000	
<i>Melaleuca nodosa</i>	0%	0.000	
<i>Melichrus urceolatus</i>	0%	0.000	
<i>Myoporum montanum</i>	0%	0.000	
<i>Olearia elliptica</i>	0%	0.000	
<i>Ozothamnus diosmifolius</i>	0%	0.000	
<i>Pandorea pandorana</i>	0%	0.000	
<i>Senna artemesioides</i> subsp. <i>zygophylla</i>	0%	0.000	
Total - Non-Nitrogen Fixing Shrubs	100%	0.200	1
Forbs and Subshrubs			
<i>Ajuga australis</i>	4%	0.010	1
<i>Atriplex semibaccata</i>	0%	0.000	
<i>Calocephalus critreus</i>	0%	0.000	
<i>Calotis cuneifolia</i>	0%	0.000	
<i>Calotis lappulacea</i>	8%	0.020	1
<i>Chrysocephalum apiculatum</i>	8%	0.020	1
<i>Desmodium brachypodium</i>	0%	0.000	
<i>Einadia hastata</i>	0%	0.000	
<i>Einadia nutans</i>	20%	0.050	1
<i>Einadia polygonoides</i>	0%	0.000	
<i>Einadia trigonos</i>	20%	0.050	1
<i>Enchylaena tomentosa</i>	0%	0.000	
<i>Eremophila debilis</i>	0%	0.000	
<i>Glycine clandestina</i>	0%	0.000	
<i>Glycine latifolia</i>	0%	0.000	
<i>Glycine tabacina</i>	0%	0.000	
<i>Haloragis heterophylla</i>	0%	0.000	
<i>Hibbertia obtusifolia</i>	0%	0.000	
<i>Hypericum gramineum</i>	0%	0.000	

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<i>Mentha satureoides</i>	0%	0.000	
<i>Maireana microphylla</i>	20%	0.050	1
<i>Neptunia gracilis</i>	0%	0.000	
<i>Podolepis neglecta</i>	0%	0.000	
<i>Pomax umbellata</i>	0%	0.000	
<i>Spartothamnella juncea</i>	0%	0.000	
<i>Solanum cinereum</i>	0%	0.000	
<i>Spartothamnella juncea</i>	0%	0.000	
<i>Swainsona galegifolia</i>	0%	0.000	
<i>Vittadinia spp.</i>	20%	0.050	1
<i>Wahlenbergia spp.</i>	0%	0.000	
Total - Forbs and Subshrubs	100%	0.250	7
Grasses - Primary Colonising			
<i>Austrostipa scabra</i>	20%	0.500	1
<i>Bothriochloa biloba</i>	10%	0.250	1
<i>Bothriochloa decipiens</i>	20%	0.500	1
<i>Bothriochloa macra</i>	10%	0.250	1
<i>Chloris truncata</i>	20%	0.500	1
<i>Digitaria spp.</i>	8%	0.200	1
<i>Enteropogon acicularis</i>	8%	0.200	1
<i>Panicum spp.</i>	4%	0.100	1
Total Grasses - Primary Colonising	100%	2.500	8
Grasses - Long Term understorey			
<i>Aristida spp.</i>	13%	0.500	1
<i>Austroanthonia spp.</i>	13%	0.500	1
<i>Austrostipa aristiglumis</i>	5%	0.200	1
<i>Capillipedium spicigerum</i>	7%	0.250	1
<i>Chloris ventricosa</i>	13%	0.500	1
<i>Dicanthium sericeum</i>	13%	0.500	1
<i>Elymus scaber</i>	0%	0.000	
<i>Eragrostis spp.</i>	7%	0.250	1
<i>Eulalia aurea</i>	0%	0.000	
<i>Heteropogon contortus</i>	0%	0.000	
<i>Paspalidium distans</i>	7%	0.250	1
<i>Sporobolus creber</i>	3%	0.100	1
<i>Themeda avenacea</i>	7%	0.250	1
<i>Themeda triandra</i>	13%	0.500	1
Total Grasses - Long Term Understorey	100%	3.800	11
Grasses - Shade tolerant			
<i>Austrostipa ramosissima</i>	0%	0.000	
<i>Austrostipa verticillata</i>	21%	0.300	1
<i>Cymbopogon refractus</i>	14%	0.200	1
<i>Dichelachne crinita</i>	0%	0.000	
<i>Imperata cylindrica</i>	14%	0.200	1
<i>Microleana stipoides</i>	36%	0.500	1
<i>Poa labillardieri</i>	14%	0.200	1
Total Grasses - shade tolerant	100%	1.400	5
Total - Native Grasses		7.700	24
TOTAL ALL CATEGORIES		9.050	40

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Categories and Species Options	Preferred Seed Mix		
	Species % of category	Sowing rate (kg/ha)	Species Count
Dominant Trees			
<i>Angophora floribunda</i>	11%	0.100	1
<i>Corymbia maculata</i>	11%	0.100	1
<i>Eucalyptus albens</i>	0%	0.000	
<i>Eucalyptus blakelyi</i>	9%	0.080	1
<i>Eucalyptus crebra</i>	33%	0.300	1
<i>Eucalyptus dawsonii</i>	0%	0.000	
<i>Eucalyptus fibrosa</i>	2%	0.020	1
<i>Eucalyptus glaucina</i>	0%	0.000	
<i>Eucalyptus moluccana</i>	33%	0.300	1
<i>Eucalyptus punctata</i>	0%	0.000	
<i>Eucalyptus tereticornis</i>	0%	0.000	
Total - Dominant Trees	100%	0.900	6
Sub-Dominant Trees			
<i>Acacia decurrens</i>	33%	0.300	1
<i>Acacia implexa</i>	11%	0.100	1
<i>Acacia lineariifolia</i>	0%	0.000	
<i>Acacia parvipinnula</i>	22%	0.200	1
<i>Acacia salicina</i>	22%	0.200	1
<i>Allocasuarina gymnanthera</i>	0%	0.000	
<i>Allocasuarina leuhmanii</i>	11%	0.100	1
<i>Allocasuarina verticillata</i>	0%	0.000	
<i>Brachychiton populneus</i>	0%	0.000	
<i>Bursaria spinosa</i>	0%	0.000	
<i>Callitris endlicheri</i>	0%	0.000	
<i>Notelaea microcarpa</i>	0%	0.000	
Total - Sub-Dominant Trees	100%	0.900	5
Shrubs- Acacias			
<i>Acacia amblygona</i>	17%	0.200	1
<i>Acacia brownii</i>	0%	0.000	
<i>Acacia crassa</i>	0%	0.000	
<i>Acacia cultriformis</i>	17%	0.200	1
<i>Acacia decora</i>	25%	0.300	1
<i>Acacia elongata</i>	8%	0.100	1
<i>Acacia falcata</i>	25%	0.300	1
<i>Acacia paradoxa</i>	8%	0.100	1
<i>Acacia spectabilis</i>	0%	0.000	
Total - Shrubs - Acacias	100%	1.200	6
Shrubs- Fabaceaea			
<i>Daviesia genistifolia</i>	29%	0.150	1
<i>Daviesia ulicifolia</i>	0%	0.000	
<i>Daviesia ulicifolia subsp. Stenophylla</i>	29%	0.150	1
<i>Hardenbergia violacea</i>	19%	0.100	1

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<i>Indigofera australis</i>	10%	0.050	1
<i>Jacksonia scoparia</i>	10%	0.050	1
<i>Podolobium ilicifolium</i>	0%	0.000	
<i>Pultenaea microphylla</i>	0%	0.000	
<i>Pultenaea spinosa</i>	4%	0.020	1
Total - Shrubs- Fabaceae	100%	0.520	6
Non-Nitrogen Fixing Shrubs			
<i>Cassinia aculeata</i>	0%	0.000	
<i>Cassinia arcuata</i>	17%	0.100	1
<i>Cassinia quinquefaria</i>	17%	0.100	1
<i>Dodonaea viscosa subsp cuneata</i>	33%	0.200	1
<i>Eremophila deserti</i>	0%	0.000	
<i>Hakea sericea</i>	0%	0.000	
<i>Kunzea ambigua</i>	0%	0.000	
<i>Melaleuca decora</i>	0%	0.000	
<i>Melaleuca nodosa</i>	0%	0.000	
<i>Melichrus urceolatus</i>	0%	0.000	
<i>Myoporum montanum</i>	8%	0.050	1
<i>Olearia elliptica</i>	8%	0.050	1
<i>Ozothamnus diosmifolius</i>	8%	0.050	1
<i>Pandorea pandorana</i>	0%	0.000	
<i>Senna artemesioides subsp. zygophylla</i>	8%	0.050	1
Total - Non-Nitrogen Fixing Shrubs	100%	0.600	7
Forbs and Subshrubs			
<i>Ajuga australis</i>	3%	0.020	1
<i>Atriplex semibaccata</i>	3%	0.020	1
<i>Calocephalus critreus</i>	0%	0.000	
<i>Calotis cuneifolia</i>	0%	0.000	
<i>Calotis lappulacea</i>	5%	0.040	1
<i>Chrysocephalum apiculatum</i>	7%	0.050	1
<i>Desmodium brachypodum</i>	0%	0.000	
<i>Einadia hastata</i>	13%	0.100	1
<i>Einadia nutans</i>	7%	0.050	1
<i>Einadia polygonoides</i>	0%	0.000	
<i>Einadia trigonos</i>	7%	0.050	1
<i>Enchylaena tomentosa</i>	11%	0.080	1
<i>Eremophila debilis</i>	7%	0.050	1
<i>Glycine clandestina</i>	0%	0.000	
<i>Glycine latifolia</i>	0%	0.000	
<i>Glycine tabacina</i>	5%	0.040	1
<i>Haloragis heterophylla</i>	0%	0.000	
<i>Hibbertia obtusifolia</i>	0%	0.000	
<i>Hypericum gramineum</i>	0%	0.000	
<i>Mentha saturoides</i>	0%	0.000	
<i>Maireana microphylla</i>	7%	0.050	1
<i>Neptunia gracilis</i>	0%	0.000	
<i>Podolepis neglecta</i>	0%	0.000	

<i>Pomax umbellata</i>	0%	0.000	
<i>Rhagodia parabolica</i>	0%	0.000	
<i>Solanum cinereum</i>	3%	0.020	1
<i>Spartothamnella juncea</i>	7%	0.050	1
<i>Swainsona galegifolia</i>	7%	0.050	1
<i>Vittadinia spp.</i>	11%	0.080	1
<i>Wahlenbergia spp.</i>	0%	0.000	
Total - Forbs and Subshrubs	100%	0.750	15
Grasses			
<i>Aristida spp.</i>	11%	0.500	1
<i>Austroanthonia spp.</i>	2%	0.100	1
<i>Austrostipa aristiglumis</i>	0%	0.000	
<i>Austrostipa ramosissima</i>	0%	0.000	
<i>Austrostipa scabra</i>	9%	0.400	1
<i>Austrostipa verticillata</i>	5%	0.200	1
<i>Bothriochloa biloba</i>	5%	0.200	1
<i>Bothriochloa decipiens</i>	9%	0.400	1
<i>Bothriochloa macra</i>	5%	0.200	1
<i>Capillipedium spicigerum</i>	2%	0.080	1
<i>Chloris truncata</i>	9%	0.400	1
<i>Chloris ventricosa</i>	9%	0.400	1
<i>Cymbopogon refractus</i>	2%	0.100	1
<i>Dicanthium sericeum</i>	9%	0.400	1
<i>Dichelachne crinita</i>	0%	0.000	
<i>Digitaria spp.</i>	2%	0.100	1
<i>Elymus scaber</i>	0%	0.000	
<i>Enteropogon acicularis</i>	2%	0.100	1
<i>Eragrostis spp.</i>	2%	0.100	1
<i>Eulalia aurea</i>	0%	0.000	
<i>Heteropogon contortus</i>	0%	0.000	
<i>Imperata cylindrica</i>	0%	0.000	
<i>Microleana stipoides</i>	0%	0.000	
<i>Panicum spp.</i>	2%	0.100	1
<i>Paspalidium distans</i>	2%	0.100	1
<i>Poa labillardieri</i>	0%	0.000	
<i>Sporobolus creber</i>	2%	0.100	1
<i>Themeda avenacea</i>	0%	0.000	
<i>Themeda triandra</i>	9%	0.400	1
Total - Grasses	100%	4.380	19
TOTAL ALL CATEGORIES		9.250	64
Cover Crop			
Oats / Millet		5.00	
Couch		2.00	
Rye		1.00	
Bulking Agent		6.00	
Total - Cover Crop		14.00	

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