

HUNTER VALLEY OPERATIONS NORTH

Mining Operation Plan

1 January 2019 – 31 December 2021

Prepared for:

Hunter Valley Operations
Lemington Road
Lemington NSW 2330

SLR Ref: 630.12640
Version No: Final
January 2019



26 February 2019

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Our ref: DOC19/134870

By email:

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Dear Tony

Mining Authorisation Number(s) CCL708, CCL755, CL359, CL360, CL584 (Mining Act 1973), CML4, ML1324, ML1337, ML1359, ML1406, ML1428, ML1474, ML1482, ML1500, ML1560, ML1589, ML1622, ML1704, ML1705, ML1706, ML1707 ML1710, ML1732, ML1748 (Mining Act 1992) Mining Operations Plan – Hunter Valley Operations North

NOTICE OF APPROVAL

Pursuant to Condition 2 of CCL708 and CL584 (1973), Condition 3 of CCL755, CL359, CL360, CML4 (1973), Condition 2 of ML1428, ML1474, ML1482, ML1500, ML1560, ML1589, ML1622 (1992), Condition 3 ML1406, ML1704, ML1705, ML1706, ML1707 ML1710, ML1732, ML1748(1992), Condition 16(e) ML1324 (1992), Condition 18(e) ML1337 (1992), Condition 9(e) ML1359 (1992) the Mining Operations Plan (MOP) that was submitted to the Resources Regulator within the Department of Planning and Environment (the Department) on 15 January 2019 (our reference: SF19/11588) is approved for the period from the date of this approval until 30 July 2020 and subject to the following.

The Regulator considers that the MOP is prepared in accordance with the ESG3 Guideline, however the following gaps have been identified:

1. Comments from the consultation process were not incorporated into the MOP prior to submission to Resources Regulator. The next MOP shall incorporate the comments as per the Department of Planning and Environment Resource Assessments (Melissa Anderson - email 25 February 2019).
2. The MOP is a stand-alone document and Management Plans cannot be simply referenced if they are relevant to the MOP. If the topic relates specifically to rehabilitation / final landuse, that section of Management Plan (ie Biodiversity Management Plan) needs to be extracted and included in the MOP.

3. Further work is required to identify suitable representative ecosystems for the successful development of Specific, Measurable, Achievable, Realistic and Timely (SMART) Completion Criteria and further refinement of the Trigger Action Response Plan (TARP) to be successfully implemented across HVO.
4. Resources Regulator identifies that following the initial rehabilitation assessment of the 12 rehabilitation lots identified in the s240 (refer MOP Appendix C – Common Appendix) there may be additional risks with the trajectory of rehabilitation success for other sites across HVO. HVO are to complete a review to identify the stages and success of rehabilitation, risks to rehabilitation, recommendations to bring back onto trajectory and proposed maintenance and future programs. Formal correspondence relating to this review will be issued to HVO following the March site inspection.

Note the approval date of this MOP is restricted to 30 July 2020 to allow for the submission of the above information. HVO is encouraged to review the opportunity to combine the HVO North and South MOP's into the one MOP to increase efficiency and reduce administrative burden.

It is the responsibility of the Authorisation Holder to ensure that all mining and mining related operations described in this MOP are as approved within the relevant Project Approval or Development Consent and all necessary approvals, consents or permits required under the relevant NSW or Commonwealth regulations have been obtained prior to carrying out the operations.

It is the responsibility of the Authorisation Holder to fulfil their obligations and commitments to the rehabilitation outcomes and performance standards as approved by the relevant consent authority to ensure the rehabilitation outcomes identified are achieved.

ASSESSED DEPOSIT

Approval of this MOP has triggered a review of the assessment of the security deposit required to secure funding for the fulfilment of rehabilitation obligations under **CCL708, CCL755, CL359, CL360, CL584 (Mining Act 1973), CML4, ML1324, ML1337, L1359, ML1406, ML1428, ML1474, ML1482, ML1500, ML1560, ML1589, ML1622, ML1704, ML1705, ML1706, ML1707 ML1710, ML1732, ML1748 (Mining Act 1992)**

Notice of the change in the security deposit condition related to this MOP approval will be provided separately.

DEFINITIONS

In this letter, words have the meaning given to those terms in the Mining Act 1992, unless otherwise specified below.

Department means the Resources Regulator within the NSW Department of Planning and Environment.

Authorisation Holder means the holder of the relevant authorisation(s).

Mining Operations Plan means the project, mining and mining related operations described in the "Mining Operations Plan HVO North" prepared by Coal & Allied Operations Pty Ltd and dated 15 January 2019, as amended by:

If you have any questions about this Notice, please contact Matthew Quinn directly on 02 4063 6630.

Yours sincerely,



MONIQUE MEYER
Manager and Principal Inspector Environment
Compliance Operations
Resources Regulator
NSW Department of Planning and Environment

Signed under delegation from the Minister for Resources

Signed under delegation from the Secretary of the NSW Department of Planning and Environment

PREPARED BY

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BASIS OF REPORT

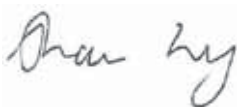
This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Hunter Valley Operations (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
630.12640 Draft	21 December 2018	Samantha Hayes	Adam Williams	Adam Williams
630.12640 Draft	10 January 2019	Samantha Hayes	Adam Williams	Adam Williams
630.12640 Draft	15 January 2019	Samantha Hayes	Adam Williams	Adam Williams
630.12640 Final	15 January 2019	Samantha Hayes	Adam Williams	Adam Williams

Hunter Valley Operations North	
Mining Operations Plan	
Name of Mine	Hunter Valley Operations North (HVO North)
MOP Commencement Date	1 January 2019
MOP Completion Date	31 December 2021
Mining Authorisations (Lease/Licence No.)	CCL 708, CCL 755, CL 359, CL 360, CL 584, CML 4, ML 1324, ML 1337, ML 1359, ML 1406, ML 1428, ML 1474, ML 1482, ML 1500, ML 1526, ML 1560, ML 1589, ML 1622, ML 1704, ML 1705, ML 1706, ML 1707, ML 1710, ML 1732, ML 1748.
Name of Authorisation / Authorisation holder(s)	CCL 708, CCL 755, CL 359, CL 360, CL 584, CML 4, ML 1324, ML 1337, ML 1359, ML 1406, ML 1428, ML 1474, ML 1482, ML 1500, ML 1526, ML 1560, ML 1589, ML 1622, ML 1704, ML 1705, ML 1706, ML 1707, ML 1710, ML 1732, ML 1748 – HVO Resources Pty Ltd ML 1710 – Novacoal Australia Pty Ltd
Name of Mine Operator (if different)	HVO Resources Pty Ltd
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Name and Contact Details of Environmental Representative	Andrew Speechly Manager Environment and Community Hunter Valley Operations PO Box 315 Singleton NSW 2330 Ph: 02 6570 0497 Email: andrew.speechly@hvo.com.au
Name of Representative of the Authorisation Holder(s)	Shaun Leary
Title	Manager Technical Services
Signature	
Date	15 January 2019
Version	Final

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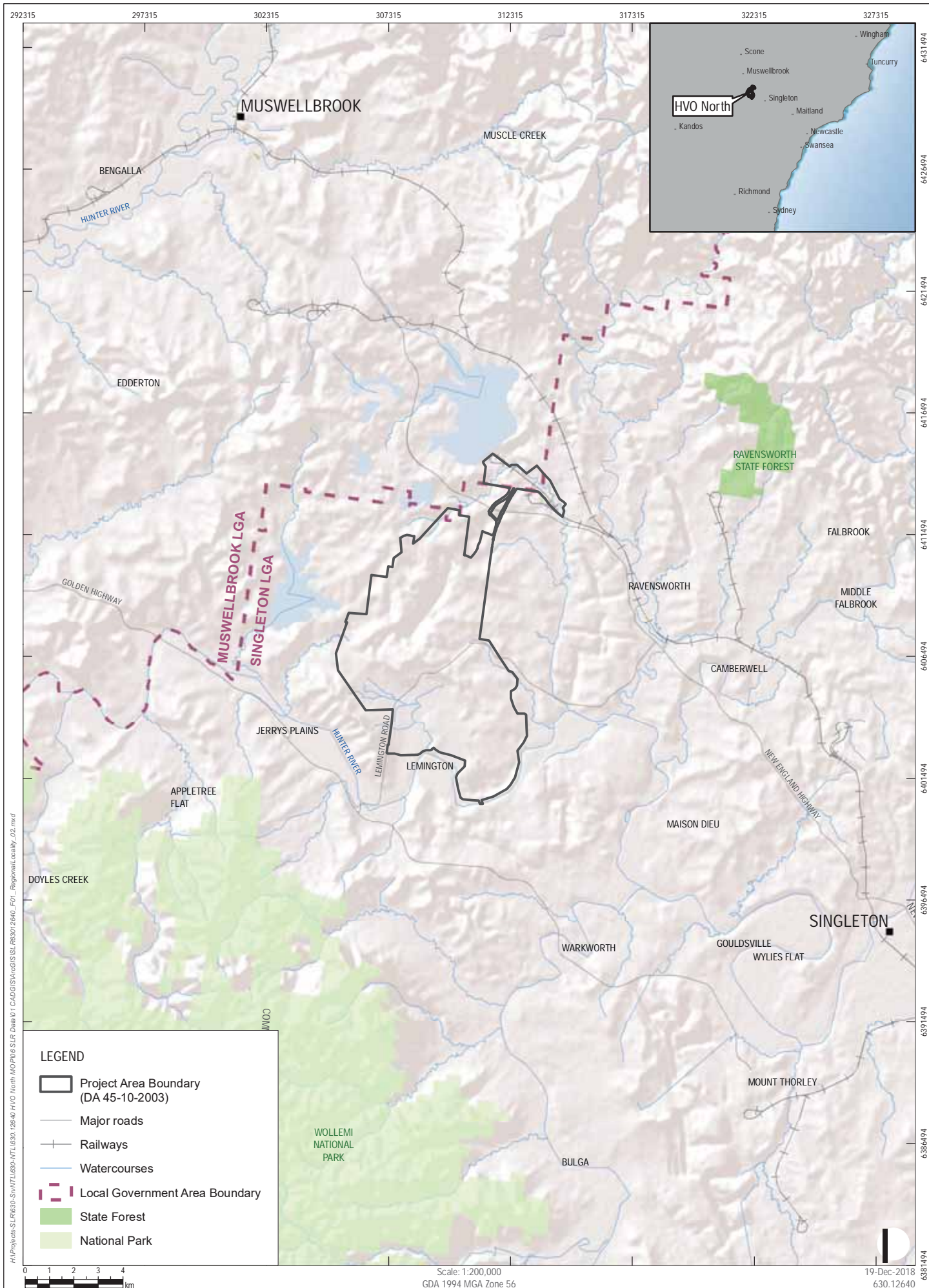
1 Introduction

This Mining Operations Plan (MOP) outlines the proposed mining operations and rehabilitation at Hunter Valley Operations North (HVO North) for the period 1 January 2019 to 31 December 2021 (herein the MOP term). HVO North and HVO South are separated by the Hunter River and collectively form the HVO Complex (HVO). HVO North is located approximately 24 kilometres (km) north-west of Singleton in New South Wales (NSW) (refer **Figure 1**). HVO North is operated by HVO Joint Venture (JV) which is a 51:49 unincorporated JV between Yancoal Australia (Yancoal) and Glencore Coal Assets Australia (GCAA), respectively.

HVO North includes the Carrington Pit, West Pit (which includes the Mitchell Pit), North Pit Tailings Storage Facility (TSF), Dam 6W TSF, Cumnock Void TSF (under agreement with GCAA), Newdell Coal Preparation Plant (NCPP), 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) (refer **Figure 2**).

HVO North operates under Development Consent DA 450-10-2003, which was issued under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). DA 450-10-2003 has been modified on seven occasions with the most recent modification (Mod 7) approved on 28 July 2017. Development Consent DA 450-10-2003 approves the extraction of up to 12 million tonnes per annum (Mtpa) of run of mine (ROM) coal from the West Pit and 10 Mtpa of ROM coal from the Carrington Pit. A copy of the consolidated development consent is attached as **Appendix A**.

This MOP has been prepared in accordance with the NSW Department of Planning and Environment – Resources Regulator’s (RR) *ESG3: Mining Operations Plan (MOP) Guidelines, September 2013* (ESG3) guideline (2013) to satisfy the requirements for a Rehabilitation Management Plan under Schedule 3, Condition 62C of DA 450-10-2003.



Regional Locality

FIGURE 1

1.1 History of Operations

The history of mining at HVO North is summarised in **Tables 1, 2 and 3** below.

1.1.1 West Pit

A brief history of development, mining and associated approvals for West Pit and NLP are provided in **Table 1**.

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 NCPP.
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.
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 HVLP sediment basin and HVO North Communications Towers.
2017	Modification to consent DA 450-10-2003 granted to amend the development consent boundary.

1.1.2 Carrington Pit

A brief history of development, mining and associated approvals for Carrington Pit is provided in **Table 2**.

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.
2018	The receipt of tailings to the North Pit TSF ceased.
2019	In-pit tailings will commence at Carrington Pit.

1.1.3 North Pit

A brief history of the development of North Pit (now the North Pit TSF) and the Alluvial Lands Reinstatement Project (ALRP) is provided in **Table 3**.

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.
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.

Year	Details
2018	The receipt of tailings to the North Pit TSF ceased.
2019	In-pit tailings will commence at Carrington Pit.

1.1.4 MOP History

A history of MOP's prepared for HVO North is outlined in **Table 4**.

Table 4 MOP History

Document Title	Amendment	Issue Date	Expiry Date	Status
HVO North MOP 2016	Original MOP	19 February 2016	30 November 2018	Superseded
	Amendment A	1 June 2017	30 November 2018	Superseded
	Amendment B	30 November 2017	30 November 2018	Current

1.2 Current Consents, Authorisations and Leases

1.2.1 Development Consents

Table 5 summarises the development consents and modification history, including key features approved. Additionally, HVO North 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 5 Development Consent

Consent	Details	Issue Date	Expiry Date
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	
EPBC 2016/7640	State Approved Mining	10 October 2016	31 December 2030

1.2.2 Mining Tenements

Table 6 lists the mining titles applicable to HVO North.

Table 6 Mining Tenements

Mining Title	Company	Issue Date	Expiry Date
(Part) CCL 708	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	17 May 1990	29 December 2023
CCL 755	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	24 January 1990	5 March 2030
CL 359	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	21 May 1990	21 May 2032
CL 360	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	29 May 1990	29 May 2032
CL 584	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	1 January 1982	31 December 2023
Coal Mining Lease (CML) 4	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	2 March 1993	3 June 2033
ML 1324	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	19 August 1993	19 August 2014 (renewal sought)
ML 1337	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	1 February 1994	9 September 2014 (renewal sought)
ML 1359	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	1 November 1994	1 November 2015 (renewal sought)
ML 1406	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	27 February 1997	10 February 2027
ML 1428	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	15 April 1998	14 April 2019
ML 1474	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	24 November 2000	23 November 2021
ML 1482	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	19 March 2001	14 April 2019
ML 1500	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	21 December 2001	20 December 2022
ML 1526	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	3 December 2002	2 December 2023
ML 1560	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	28 January 2005	27 January 2026
ML 1589	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	2 November 2006	1 November 2027
ML 1622	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	22 October 2010	10 March 2027
ML 1704	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	5 December 2014	5 December 2035

Mining Title	Company	Issue Date	Expiry Date
ML 1705	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	17 December 2014	17 December 2035
ML 1706	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	9 December 2014	9 December 2035
ML 1707	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	9 December 2014	9 December 2035
ML 1710	Novacoal Australia Pty Ltd	22 December 2016	10 March 2027
ML1732	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	6 April 2016	5 April 2037
ML 1748	Coal & Allied Operations Pty Ltd & HVO Resources Pty Ltd	5 December 2016	4 December 2037
Mining Lease Application (MLA) 535	Coal & Allied Operations Pty Ltd & Anotero Pty Ltd	28 October 2018	-
MLA 495	Coal & Allied Operations Pty Ltd & Anotero Pty Ltd	12 May 2015	-
MLA 496	Coal & Allied Operations Pty Ltd & Anotero Pty Ltd	12 May 2015	-
EL 5417	Coal & Allied Operations Pty Ltd & Anotero Pty Ltd	23 December 1997	8 May 2018 (renewal sought)
EL 5418	Coal & Allied Operations Pty Ltd & Anotero Pty Ltd	23 December 1997	8 May 2018 (renewal sought)
EL 5606	Coal & Allied Operations Pty Ltd & Anotero Pty Ltd	11 August 1999	10 August 2019
Exploration Licence Application (ELA) 5525	Coal & Allied Operations Pty Ltd & Anotero Pty Ltd	3 July 2017	-
ELA 5526	Coal & Allied Operations Pty Ltd & Anotero Pty Ltd	3 July 2017	-
AUTH 72	Coal & Allied Operations Pty Ltd & Anotero Pty Ltd	8 March 1977	24 March 2018 (renewal sought)

1.2.3 Other Approvals

HVO North holds a flood levee permit as shown in **Table 7**

Table 7 Other Approvals

Approval Number	Details	Issue Date	Expiry Date
627/2006	Carrington Mine Extended Flood Levees	08 February 2007	N/A

Licences

Current licences applicable to HVO North are summarised in **Table 8**.

Table 8 Licences

Licence / Permit No.	Description	Expiry Date
EPL 640	Environmental Protection Licence	1 April (anniversary) 20 August 2020 (Review due date)
RML 5085293	Radiation Management Licence	14 November 2019
NDG 037852	Dangerous Goods Notification (for the storage and handling of hazardous chemicals)	No expiry date

Water Licences

The water licences applicable to HVO North are listed in **Table 9**.

Table 9 Water Licences

Licence No.	Type	Purpose	Legislation	Renewal Date
20AL201237; 20AL201895	Water Access Licence	Water Access Licence	<i>Water Management Act 2000</i>	Perpetuity
20BL141584; 20BL168820; 20BL169241; 20BL171423; 20BL171424; 20BL171425; 20BL171426; 20BL171427; 20BL171428; 20BL171437; 20BL171438; 20BL171439; 20BL171492; 20BL171726; 20BL171851; 20BL171852; 20BL171853; 20BL171854; 20BL171855; 20BL171856; 20BL171857; 20BL171858; 20BL171895; 20BL171896; 20BL171897; 20BL171898; 20BL173062; 20BL173063; 20BL173064; 20BL173065; 20BL173069	Bore	Monitoring Bore	Part 5 <i>Water Act 1912</i>	Perpetuity
20BL167860	Bore	Excavation - Mining	Part 5 <i>Water Act 1912</i>	11 May 2020
20CA201247	Works Approval	Pumping Plant	<i>Water Management Act 2000</i>	28 December 2027
20FW213278 (formally 20CW802604)	Flood Work Approval	Levee	<i>Water Management Act 2000</i>	21 September 2021
20FW213280 (formally 20CW802612)	Flood Work Approval	Levee	<i>Water Management Act 2000</i>	04 September 2021
20WA210991	Stream Diversion	Stream Diversion	<i>Water Management Act 2000</i>	9 January 2023
20WA211427	Stream Diversion	Cutting (diversion drain)	Section 10 <i>Water Act 1912</i>	7 September 2023

Licence No.	Type	Purpose	Legislation	Renewal Date
20WA211428 20SL061594	Stream Diversion	Cutting (diversion drain)	<i>Water Management Act 2000</i>	31 July 2022
20WA210984 20SL042746	Diversion Works	Industrial	<i>Water Management Act 2000</i>	8 September 2022
20WA201238	Diversion Works	Pumping Plant	<i>Water Management Act 2000</i>	16 March 2028
20WA201685	Diversion Works	Pumping Plant	<i>Water Management Act 2000</i>	Perpetuity
WAL 11933; WAL 13387; WAL 13391; WAL 969; WAL 962; WAL 965, WAL 40462, WAL 40463, WAL 41533	Water Access License	Certificate of Title	<i>Water Management Act 2000</i>	Perpetuity

Tailings Emplacement Area Approvals

Tailings emplacement approvals held for operations at HVO North are listed in **Table 10**. Additionally, approximately 25% of the GCAA-owned Cumnock Void TSF is utilised by HVO North for the storage of tailings from the HCPP.

Table 10 Tailings Emplacement Area Approvals

Approval	Approval Date	Expiry Date	TSF Status
Central TSF	17 April 1998	N/A	Inactive
South-East TSF	5 October 2001	N/A	Inactive - Partly capped and rehabilitated
Bobs Dump TSF	21 November 2001	N/A	Rehabilitated
North Pit TSF	13 June 2003	N/A	Active
Bobs Dump TSF – Stage 2	23 December 2003	N/A	Rehabilitated
Dam 6W TSF	18 August 2011	N/A	Active
Western TSF	Unknown	Unknown	Rehabilitated
Carrington Pit	25 January 2017	12 June 2025	To commence during MOP Term

Table 11 includes details regarding high risk activity notifications for tailings facilities. These approvals are issued for formal closure of a tailings dam under the *NSW Work Health and Safety (Mines) Regulation 2014*.

Table 11 High Risk Activity Notification

Tailings Dam	Authority	Commencement Date	Expiry Date
South-East TSF	RR	12 August 2015	N/A

1.3 Land Ownership

Coal & Allied Operations Pty Ltd and Anotero Pty Limited own the majority of the lands within the existing leases area. A schedule of land ownership on and adjacent to HVO North coal leases is contained in Appendix A of the development consent and shown on **Plan 1C** (refer **Appendix B**).

1.4 Consultation

The objectives of the Stakeholder Engagement Strategy are to:

- Identify and assess stakeholders, key influencers and related impacts, issues, concerns, risks, interests, needs, opportunities and maintain an accurate database;
- Implement communication and consultation practices that are consistent with industry best-practice;
- Provide timely and relevant information to stakeholders regarding HVO's activities;
- Work with stakeholders to develop appropriate solutions and strategies to minimise negative impacts associated with HVO's activities;
- Actively seek feedback from stakeholders in relation to HVO's performance, communication/consultation process and where required, integrate this feedback into decision-making processes;
- Record and respond to community complaints in a professional and timely manner;
- Provide feedback to stakeholders about their issues and concerns and how their feedback has been actioned and used;
- Implement a Community Development Plan, which is relevant and consistent with current socio-economic conditions and context; and
- Monitor and measure the effectiveness of engagement and community development and investment activities.

1.4.1 Community

The Community Consultative Committee (CCC) for HVO provides a forum for important community discussion. Community representatives act as the point of contact to provide feedback between HVO and the community. Community representatives are asked to relay information from these meetings to their community and in turn, through their representative, the community can raise issues they would like addressed. This CCC is comprised of members from the community, HVO, Environmental Groups and Singleton Shire Council (SSC). The Resource Regulator, NSW Planning & Environment and NSW Environmental Protection Authority attend as available. The CCC is required to meet three times a year, or as agreed by the Director-General, throughout the life of the combined operations.

HVO operates a 24-hour Environmental Hotline for community members to voice their concerns. Community members have been informed that they may contact HVO at any time to raise concerns or enquiries regarding HVO. A system has been established to ensure an appropriate HVO representative responds to any complaint lodged.

1.4.2 Government

HVO has consulted with appropriate government authorities regarding the preparation and content of this MOP (refer **Section 1.4.4**). Consultation with these authorities has also occurred during recent approval submissions and environmental assessments.

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

1.4.3 Aboriginal Groups

HVO works closely with local Aboriginal groups through professional engagement and consultation on cultural heritage management. HVO facilitate Cultural Heritage Working Group (CHWG) meetings, which is comprised of HVO representatives and recognised aboriginal parties (RAPs).

Through this working group, HVO have an ongoing consultation process with the Aboriginal community and a forum for discussions on all matters pertaining to cultural heritage associated with HVO owned lands, projects and operations in the Upper Hunter Valley.

The CHWG works with HVO to develop cultural heritage processes including community consultation procedures, cultural heritage investigations methodologies, and a process for the selection and engagement of Aboriginal corporate entities for project management and administrative coordination. Moreover, the CHWG developed an agreed process for the selection of cultural heritage field officers and technical advisors to conduct the cultural heritage investigations.

1.4.4 MOP Consultation

Representatives from HVO, SLR and the RR met to discuss the development of this new MOP on 24 October 2018. In accordance with Schedule 6, Condition 3 of DA 450-10-2003, HVO sought approval from the Secretary to undertake the preparation of this MOP without undertaking consultation. This was approved by the DPE on 14 January 2019.

Updates to the MOP will be communicated to the CCC via regular meetings.

2 Proposed Mining Activities

2.1 Project Description

Development Consent DA 450-10-2003 allows HVO North to carry out mining operations until 12 June 2025. The consent allows HVO North to mine at a rate of up to 12 Mtpa of ROM coal from West Pit and 10 Mtpa of ROM coal from Carrington Pit.

The following life expectancies for each pit are based on current approved rates of production:

- West Pit – expected to produce coal beyond 2030; and
- Carrington Pit – mining is expected to cease in 2019. Following this, fine reject emplacement is scheduled to begin.

Proposed activities in the MOP term are further discussed in **Section 2.2**.

2.2 Activities over the MOP Term

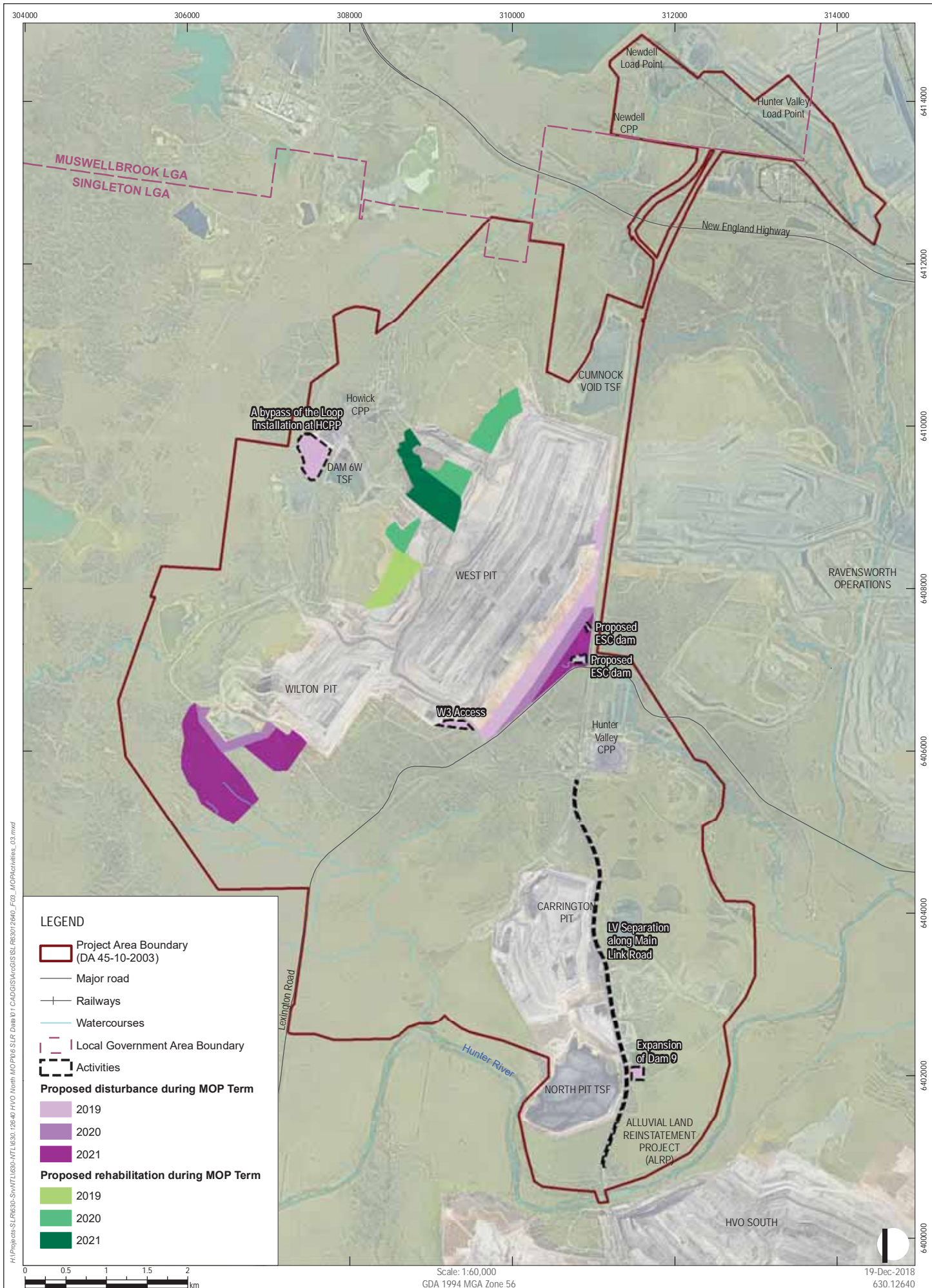
Proposed activities and construction are shown in **Figures 3**.

A summary of the activities to be undertaken during the MOP term include:

- Exploration drilling;
- Construction during 2019 as shown in **Figure 3**;
- Mining will continue south-eastwards towards the haul road in West Pit, the Mitchell Pit will be expanded towards the south-west and mining will cease in Carrington Pit in 2019;
- Overburden emplacement will continue using current practices;
- Tailings will be transported to North Pit TSF, Dam 6W TSF and Cumnock Void TSF (under an agreement with Glencore). In-pit tailings will commence at Carrington Pit in early 2019;
- All waste will be managed by an appropriately licenced waste contractor;
- No decommissioning or demolition will occur during the MOP term; and
- Progressive rehabilitation will occur in West Pit.

2.2.1 Exploration

HVO North will continue to undertake exploration drilling within the tenement areas to obtain further information regarding resources to be mined, as well as geological and geotechnical information relevant to the mining and construction activities that will be undertaken.



Rehabilitation and Disturbance
during the MOP Term

FIGURE 3

2.2.2 Construction

As shown in **Figure 3**, all construction activities are proposed to be undertaken during 2019, including:

- Duplication of Dam 9;
- Realign sections of the existing haul road for the W3 Access;
- The construction of erosion and sediment control structures on the eastern side of West Pit;
- Light Vehicle separation road along the Main Link Road;
- Enlargement of the ROM coal loop at HCPP; and
- Construction of 33 kW powerline within 30 m easement along south-western limit of West Pit. Ground disturbance will be limited to pole locations, light vehicle track (approximately 6 m wide) and minor associated drainage controls.

2.2.3 Mining Operations

Mining at HVO North involves the following general sequence:

- Pre-stripping the topsoil;
- Removing the overburden (by dragline, shovel and excavators);
- Coal mining (coal extraction by excavators and front end loaders); and
- Coal transport and processing.

Land preparation ahead of mining involves the construction of appropriate erosion and sediment control structures, clearing of vegetation, stripping and stockpiling of topsoil.

Mining will continue in accordance with current operational practices. Mining is currently carried out by a dragline (West Pit only), electric shovels and excavators, supported by loaders, dozers, graders, water trucks and a fleet of dump trucks. Overburden and interburden is either free dug or drilled and blasted, removed using a combination of shovel/excavator/front end loaders and placed in trucks for haulage to out of pit emplacements or refill areas in the pit.

In the West Pit, coal seams thinner than 2 metres (m) are ripped by dozers and pushed into windrows while seams thicker than 2 m are drilled and blasted. In the Carrington Pit, coal is drilled and blasted and removed with a front end loader or excavator feeding the coal into trucks. Coal is then placed into trucks by front-end loaders and delivered to the ROM coal stockpile facilities.

During the MOP term the open cut resources will be mined in the two main pit areas (refer **Figure 2**):

- West Pit – mining will extend south-eastwards toward the haul road. Mining will also commence in the Mitchell Pit which is located at the southern end of the West Pit; and
- Carrington Pit – mining has ceased at Carrington Pit and the placement of fine rejects will commence during the MOP term.

The development of the West Pit and Carrington Pit during the MOP term are shown in **Plans 3A – 3C** (refer **Appendix C**).

2.2.4 Rock/Overburden Emplacement

All overburden and interburden material generated from mining operations at HVO North is either road hauled to, or directly emplaced by the dragline on current emplacement areas behind the active mining operation. As part of the integration of operations at HVO, mining waste may be transported to any HVO pit for emplacement to achieve the final approved landform.

All mining waste emplacements shall be reshaped as required. The actual method and height of emplacement areas shall be in accordance with the final approved landforms and HVO procedures for dumping and is dependent on the competency of the overburden material. The approximate maximum heights of emplacement at HVO North will be in accordance with the proposed final landform levels and as shown on **Plan 4**.

2.2.5 Processing Residues and Tailings

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 little propensity for spontaneous combustion. This material has similar properties to overburden in contact with coal seams, and is generally saline and alkaline.

The HCPP and HVCPP currently generate approximately 78,000 Mtpa and 3.6 Mtpa of coarse washery rejects, respectively. Coarse rejects are transported by truck and buried approximately 2 m below the final surface level in overburden emplacements as part of the final landform design.

The NCPP is not currently used for coal processing but components of the facility are used for transferring coal from stockpile areas to the train loading facility.

Fine Rejects

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 transported to the following emplacement areas:

- North Pit TSF;
- Dam 6W TSF; and
- Cumnock Void TSF – under an agreement with Glencore (Ravensworth) to utilise 25% of the voids capacity.

Tailings from the HCPP are currently pumped via pipeline to the Dam 6W TSF and Cumnock Void TSF, while tailings from the HVCPP are currently pumped via pipeline to the North Pit TSF. TSF locations are shown on **Figure 2**. The Carrington in-pit TSF will take over from the North Pit TSF as the primary TSF for deposition of tailings from HVCPP in 2019.

Tailings from the HCPP will be deposited into Dam 6W TSF and Cumnock Void TSF until 2022. **Section 7.2** provides information on the plans for rehabilitation of TSF's during the period of this MOP.

Initial capping of South East TSF is expected to recommence during 2019.

2.2.6 Waste Management

Recycling and disposal of waste at HVO North focuses on the correct handling, storage, segregation and reuse of materials. In accordance with the *Waste Management Plan*, HVO North 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.

Sewage Waste

The West Pit sewage treatment plant is located approximately 1 km north of the surface facilities, which treats wastewater from the workshop, bathhouse and office. Sewage is treated on-site in an aerobic digester and the treated effluent is retained in two detention ponds for evaporation and infiltration. Effluent from the plant is discharged through a number of small farm dams. Overflow from these dams pass into Pikes Gully. Sewage from the in-pit crib huts in West Pit is pumped out and removed or treated with the 'biocycle system'. Where required, the sewage from the crib huts is pumped to the sewage treatment plant.

Personnel working in Carrington Pit and the southern part of the HVO North site use the bathhouse facilities at the administration area. The wastewater generated at these facilities is passed through an extended aeration package treatment plant and the treated effluent is disinfected and directed to mine water storage dams where it is recycled.

Effluent from in-pit mobile lunch/amenity rooms in Carrington Pit is treated by aerated treatment plants and the treated effluent is spray irrigated onto adjacent evaporation areas.

Oil and Grease

A specialised oil and grease storage facility exists at all active service areas, which is collected for recycling by a certified waste disposal contractor. The bulk oils and grease storage facilities are part of the fuel storage facility and meet Australian Standards. All waste hydrocarbons are recycled via a licensed waste hydrocarbon disposal company.

2.2.7 Decommissioning and Demolition Activities

During the MOP term, HVO North will continue to use existing infrastructure. No decommissioning or demolition is proposed during the MOP term.

2.2.8 Temporary Stabilisation

Where rehabilitation is delayed due to changes or delays in the mining schedule, and/or poor conditions, overburden areas will be shaped to final landform as close as reasonably practicable behind the active mining operation and suitable cover crops applied on exposed areas to minimise dust and erosion.

Temporary rehabilitation by seeding with sterile cover crops may be undertaken on disturbed areas during construction activities (such as road batters and temporary lay down areas). Temporary revegetation may also be undertaken on unshaped overburden dumps and other disturbed areas where deemed to be a substantial contributor to dust emissions. Temporary revegetation of these areas is designed to improve visual amenity and the control of dust emissions.

2.2.9 Progressive Rehabilitation and Completion

Rehabilitation at HVO North is undertaken progressively over the life of the mine, with overburden emplacements and backfilled pits shaped and rehabilitated once dumping is complete. At the commencement of the MOP, approximately 1,806.6 ha of mined land has been rehabilitated at HVO North.

Rehabilitation progress during the MOP term is depicted on **Plans 3A to 3C** (refer **Appendix C**). It is anticipated that at the end of the MOP term an additional 100.1 ha of land disturbed by mining will be undergoing rehabilitation. It is not anticipated that any rehabilitation areas will be relinquished in the MOP term.

All rehabilitation to be undertaken during the MOP term will be along the north-western edge of the West Pit. Further details related to projected rehabilitation are provided in **Section 7.2**.

2.2.10 Material Production Schedule

The material production schedule during the MOP term is provided in **Table 12**. Any proposed changes to this schedule will be outlined in the Annual Review.

Table 12 Material Production Schedule during the MOP Term

Material	Unit	2019	2020	2021
Stripped topsoil	m ³	46,435	38,094	77,620
Rock/overburden	Mbcm	51.1	45.7	51.3
ROM coal	Mt	8.1	7.9	8.1
Reject material*	Mt	2.1	0.8	0.7
Product	Mt	5.6	6.5	6.1

Note: * Includes coarse reject, tailings and co-disposed paste thickened tailings.

2.3 Primary Domains

For the purpose of this MOP, operational (primary) domains have been defined as the set of discrete areas that have a particular operational or functional purpose. All areas previously disturbed by mining, or proposed to be subject to the activities described in **Section 2.2**, have been assigned to an appropriate primary domain. Primary domains at HVO North are defined in **Table 13**. The footprint of each primary domain at the commencement of the MOP term is depicted in **Plan 2** (refer **Appendix C**).

Table 13 Primary Domains

Code	Domain	Description
1	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.
2	Active Mining	The footprint of the HVO North active mining areas, including: <ul style="list-style-type: none"> • Pre-strip areas ahead of mining; • Active mining areas; and • Voids and inactive in-pit areas prior to commencement of backfilling.
3	Overburden Emplacement Area	The footprint of all in-pit and out of pit waste rock emplacements (overburden and coarse rejects).
4	Tailings Storage Facility	The footprint of current tailings emplacement areas (fine rejects).
5	Water Management Area	This domain includes the network of dams and associated water management structures at HVO North.
6	Rehabilitation Pasture	Existing pasture rehabilitation areas at HVO North. This includes the ALRP area.
7	Rehabilitation Woodland	Existing woodland rehabilitation areas at HVO North. This includes the 0.14 ha of Swamp Oak Floodplain Forest community.
8	Offset Areas	All offsets related to HVO North, including: <ul style="list-style-type: none"> • Mitchell Hill Biodiversity Area – 132 ha; • Condon View Biodiversity Area – 168 ha; and • Crescent Head Biodiversity Area – 190.4 ha.

2.4 Asset Register

The asset register included as **Table 14** provides a summary of the key features of each primary domain (refer **Section 2.3**), and principal activities required for rehabilitation. This asset register is intended to provide a suitable level of context for the Rehabilitation Cost Estimate (RCE).

The areas for each primary domain represent the total disturbance footprint for each domain in **Plan 2** (refer **Appendix C**).

Table 14 Asset Register

Major Assets	Use	Demolition / Rehabilitation Activities	Approvals Required	Quantity	Unit
Domain 1 – Infrastructure: 420.9 ha					
HCPP	Washing coal – currently utilised	Disconnect and terminate all services; demolish and remove CPP buildings; demolish and remove CPP; remove carbonaceous material.	Radiation licence/s	1	Unit
HVCPP	Washing coal – currently utilised		Demolition certificates	1	Unit
NCPP	Washing coal – not in use		Phase 1 and, if required, Phase 2 Contamination Assessments	1	Unit
HVLP	Loading onto trains – currently utilised	Remove train loading facility.	None	1	Unit
NLP	Loading onto trains – currently utilised			1	Unit
Carrington Administration Area	Administration and staff facilities – currently utilised	Disconnect services; demolish and remove infrastructure; remove concrete pads.	None	16,170	m ² /floor
Small buildings at West Pit, HVLP and Newdell (admin buildings, single story accommodation buildings and tanks)	Administration, accommodation and supporting infrastructure – currently utilised			5,049	m ² /floor
Carrington Main Workshop	Workspace – currently utilised	Disconnect services, demolish and remove industrial buildings and infrastructure; remove concrete pads, and light and heavy vehicle wash pads. Undertake contamination assessment and remediate any contaminated areas.	Demolition certificates	18,948	m ² /floor
Mine Infrastructure Area at West Pit, HVLP and Newdell - workshops and tyre changing services (Industrial Buildings)	Workspace and storage facilities – currently utilised		Phase 1 and, if required, Phase 2 Contamination Assessments	5,901	m ² /floor

Major Assets	Use	Demolition / Rehabilitation Activities	Approvals Required	Quantity	Unit
Powerlines	Power supply – currently utilised	Disconnect and remove poles and wires.	None	96.4	km
Infrastructure - Conveyors transfer stations and gantries	Coal processing – currently utilised	Demolish and remove conveyors and gantries demolish and remove coal clearance conveyor and concrete reclaim tunnel, remove carbonaceous material.	None	13,972	m
Stacker or Reclaimer	Stackers – currently utilised	Demolish and remove stackers.	None	8	Unit
Thickener Tanks (small and large)	Tailings management – currently utilised	Demolish and remove thickener tank.	None	12	Unit
Underground Tanks 5,000 L – 15,000	Underground tanks – currently utilised	Demolish and remove.	None	2	Unit
Concrete Pads and Footings	Supporting infrastructure – currently utilised	Remove concrete pads and footings.	None	62,219	m ²
Car Parks and Access Roads	Internal access and parking – currently utilised	Remove bitumen car parks and roads.	None	10,000	m ²
Unsealed Roads and Haul Roads	Internal haul routes – currently utilised	Remove roadside tyres/markers/signs; and remove carbonaceous material.	None	311.5	ha
Rail Loop and Spur	Coal train loading and coal transport – currently utilised	Removal of site services (electricity, telecommunications etc.). Dismantle rail load out, remove rail loop track and formation, and refuelling facility. Undertake contamination assessment and remediate any contaminated areas.	Demolition certificate Phase 1 and, if required, Phase 2 Contamination Assessments	2,577	ha
Substations	Power supply – currently utilised	Disconnect services, demolish and remove substations, dispose of waste materials.	None	2	Unit

Major Assets	Use	Demolition / Rehabilitation Activities	Approvals Required	Quantity	Unit
Domain 2 – Active Mining: 347.3 ha					
No building or plant located within this domain	N/A	N/A	None	N/A	N/A
Domain 3 – Overburden Emplacement Area: 972.1 ha					
No building or plant located within this domain	N/A	N/A	None	N/A	N/A
Domain 4 – Tailings Storage Facility: 171.5 ha					
Dam 6W TSF North Pit TSF Central TSF South-East TSF	Dam 6W TSF, North Pit TSF – currently utilised Central TSF – Inactive South-East TSF – Inactive (partly capped and rehabilitated)	Remove pumping infrastructure. Desiccation / settlement. Develop approved detailed capping design and High Risk Activity application. Cap tailings. Rehabilitation.	Section 101 Approval under the <i>Coal Mine Health and Safety Act 2002</i> Dam Safety Committee sign off for rehabilitation design, de-prescription for Central TSF and South-East TSF	171.4	ha
Domain 5 – Water Management Area: 66.0 ha					
All on site water storage dams remaining in final landform	Water storage – currently utilised	Remove sediments from floor of dams to enable them to be converted to clean water structures.	None	19	ha
All on site water storage dams being removed in final landform	Water storage – currently utilised	Remove contaminated sediments from the floor of the dams to be decommissioned and bury material in spoil; fill dam voids.		47	ha

Major Assets	Use	Demolition / Rehabilitation Activities	Approvals Required	Quantity	Unit
Groundwater Bores	Water monitoring and supply – currently used	Seal open bores.	ESG5: Assessment Requirements for Exploration Activities	37	Unit
Domain 6 – Rehabilitation Pasture: 1,203.7 ha					
No building or plant located within this domain	N/A	N/A	None	N/A	N/A
Domain 7 – Rehabilitation Woodland: 602.9 ha					
No building or plant located within this domain	N/A	N/A	None	N/A	N/A
Domain 8 – Offset Areas: 490.4 ha					
No building or plant located within this domain	N/A	N/A	None	N/A	N/A

2.4.1 Rehabilitation Cost Estimate

In addition to the detail contained within **Table 14** above, the RCE prepared and submitted with the MOP includes specific detail relating to the lengths, volumes and size of individual assets that are intended to be decommissioned as part of the eventual closure of the mine.

The RCE has been calculated to undertake the necessary works to achieve the desired final land use (refer **Section 4** and **Plan 4**). The RCE provides for third party rates to undertake the following:

- Decommissioning and demolition of all surface infrastructure;
- Rehabilitation of all areas disturbed by mining as depicted in **Plan 2**, with the exception of some dams that will be retained for post mining use; and
- Mobilisation costs, project management and contingencies.

A copy of the RCE was submitted to the RR with this MOP for approval.

3 Environmental Management

3.1 Environmental Risk Assessment

An Environmental Broad Brush Risk Assessment (BBRA) was undertaken for HVO North and includes rehabilitation issues. The BBRA was undertaken in accordance with *Australian & New Zealand Standard AS/NZS 31000:2009 Risk Management – Principles and Guidelines*.

The BBRA assessed 100 key environment and community risks, which are summarised as:

- 34 risks were ranked as low;
- 28 risks were ranked as medium;
- 38 risks were ranked as high; and
- No risks were ranked as critical.

A copy of the Risk Register developed for the BBRA is attached as **Appendix D**.

3.2 Environmental Risk 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. The HVO EMS has been developed generally in accordance with ISO 14001.

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. The following management plans are in place for HVO:

- *Environmental Management Strategy;*
- *Pollution Incident Response Management Plan;*
- *Water Management Plan (including a Surface Water Management Plan, Surface Water Monitoring Program, Groundwater Management Plan and Groundwater Monitoring Program);*
- *Air Quality and Greenhouse Gas Management Plan;*
- *Noise Management Plan;*
- *Blast Management Plan;*
- *HVO North Heritage Management Plan;*
- *Integrated Biodiversity Management Plan;*
- *Biodiversity Offset Strategy;*
- *Landscape and Rehabilitation Management Strategy;*
- *Agricultural Lands Reinstatement Management Plan;*
- *River Red Gum Rehabilitation and Restoration Strategy;*
- *Bushfire Management Plan; and*
- *HVO's series of Spontaneous Combustion Management Plans.*

These management plans will be updated as required with the approval of the DPE. Copies of the current versions of these management plans are available on the HVO website (<https://insite.hvo.com.au>).

3.2.1 Air Quality

Air quality is managed in accordance with the *Air Quality and Greenhouse Gas Management Plan* (AQMP) which includes the following:

- Air quality related legal and other requirements relevant to HVO North;
- The measures (both proactive and reactive) which are implemented to minimise air quality impacts on near neighbours and the surrounding environment, and ensure compliance with consented air quality criteria;
- Processes in place to provide regular updates to the DPE and local community regarding the outcomes of the air quality monitoring program; and
- All aspects of HVO's air quality monitoring program including monitoring locations, frequency of assessment, the use of real time monitoring systems, and a protocol for determining compliance with the air quality criteria.

Air quality compliance monitoring results are reported in the Monthly Environmental Monitoring Report, Annual Review, EPL Annual Return, on the HVO website and to the CCC.

3.2.2 Erosion and Sedimentation

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

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.

3.2.3 Water Management

Surface water and groundwater is managed in accordance with the *Water Management Plan* (WMP). The HVO North water management system consists of a network of infrastructure (i.e. dams, pipelines, contour banks) to control the movement of water around the site. The main types of water managed at HVO include:

- Mine Water
- Sediment Water
- Clean Water

The major uses of water at the HVO North are process water at the CPP's and dust suppression. During periods of water surplus, excess mine water can be released via licensed discharge points (LDPs) into the Hunter River under the Hunter River Salinity Trading Scheme (HRSTS).

Surface Water

HVO North maintains a network of surface water monitoring sites located on mine site dams, surrounding natural watercourses and the Hunter River (both upstream and downstream of mining operations). Results of the surface water quality monitoring at HVO are reported to the CCC, on the HVO website and in the Annual Review.

Full details of the HVO surface water monitoring programme are outlined in the WMP.

Groundwater

HVO has established a substantial network of groundwater monitoring and testing bores to monitor the groundwater levels and quality at HVO North. Full details of the groundwater monitoring programme are outlined in the WMP.

Results of the groundwater monitoring at HVO North are reported in the Monthly Environmental Monitoring Report, Annual Review and to the CCC.

3.2.4 Contaminated Land

Hazardous materials including bulk diesel fuels and chemicals are contained in bunded storage areas to minimise the potential for accidental spills as described in **Section 3.2.5**.

Additional management measures include:

- Inspecting and maintaining equipment and plant, including the conveyor networks regularly to minimise potential for leaks associated with equipment failures;
- Management of identified asbestos at various buildings across HVO North in accordance with the Asbestos Management Plan and Register;
- Maintaining the existing bioremediation areas and establishing additional bioremediation areas as required to treat soils contaminated by hydrocarbon spills; and
- Maintaining a Contaminated Sites Register.

3.2.5 Hazardous Material Contamination

Hazardous materials and dangerous goods used at HVO North 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 North 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, bunded for medium to long-term storage requirements.

3.2.6 Flora and Fauna

Biodiversity at HVO is managed in accordance with the *Integrated Biodiversity Management Plan*.

Existing vegetation communities and recorded occurrences of threatened species are shown on **Plan 1B**. Flora at the Carrington billabong is managed in accordance with the *River Red Gum Rehabilitation and Restoration Strategy*. A *Landscape and Rehabilitation Management Strategy* has also been prepared as per Condition 32 of DA 450-10-2003.

Management measures have been developed to minimise the direct and indirect impacts of the gradual clearance of native vegetation including vegetation and habitat clearance protocols, progressive rehabilitation and regeneration. The Ground Disturbance Permit (GDP) approval process applies to all areas of land owned or managed by HVO North that have not previously been disturbed by mining or mining associated activities; and rehabilitated areas.

HVO North was granted EPBC Approval (EPBC 2016/7640) for the continuation of open cut coal mining in areas that were previously approved by the State. EPBC 2016/7640 was granted on 10 October 2016 and approved the clearing of 61 ha of CHVEF. To offset this clearing, 405.8 ha at the Wandewoi Biodiversity Area is to be protected in perpetuity. The condition of the EPBC Act approval requires the grassland area within the Wandewoi Biodiversity Area to attain the key characteristic of the CHVEF within three years of the approval.

The *Biodiversity Offset Strategy* details the provision of the following offset properties that will be protected in perpetuity to meet the objectives listed above:

- Mitchell Hill Biodiversity Area – 132 ha of CHVEF and Regent Honeyeater habitat;
- Condon View Biodiversity Area – 168 ha of Regent Honeyeater habitat; and
- Crescent Head Biodiversity Area – 190.4 ha of Green and Golden Bell Frog habitat.

3.2.7 Blasting

Blasting is undertaken in accordance with the *Blast Management Plan*. Blasting controls have been implemented as required by DA 450-10-2003 and EPL 640. The objectives of the *Blast Management Plan* are to:

- Meet the requirements of DA 450-10-2003;
- Set out the notification procedure;
- Describe the process for assessing real-time weather conditions prior to blasting;
- Set out the hours of blasting;
- Ensure good blast design and exclusion zones are in place to ensure safety from fly rock;
- Describe the monitoring programme and how it will be implemented and maintained;
- Detail the controls to be implemented to minimise blasting impacts off site; and
- Detail the procedure for reporting blast criteria exceedances to relevant stakeholders.

Blast monitoring is undertaken in accordance with the monitoring programme listed in the *Blast Management Plan*.

3.2.8 Noise

Noise management at HVO is undertaken in accordance with the *Noise Management Plan*. The main sources of noise at the HVO North are associated with coal and overburden excavation, dump truck movements, coal handling and processing and rail movements.

Noise monitoring is undertaken in accordance with development consent conditions, which specify required methods of sampling, analysis and frequency of monitoring. The *Noise Management Plan* includes a combination of continuous and attended monitoring measures.

Attended noise monitoring is conducted in accordance with the EPA's *Noise Policy for Industry* (2017) guidelines (or its latest version) and the *Australian Standard AS1055.2-1997, Acoustics – Description and Measurement of Environmental Noise, Part 1 General Procedures*.

Noise management initiatives and noise monitoring performance is reported in the Monthly Environmental Monitoring Report, Annual Review and to the CCC.

3.2.9 Visual and Lighting

Visual and lighting impacts are managed in accordance with the relevant consent conditions.

3.2.10 Aboriginal Heritage

Aboriginal cultural heritage is managed in accordance with the *HVO North Heritage Management Plan* (HMP) required under DA 450-10-2003. HVO North works closely with the local Aboriginal community on all aspects of cultural heritage management. HVO North consults jointly with the Upper Hunter Valley Cultural Heritage Working Group (CHWG) and the Plains Clan of the Wonnarua Peoples (PCWP) CHWG for community consultation on matters pertaining to Aboriginal cultural heritage.

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

There are a number of Aboriginal heritage sites present within the proposed disturbance area for this MOP term. These sites will be managed or salvaged in accordance with development consent, the HMP and legislative requirements.

3.2.11 European Heritage

There are no listed items of European Heritage within the HVO North lease area, therefore, no management measures are required.

3.2.12 Mine Subsidence

No subsidence impacts will occur as a result of the operations, as all current and proposed mining operations at HVO North are open cut.

3.2.13 Bushfire

Bushfire management is undertaken in accordance with the HVO *Bushfire Management Plan*. The *Bushfire Management Plan* was prepared in consultation with SSC and the NSW Rural Fire Services (RFS).

The following are implemented to manage the risk associated with bushfire:

- Controls including mowing, slashing, ploughing, flailing and manual removal as required to reduce fuel loads and fire risk in peak seasons;
- Grazing licences have been established to allow strategic grazing in rehabilitation areas and other on-site areas to reduce fuel loads;
- Fuel reduction requirements will be assessed in consultation with the NSW RFS;
- Establishment and maintenance of fire breaks, including around critical infrastructure;
- Maintenance of rescue truck and water carts to be available in the event of fires; and
- Periodic review, testing and training of relevant personnel in the site Emergency Response Procedure.

3.2.14 Public Safety

HVO North implements a variety of control strategies to minimise the potential for public safety incidents at the site, including the following:

- HVO North is a controlled site with all visitors required to report to the reception areas on arrival and complete an induction process to ensure all safety requirements are addressed;
- Access points to control areas have boom gates, and the remainder of the access points are secure with locked gates and fencing;
- Operational staff or security are present on site at all times;
- Safe operation of all mining equipment and processes are undertaken in accordance with the existing HVO Safety Management System;
- Hazardous substances are managed on site in licenced facilities to ensure safe handling and storage;
- Blasting activities are undertaken in accordance with the *Blast Management Plan*; and
- HVO operates a 24 hour emergency response line for the public to report any concerns regarding public safety associated with the HVO North.

3.3 Operational Issues Which Affect Rehabilitation

3.3.1 Geology and Geochemistry

HVO North is within the Sydney Basin which formed in the Late Carboniferous – Early Permian due to igneous rifting and crustal thinning, which resulted in the deposition of Permian and Triassic aged sedimentary sequences (EMM 2016).

HVO North extract coal seam 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 North spoil material indicates that, in general, the overburden is slightly sodic and alkaline, but within acceptable ranges for use as a plant growth medium.

3.3.2 Material Prone to Spontaneous Combustion

HVO has procedures for the management of Spontaneous combustion. Spontaneous combustion issues have historically occurred within NLP rail loop.

The objectives of the management plans are 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;
- Where longer term spontaneous combustion problems occur, instigate a management plan to deal with these; and
- Ensure final rehabilitation is free from spontaneous combustion.

3.3.3 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 at HVO North is low.

The EIS prepared by EMM (2010) as part of Mod 4 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.

Existing management processes are in place to ensure ARD material is managed appropriately. In accordance with Schedule 4, Condition 62A of DA 450-10-2003, potentially acid forming interburden materials 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.

3.3.4 Erosion and Sediment Control

Erosion and sedimentation at HVO North will be managed in accordance with the approved WMP, as discussed in **Section 3.2.2**. 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 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.

3.3.5 Tailings Capping Materials

Tailings and fine rejects will be managed in accordance with the *Life of Mine Fine Reject Management Strategy* (ATC Williams 2018).

Capping and rehabilitation will continue at the South-East TSF. The placement of tailings at the North Pit TSF ceased in 2018 and in-pit tailings emplacement will commence at Carrington Pit during 2019.

It is a statutory requirement that all TSFs be capped and rehabilitated at completion of filling. For HVO North's TSFs, the main elements of the closure and rehabilitation include:

1. Reducing tailings deposition rate (towards end of filling) to provide for development of a 5 m thick tailings crust to support closure activities;
2. Placement of layers of capping fill materials, comprising typically mine overburden material, at a minimum of 2 m thick;
3. Revegetation; and
4. Final land use for the TSFs is either pasture or woodland areas based on **Plan 4**. Noting that species used will be shallow rooted (<600 mm root depth) to ensure cap integrity.

3.3.6 Final Land Use Integration with Adjacent Operations

Final land uses across the site will include grazing and land set aside for native habitat. A conceptual final rehabilitation plan which details land uses is shown in **Plan 4**. An unavoidable exception to rehabilitated land will be the loss of land associated with final voids.

With regards to tailings, HVO South currently has no active tailings storage facilities as all previously active facilities have been closed, capped and rehabilitated. As HVO North operations will be completed prior to HVO South operations, the voids remaining in the North (Carrington In-Pit and West Pit) will be suitable to backfill with tailings produced from the processing of coal from HVO South, pending approval (ATC Williams 2018).

4 Post Mining Land Use

4.1 Regulatory Requirements

The regulatory requirements related to the post-mining land use, landscape and rehabilitation outcomes at HVO North are listed in **Table 15**.

Table 15 Regulatory Requirements Relating to Post Mining Land Use and Rehabilitation

Condition	Requirement	Applicable Area	Status
DA 450-10-2003			
Schedule 4 Condition 28	<p>Final Void Management Plan</p> <p>At least 5 years before the cessation of open cut coal extraction that will result in the creation of a final void, or as otherwise agreed with the Secretary, the Applicant must prepare a Final Void Management Plan for each void, in consultation with DRE and DPI Water, and to the satisfaction of the Secretary. Each plan must:</p> <ul style="list-style-type: none"> a) assess locational, design and future use options; b) be integrated with the Water Management Plan and the Rehabilitation Management Plan; c) assess short term and long term groundwater and other impacts associated with each option; and d) describe the measures to be implemented to avoid, minimise, manage and monitor potential adverse impacts of the final void over time. 	Domain A	This will be completed 5 years prior to the cessation of mining.
Schedule 4 Condition 28A	<p>Fine Reject Management Strategy</p> <p>The Applicant must prepare a life of mine fine reject management strategy to the satisfaction of the Secretary. The strategy must:</p> <ul style="list-style-type: none"> a) be prepared in consultation with DRE and DPI Water, and submitted to the Secretary for approval by 30 June 2015; b) describe potential locations and design options for the emplacement of fine reject on site; c) assess any material short term and long term impacts on surface and groundwater resources associated with each option; d) describe the measures that would be implemented to avoid, minimise, manage and monitor any adverse impacts of the fine reject emplacements over time; e) describe how the fine reject emplacements would be rehabilitated and describe potential options for future land uses; and f) be integrated with the Rehabilitation Management Plan and Agricultural Land Reinstatement Management Plan for the mine. 	Domain 4	<i>HVO Life of Mine Fine Rejects Management Strategy (ATC Williams 2018).</i>

Condition	Requirement	Applicable Area	Status
Schedule 4 Condition 31	<p>Rehabilitation/Regeneration Strategy</p> <p>By 30 June 2007, the Applicant must prepare a comprehensive Rehabilitation and Restoration Strategy for the Carrington billabong and river red gum population, in consultation with DPI Water, and to the satisfaction of the Secretary. This strategy must be prepared by suitably qualified expert/s, and must include:</p> <ul style="list-style-type: none"> a) the rehabilitation and restoration objectives for the billabong and associated river red gum population; b) a description of the short, medium and long term measures that would be implemented to rehabilitate and restore the billabong and associated river red gum population (including measures to address matters which affect the long term health and sustainability of the billabong and river red gums such as surface and ground water supply, and controlling weeds, livestock and feral animals); and c) detailed assessment and completion criteria for the rehabilitation and restoration of the billabong and associated river red gum population. 	Carrington Billabong area	<i>HVO River Red Gum Rehabilitation and Restoration Strategy</i> (Umwelt 2010). This was originally prepared in 2007 and updated in 2010.
Schedule 4 Condition 31A	The Applicant must revegetate an area of at least 0.14 ha using trees representative of the Swamp Oak Floodplain Forest community on land which adjoins existing riparian vegetation and is suitable for the establishment of this community.	CWW Extension Area	Ongoing
Schedule 4 Condition 32	<p>By June 2007, the Applicant must prepare a conceptual Landscape and Rehabilitation Management Strategy to the satisfaction of the Secretary. The strategy must:</p> <ul style="list-style-type: none"> a) include objectives for landscape management and rehabilitation of the site of the development subject to the consent and a justification for the proposed strategy; b) present a conceptual plan for landscape management and rehabilitation of the site; c) be integrated with the relevant requirements of the Mining Operations Plan; d) describe the measures that would be implemented to achieve the objectives (including an indicative timetable for mine closure); e) include proposals to offset the flora and fauna impacts of the development, and an outline of how the strategy would integrate with existing and planned corridors of native vegetation in areas surrounding the development; and f) outline how the proposed strategy would be integrated with landscape management and rehabilitation of the other operations within the Hunter Valley Operations (both north and south of the Hunter River) and other coal mines in the vicinity. 	DA 450-10- 2003 Approval Area	<i>HVO Conceptual Landscape and Rehabilitation Management Strategy</i> (June 2007).

Condition	Requirement	Applicable Area	Status
Schedule 4 Condition 34	<p>Flora and Fauna Management</p> <p>The Applicant must salvage and reuse as much material as possible from the land that will be mined, such as soil, seeds, tree hollows, rocks and logs. Cleared vegetation must be reused or recycled to the greatest extent practicable. No burning of cleared vegetation must be permitted. Reuse options including removing millable logs, recovering fence posts, mulching and chipping unusable vegetation waste for on-site use are to be implemented.</p>	DA 450-10-2003 Approval Area	Section 7.7
Schedule 4 Condition 35	<p>Flora and Fauna Management</p> <p>The Applicant must prepare procedures for the management of flora and fauna for the development. These procedures must:</p> <ol style="list-style-type: none"> provide details on: <ul style="list-style-type: none"> delineating areas of disturbance; protecting areas outside of the disturbance areas; identifying when pre-clearance surveys are required for fauna; determining the best time to clear vegetation to avoid nesting/breeding activities of threatened fauna; capturing and releasing fauna; relocating bat roosts; salvaging habitat resources and collecting seed; controlling weeds in regeneration/rehabilitation areas; and controlling access to the regeneration/rehabilitation areas; describe how the land in regeneration areas would be revegetated; describe how the mined areas would be rehabilitated for grazing and biodiversity values; identify actions to minimise the potential impacts of the development on threatened fauna; describe how the performance of the revegetation/rehabilitation strategies would be monitored over time including, as a minimum, the parameters in Table 18; and identify who is responsible for monitoring, reviewing, and implementing the procedures. <p>The Applicant must submit a copy of these procedures to the Secretary for approval within 6 months of the date of this consent.</p> <p>Note: The requirements of condition 35 may be satisfied within the Rehabilitation Management Plan required under Condition 62C of Schedule 4.</p>	DA 450-10-2003 Approval Area	<p><i>Integrated Biodiversity Management Plan</i></p> <p><i>HVO River Red Gum Rehabilitation and Restoration Strategy</i></p> <p><i>Biodiversity Offset Strategy</i></p>

Condition	Requirement	Applicable Area	Status										
Schedule 4 Condition 53	Visual Impact The Applicant must implement measures to mitigate visual impacts including: a) design and construction of development infrastructure in a manner that minimises visual contrasts; and b) progressive rehabilitation of mine waste rock emplacements (particularly outer batters), including partial rehabilitation of temporarily inactive areas.	DA 450-10-2003 Approval Area	Section 3.2.9										
Schedule 4 Condition 62	Rehabilitation Objectives The Applicant must rehabilitate the site to the satisfaction of DRE. The rehabilitation must be generally in accordance with the proposed rehabilitation strategy described by the documents listed in Condition 2 of Schedule 3 (and depicted conceptually in the final landform plans in Appendices 6 and 7) and the objectives in Table 17. Table 17: Rehabilitation Objectives <table><tr><th>Area/Domain</th><th>Rehabilitation Objectives</th></tr><tr><td>Mine site (as a whole), including the final void</td><td>Safe, stable & non-polluting</td></tr><tr><td>Carrington West Wing revised proposed extension area</td><td>Reinstatement of Rural Land Capability agricultural land values to be measured as: 65.0 hectares of Class II and 65.0 hectares of Class III</td></tr><tr><td>Surface infrastructure</td><td>To be decommissioned and removed, unless DRE agrees otherwise</td></tr><tr><td>Community</td><td>Ensure public safety Minimise the adverse socio-economic effects associated with mine closure</td></tr></table>	Area/Domain	Rehabilitation Objectives	Mine site (as a whole), including the final void	Safe, stable & non-polluting	Carrington West Wing revised proposed extension area	Reinstatement of Rural Land Capability agricultural land values to be measured as: 65.0 hectares of Class II and 65.0 hectares of Class III	Surface infrastructure	To be decommissioned and removed, unless DRE agrees otherwise	Community	Ensure public safety Minimise the adverse socio-economic effects associated with mine closure	DA 450-10-2003 Approval Area	Section 4.3
Area/Domain	Rehabilitation Objectives												
Mine site (as a whole), including the final void	Safe, stable & non-polluting												
Carrington West Wing revised proposed extension area	Reinstatement of Rural Land Capability agricultural land values to be measured as: 65.0 hectares of Class II and 65.0 hectares of Class III												
Surface infrastructure	To be decommissioned and removed, unless DRE agrees otherwise												
Community	Ensure public safety Minimise the adverse socio-economic effects associated with mine closure												

Condition	Requirement	Applicable Area	Status
Schedule 4 Condition 62A	<p>The Applicant must:</p> <p>a) develop a detailed soil management protocol that identifies procedures for</p> <ul style="list-style-type: none"> comprehensive soil surveys prior to soil stripping; assessment of top-soil and sub-soil suitability for mine rehabilitation; and annual soil balances to manage soil handling including direct respreading and stockpiling; <p>b) maximise the salvage of suitable top-soils and sub-soils and biodiversity habitat components such as bush rocks, tree hollows and fallen timber for rehabilitation of disturbed areas within the site and for enhancement of biodiversity offset areas;</p> <p>c) ensure that coal reject or any potentially acid forming interburden materials must not be 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; and</p> <p>d) ensure that no dirty water can drain from an out of pit emplacement area to any offsite watercourse or to any land beyond the lease boundary.</p>	DA 450-10-2003 Approval Area	<p><i>HVO Agricultural Land Reinstatement Management Plan.</i></p> <p><i>HVO ALRMP Soil Management Plan.</i></p> <p>Section 3.3.3</p> <p>Dirty water dams constructed in accordance with recognised engineering design standards including 'Blue Book': Managing Urban Stormwater: soils and construction (Landcom 2004)</p>
Schedule 4 Condition 62B	<p>Progressive Rehabilitation</p> <p>The Applicant must carry out rehabilitation of the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable and feasible measures must be taken to minimise the total area exposed for dust generation at any time. Interim rehabilitation strategies must be employed when areas prone to dust generation cannot yet be permanently rehabilitated.</p> <p>Note: It is accepted that some parts of the site that are progressively rehabilitated may be subject to further disturbance at some later stage in the development.</p>	DA 450-10-2003 Approval Area	Section 2.2.9
Schedule 4 Condition 62C	<p>Rehabilitation Management Plan</p> <p>The Applicant must prepare and implement a Rehabilitation Management Plan for the HVO North mine to the satisfaction of the DRE. This plan must:</p>	DA 450-10-2003 Approval Area	This MOP
	a) be prepared in consultation with the Department, DPI Water, OEH, Council and the CCC;	DA 450-10-2003 Approval Area	Section 1.4.4
	b) be submitted to DRE by the end of September 2013;	DA 450-10-2003 Approval Area	Section 1.1.4 Table 4
	c) be prepared in accordance with any relevant DRE guideline;	DA 450-10-2003 Approval Area	Section 1

Condition	Requirement	Applicable Area	Status
	d) include an Agricultural Land Reinstatement Management Plan;	DA 450-10-2003 Approval Area	<i>HVO Agricultural Land Reinstatement Management Plan</i> has been prepared.
	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);	DA 450-10-2003 Approval Area	Section 6
	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;	Mitchell Hill Biodiversity Area Condon View Biodiversity Area Crescent Head Biodiversity Area	<i>Biodiversity Offset Strategy</i> Plans 2 and 4
	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;	DA 450-10-2003 Approval Area	Sections 4.1 – 4.5
	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;	DA 450-10-2003 Approval Area	Section 3.3.6
	i) include interim rehabilitation where necessary to minimise the area exposed for dust generation;	DA 450-10-2003 Approval Area	Section 7.2
	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	DA 450-10-2003 Approval Area	Section 8
	k) build to the maximum extent practicable on the other management plans required under this consent.	DA 450-10-2003 Approval Area	This MOP

Condition	Requirement	Applicable Area	Status
Schedule 4 Condition 62D	<p>Agricultural Land Reinstatement Management Plan</p> <p>The Agricultural Land Reinstatement Management Plan required under Condition 62C of Schedule 4 is intended to ensure that the alluvial lands are restored to a productive capacity at least equivalent to their pre-mining state and are able to be managed using techniques and equipment common to the management of equivalent lands in the district. The plan must:</p> <ol style="list-style-type: none"> be prepared in consultation with DPI and to the satisfaction of the Secretary; be prepared in accordance with any relevant DPI guideline; include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the Carrington West Wing revised proposed extension area, and triggering remedial action (if necessary); include a long-term monitoring programme on the success of reinstating alluvial lands, which must: <ul style="list-style-type: none"> assess a comprehensive suite of indicators of productivity and environmental sustainability (such as soil settling, soil profile development, other soil characteristics, water transmissivity and soil water availability, agricultural productivity, fertilizer needs, weeds and pests) over an extended period (a minimum of 20 years); compare the performance of the reinstated alluvial lands with a reference site; and make monitoring results publicly available. In accordance with Condition 4(h) of Schedule 6 provide for reviews of progress against the plan every 3 years (unless otherwise agreed by the Secretary after completion of the second review) and for a final review by the end of 2033. 	DA 450-10-2003 Approval Area	<i>HVO Agricultural Land Reinstatement Management Plan</i> has been prepared.
Mining Tenements			
CCL4, CCL755 Condition 7 ML1526, ML1704, ML1705, ML1706, ML1707, ML1710, ML1732, ML1748 Condition 2	Any disturbance as a result of activities under this lease must be rehabilitated to the satisfaction of the Director-General/Minister.	Lease area	In progress

Condition	Requirement	Applicable Area	Status
ML1324 Condition 18 ML1337 Condition 8 ML1359 Condition 11 ML1428, ML1474, ML1482 Condition 22	Upon completion of operations on the surface of the subject area or upon the expiry or sooner determination of this lease or any renewal thereof, the registered holder shall remove from such surface such buildings, machinery plant, equipment, construction and works as may be directed by the Minister and such surface shall be rehabilitated and left in a clean, tidy and safe condition to the satisfaction of the Minister.	Lease area	To be undertaken at mine closure
ML1324 Condition 14 ML1337 Condition 4	Subject to any specific condition of this lease providing for rehabilitation of any particular part of the subject area affected by mining or activities associated therewith, the registered holder shall: <ul style="list-style-type: none"> a) reinstate, level, regrass, reforest and contour to the satisfaction of the Minister, any part of the subject area that may, in the opinion of the Minister, have been damaged or deleteriously affected by mining operations and to ensure such areas are permanently stabilised; and b) fill in, seal or fence, to the satisfaction of the Minister, any excavation within the subject area. 	Lease area	In progress
ML1324 Condition 26 ML1337 Condition 13 ML1359 Condition 19	The registered holder shall plant such grasses, trees or shrubs or such other vegetation as may be required by the Minister and care for same during the currency of this lease or any renewal thereof, to the satisfaction of the Minister.	Lease area	In progress
ML1324 Condition 32 ML1337 Condition 18 ML1359 Condition 26	In the event of any excavation being made the registered holder shall ensure that such are refilled and the top dressing material previously removed is replaced and levelled. All such refilling and levelling shall be done to the satisfaction of the Minister.	Lease area	In progress
ML1324 Condition 28 ML1337 Condition 14 ML1359 Condition 22	The registered holder shall cover with top dressing material, to the Minister's satisfaction, such parts of the subject area as may be stipulated by the Minister and shall plant and maintain, to the Minister's satisfaction, such grasses, trees or shrubs or such other vegetation as may be required by the Minister.	Lease area	In progress
ML1337 Condition 17 ML1359 Condition 25	The registered holder shall ensure that any topsoil or other material suitable for topdressing purposes which may be disturbed during operations shall be removed separately for replacement as far as may be practicable and the registered holder shall plant or sow such grasses, shrubs or trees in the replaced surface material as may be considered necessary by the Minister to control or prevent soil erosion.	Lease area	In progress

Condition	Requirement	Applicable Area	Status
ML1406 Condition 7	Disturbed lands must be rehabilitated to a sustainable/agreed end land use to the satisfaction of the Director-General.	Lease area	In progress
ML 1337 Condition 7 ML1359 Condition 10 ML1428, ML1474, ML1482 Condition 21	If so directed by the Minister the lease holder shall rehabilitate to the satisfaction of the Minister any lands within the subject area which may have been disturbed by the lease holder.	Lease area	In progress
ML1337 Condition 9 ML1359 Condition 12 ML1428, ML1474, ML1482 Condition 23	If so directed by the Minister the lease holder shall rehabilitate to the satisfaction of the Minister and within such time as may be allowed by the Minister any lands within the subject area which may have been disturbed by mining or prospecting operations whether such operations were or were not carried out by the lease holder.	Lease area	In progress
EL5417 Condition 6	The licence holder must carry out rehabilitation of all disturbance caused by activities carried out under this licence in accordance with the requirements in Part B of the <i>Exploration Code of Practice - Rehabilitation</i> (DPE) to the satisfaction of the Minister.	Lease area	In progress
EL5418, EL5606, AUTH72 Condition 25	The licence holder must ensure that all topsoil removed in the course of prospecting operations is stockpiled for later use in rehabilitating those operations.	Lease area	In progress
EL5418, EL5606, AUTH72 Condition 26	The licence holder must: a) Construct, maintain and decommission all boreholes and petroleum wells in accordance with standards equivalent to or exceeding the <i>Minimum Construction Requirements for Water Bores in Australia</i> (NUDLC 2012), as amended or replaced from time to time. Where this condition is inconsistent with other conditions set out in this exploration licence, those conditions prevail to the extent of that inconsistency. g) Remove equipment and logging tools from the borehole prior to plugging and abandonment of the borehole, unless otherwise approved by the Minister; and h) Once a borehole ceases to be used, the borehole must be completely filled with cement grout during drill rod withdrawal and plugged, unless otherwise approved by the Minister.	Lease area	In progress
EL5418, EL5606, AUTH72 Condition 28	The licence holder must ensure that: c) Drilling by-products contaminated by chemicals, oils or fuels must be collected and remediated or disposed lawfully.	Lease area	In progress

Condition	Requirement	Applicable Area	Status
EL5418, EL5606, AUTH72 Condition 35	The licence holder must make every reasonable attempt, and be able to demonstrate their attempts, to enter into a cooperation agreement with the holder(s) of any overlapping authorisations under the <i>Mining Act 1992</i> or petroleum title under the <i>Petroleum (Onshore) Act 1991</i> . The cooperation agreement should address but not be limited to: h) Integrated rehabilitation activities.	Lease area	In progress
EL5418 Condition 38 EL5606, AUTH72 Condition 37	All disturbance resulting from prospecting operations carried out under this exploration licence must be rehabilitated by the licence holder to the satisfaction of the Minister.	Lease area	In progress
EL5418 Condition 39 EL5606, AUTH72 Condition 38	In rehabilitating the disturbance resulting from prospecting operations, the licence holder must ensure that: a) all machinery, buildings and other infrastructure is removed from the area; b) the area is left in a clean, tidy and stable condition c) there is no adverse environmental effect outside the disturbed area; d) the land is properly drained and protected from soil erosion; e) the land is not a potential source of pollution; f) the land is compatible with the surrounding land and land use requirements; g) the landforms, soils, hydrology and flora require no greater maintenance than that in, or on, the surrounding land; h) the land does not pose a threat to public safety; and i) in cases where vegetation has been removed or damaged: i. where the previous vegetation was native, species used for revegetation are endemic to the area; or ii. where the previous vegetation was not native, species used for revegetation are appropriate to the area; and iii. any revegetation is of an appropriate density and diversity.	Lease area	In progress
EL5418 Condition 40 EL5606, AUTH72 Condition 39	The licence holder must ensure that all water land and wetland crossings that are disturbed during prospecting operations are rehabilitated such that the natural flow of water is unimpeded and bank stability is maintained to prevent erosion.	Lease area	In progress
EL5418 Condition 41 EL5606, AUTH72 Condition 40	The licence holder must comply with any relevant guidelines issued by the Director General in the rehabilitation of disturbance resulting from prospecting operations under this exploration licence.	Lease area	In progress

Condition	Requirement	Applicable Area	Status
EL5418 Condition 42 EL5606, AUTH72 Condition 41	All rehabilitation of disturbance resulting from prospecting operations under this exploration licence must be completed before the expiry of this exploration licence or as soon as practicable following cancellation of this exploration licence, unless otherwise approved by the Minister.	Lease area	In progress
EL5418 Condition 45 EL5606 Condition 44	The report must be prepared in accordance with any Director-General's requirements for environmental and rehabilitation reporting on exploration licences and include information on all disturbance resulting from prospecting operations and rehabilitation carried out within the exploration licence area. The report must be prepared to the satisfaction of the Director-General.	Lease area	In progress
Commitments in Environmental Impact Assessments			
West Pit Extension and Minor Modifications EIS (ERM 2003)			
Statement of Commitments	Security deposits, usually in the form of a bank guarantee, must be lodged with the DPI to ensure that the rehabilitation is undertaken.	DA 450-10-2003 Approval Area	In progress
Statement of Commitments	<p>The aim of rehabilitation will be to:</p> <ul style="list-style-type: none"> Rehabilitate all mined land to its original land capability class or better; Restore 70 % of mined land for grazing with native or introduced pasture crops, which will provide some biodiversity values for native fauna species that are able to persist in grazed or disturbed areas; Restore 30 % the landscape to a state that provides potential habitat for populations of threatened species that are currently known to occur in and around HVO; and Create an area of woodland vegetation that links with existing remnants, adding to a more uniform cover of vegetation throughout the Hunter Valley floor. Specifically, the aim will be to link up the rehabilitated and regenerated woodland in HVO north of the Hunter River with a patch of remnant woodland east of HVO and with the north south regional corridor outlined in the Synoptic Plan. <p>The existing areas of rehabilitated woodland in HVO north of the Hunter River will add to the 'refuge' and 'stepping stone' habitat in a mostly rehabilitated final landform. In addition, land used for final voids will be filled with water and will provide some potential habitat for water birds and common amphibians and reptiles.</p>	DA 450-10-2003 Approval Area	Sections 4, 6 and 7
Statement of Commitments	Following completion of mining, with the exception of the final voids at West Pit and Carrington, all mined areas will be rehabilitated. Rehabilitation will be undertaken progressively in accordance with rehabilitation plans approved by the Minister for Mineral Resources.	DA 450-10-2003 Approval Area	In progress

Condition	Requirement	Applicable Area	Status
Carrington Pit Extension – SEE and Response to Submissions Report (ERM 2005 & 2006)			
Rehabilitation SEE Section 2.2.3	Final land use to comprise of woodland, grazing and cropping in accordance with the current Carrington Mine Closure Plan.	DA 450-10-2003 Approval Area	In progress
Soil and Erosion Control SEE Section 5.10	<p>Manage activities such that the integrity of natural ecosystems and class II agricultural lands are maintained in accordance with the Carrington Pit Extended SEE.</p> <p>To develop a stable and self-sustaining vegetative cover that comprises an area of woodland vegetation that links with existing remnants, adding to a more uniform cover of vegetation throughout the Hunter Valley floor. Specifically, the aim will be to link up the rehabilitated and regenerated woodland in HVO north of the Hunter River with a patch of remnant woodland east of HVO and with the north south regional corridor outlined in the Synoptic Plan.</p>	DA 450-10-2003 Approval Area	In progress
Carrington West Wing – Environmental Assessment (EMGA Mitchell McLennan 2010)			
Soil and Land Classes EA Section 5.4	Management and mitigation strategies for the stripping, handling and use of topsoil, landform design, erosion and sediment control and seedbed preparation will be implemented to achieve the desired post mining land capability and agricultural suitability outcomes. The detailed rehabilitation plans, consistent with Figure 3.4, will be documented in the REMP/MOP, and will be tracked for progress in the AEMR.	DA 450-10-2003 Approval Area	In progress in accordance with the <i>HVO Agricultural Land Reinstatement Management Plan</i> and this MOP
Soil and Land Classes EA Section 5.4	<p>Rehabilitation will aim to achieve the following objectives:</p> <ul style="list-style-type: none"> • Successful design and rehabilitation of landforms to ensure structural stability, revegetation success and containment of wastes; • Development of a final landform with recognition of the pre-mining landform features, which incorporates the existing rehabilitated landforms and is consistent with the surrounding landscape features; and • Post-mining land use compatible with surrounding land uses, capable of supporting viable grazing and ecological values and providing environmental and community benefits. 	DA 450-10-2003 Approval Area	In progress

4.2 Post Mining Land Use Goal

The objective of the post mining land use is to be compatible with surrounding land uses and provide environmental and community benefits.

The final land uses across the site will include grazing and land set aside for biodiversity native habitat. A conceptual final rehabilitation plan which details land uses is shown in **Plan 4**. An unavoidable exception to rehabilitated land will be the loss of land associated with final voids and evaporative sink (within West Pit and Carrington Pit).

70% of mined land will be restored for grazing with native or introduced pasture crops, which will provide some biodiversity values for native fauna species that are able to persist in grazed or disturbed areas. While 30% of the landscape will be restored to a state that provides potential habitat for populations of threatened species that are currently known to occur in and around HVO North.

An area of woodland vegetation that links with existing remnants will also be created, adding to a more uniform cover of vegetation throughout the Hunter Valley floor. Specifically, the aim will be to link up the rehabilitated and regenerated woodland at HVO and north of the Hunter River with a patch of remnant woodland east of the mine with the north-south regional corridor outlined in the Synoptic Plan (Andrews Neil Architects Planners, 1999).

4.2.1 Land Capability

A core objective of rehabilitation at HVO North is to reinstate all mined land to its original land capability class or better. Pre-mining land capability data at HVO North was assessed during various environmental assessments (EIS 2003, SEE 2005 and EA 2010) and is available over part of HVO North. Exceptions include areas in which mining was established before 1989. Land capability classes across HVO North are summarised in **Table 16**.

Table 16 Pre-Mining Land Capability Classes

Area	Land Capability Classes							
	I	II	III	IV	V	VI	VII	VIII
West Pits Consent 1989			✓	✓	✓			
West Pits Consent 1996				51.7%	36%	2.6%	9.3%	
West Pits Consent 2004				18%	50%	32%		
Carrington 1999				87%		9%		4%
Carrington 2006		37%		60%				3%
Alluvial Lands	63 ha		102 ha				37.2%	
CWW Extension 2010		65 ha	44 ha	23.9 ha	3.9 ha			

✓ - indicates the presence of this land capability class over the area covered by the 1989 assessment

Land in West Pit predominantly falls within Classes IV and V. As such this land is generally unsuitable for long term cultivation though is suitable for grazing land.

The majority of the land in the Carrington Pit area (prior to extension) was characterised by Class IV which takes up about 87% of the mining area. The other two land capability classes, VI and VIII cover almost 9% and 4% of the mining area. The Carrington Pit extension area contained 60% of Class IV land, 37% of Class II land and 3% of Class VIII land. Like West Pit, the majority of land within Carrington (Classes IV and higher) was unsuitable for long term cultivation; however, it was suitable as grazing land (excepted Class VIII lands). Class II lands can support a wide variety of agricultural uses.

4.2.2 Alluvial Lands

Development Consent DA 7/93 for Hunter Valley Mine's Authorisation 436 (granted 13 May 1993), enabled the disturbance and mining of a 165 ha parcel of land adjacent to the Hunter River. The consent required the relocation and reinstatement of 63 ha of Class I and II lands suitable for irrigated agriculture and the remainder to Class IV land suited for grazing. The Alluvial Lands Project was undertaken in accordance with DA 7/93 which was surrendered on 11 January 2006.

Condition 15 of Development Consent DA 7/93 and special condition 7 in Annexure A3 required the reinstatement of Class 1 and 2 land. This was demonstrated by showing that the reinstated area achieved a Lucerne hay productivity yield of 'at least equivalent to the average crop productivity yields for the Upper Hunter Region for three consecutive years'. This productivity level was nominated at approximately 15 tonnes per hectare per year.

With regards to landform, the only difference between Class I and II lands is that the Class II lands have a low grade, where Class I land does not.

4.2.3 Carrington West Wing Extension

In 2013, DA 450-10-2003 (Mod 3) was approved, allowing the disturbance and mining of a 136 ha parcel of land within the alluvium of the Hunter River. Condition 62 of DA 450-10-2003, requires the reinstatement of 65 ha of Class II and 65 ha of Class III land within the CWW Extension area.

HVO will also 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.

The CWW Extension project is not scheduled to commence during the MOP term, therefore this requirement has not been triggered.

4.3 Rehabilitation Objectives

The overall objective of rehabilitation at HVO North is to implement successful design and rehabilitation of landforms to ensure structural stability, revegetation success and containment of wastes, and to ensure rehabilitation and revegetation is self-sustaining and follows the principles of sustainable development.

The aim of rehabilitation activities will be to:

- Rehabilitate all mined land to its original land capability class or better;
- Develop a final landform with recognition of the pre-mining landform features, which incorporates the existing rehabilitated landforms and is consistent with the surrounding landscape features;
- Implement a post-mining land use compatible with surrounding land uses, capable of supporting viable grazing and ecological values and providing environmental and community benefits;

- Restore 70% of mined land for grazing with native or introduced pasture crops, which will provide some biodiversity values for native fauna species that are able to persist in grazed or disturbed areas;
- Restore 30% the landscape to a state that provides potential habitat for populations of threatened species that are currently known to occur in and around HVO North;
- Rehabilitate 63 ha of mined land in the ALRP area to Class I and II land capability – this is complete and is being monitored;
- Restoration of 65 ha of Class II and 65 ha of Class III capability land within the (CWW) Extension area if/when the CWW Extension project commences;
- 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;
- Decommission all surface infrastructure, unless otherwise agreed to by the RR;
- Ensure public safety;
- Minimise the adverse socio-economic effects associated with mine closure;
- Revegetate an area of at least 0.14 ha using trees representative of the Swamp Oak Floodplain Forest community on land which adjoins existing riparian vegetation and is suitable for the establishment of this community; and
- Develop a stable and self-sustaining vegetative cover that comprises an area of woodland vegetation that links with existing remnants, adding to a more uniform cover of vegetation throughout the Hunter Valley floor. Specifically, the aim will be to link up the rehabilitated and regenerated woodland in HVO (north of the Hunter River) with a patch of remnant woodland (east of HVO), and with the north south regional corridor outlined in the Synoptic Plan (Andrews Neil Architects Planners 1999).

Land used for final voids will be filled with water and will provide some potential habitat for water birds and common amphibians and reptiles.

4.4 Proposed Post Mining Landform

The final landform and land use in 2030 (five years following the cessation of approved mining) has been illustrated on **Plan 4**.

The proposed final landform at West Pit will consist of a series of hills, ridges and minor valley systems. Final landform slopes will vary according to erosion hazard, stability and drainage requirements. Maximum external slopes will be less than 10° (equivalent to a slope of one vertical to 5.7 horizontal). Internal slopes may be steepened to grades up to 18°, noting this will only occur with the permission of RR. Final landforms at Carrington Pit, CWW Extension, North Pit and the Alluvial Lands will reflect pre mining landscapes.

Drainage lines from the final landforms will be compatible with the surrounding drainage network. This will be achieved using a combination of controls such as graded banks, designed channels and where necessary, water course reinforcement.

Three final voids will remain after open cut mining is completed. Upon cessation of mining, final voids will generally fill with water to the level of the surrounding water table, to become mine lakes.

4.5 Detailed Mine Closure Planning

HVO North will commence the detailed mine closure planning process at least 5 years prior to the anticipated mine closure date (i.e. the planned cessation of mining). Based upon current approvals mining will continue until 2025.

The detailed mine closure plan will include:

- A review and finalisation of the final landform prior to the planned closure date with a detailed assessment of predicted water quality and void recharge undertaken as part of this process;
- Groundwater impact assessments associated with detailed planning for mine closure will be undertaken prior to planned closure of the mine to assist with refinement of the final landform to minimise long term impacts associated with mine closure;
- A social impact assessment will be undertaken leading up to the development of a detailed mine closure plan (e.g. within five years of life of mine);
- A detailed mine closure plan will be developed at least two years prior to the anticipated mine closure date. During the development of the mine closure plan, consultation will be undertaken with relevant government agencies and the local community; and
- A final void management plan will be developed and included in the mine closure plan. The final closure plan will be submitted to the appropriate regulatory agencies for approval two years prior to cessation of mining.

5 Rehabilitation Planning and Management

5.1 Domain Selection

In accordance with ESG3, HVO North has been categorised into a series of primary (operational) domains and secondary (post mining land use) domains as outlined in **Table 17**. Primary domains at the commencement of the MOP term are depicted on **Plan 2**.

Primary domains have been defined on the basis of existing land management units within the mine site which have similar operational purposes and therefore similar geophysical characteristics. Secondary domains have been defined as land management units characterised by similar post mining land use objectives.

Table 17 Primary and Secondary Domains

Primary Domain	Code	Secondary Domain	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	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. Final voids will create permanent water bodies. Highwalls above pit water level will be vegetated with woodland vegetation communities.	A
Active Mining – The footprint of the HVO North active mining areas, including: <ul style="list-style-type: none"> • Pre-strip areas ahead of mining; • Active mining areas; and • Voids and inactive in-pit areas prior to commencement of backfilling. 	2	Water Management Area – the network of dams and surface water management structures to be retained in perpetuity.	B
Overburden Emplacement Area – The footprint of all in-pit and out of pit waste rock emplacements (overburden and coarse rejects).	3	Rehabilitation Pasture – Areas to be rehabilitated with selected grasses and pasture species.. Approximately 70% of mined land will be returned to pasture.	C
Tailings Storage Facility – The footprint of current tailings emplacement areas (fine rejects).	4	Rehabilitation Woodland – Areas to be rehabilitated with woodland species commensurate with adjacent remnant vegetation. Approximately 30% of mined land will be returned to woodland. This will also include a network of tree corridors to ensure connectivity of woodland community areas.	D
Water Management Area – This domain includes the network of dams and associated water management structures at HVO North.	5	Rehabilitation ALRP Class I and II Land – restoration of 63 ha Class I and II land on the ALRP area	E
Rehabilitation Pasture – Existing pasture rehabilitation areas at HVO North. This includes the ALRP area.	6	Rehabilitation CWW Class II and III Land – restoration of 65 ha Class II and 65 ha of Class III Land on the CWW extension area.	F
Rehabilitation Woodland – Existing woodland rehabilitation areas at HVO North. This includes the 0.14 ha of Swamp Oak Floodplain Forest community.	7		

Primary Domain	Code	Secondary Domain	Code
Offset Areas – All offsets related to HVO North, including: <ul style="list-style-type: none"> • Mitchell Hill Biodiversity Area – 132 ha; • Condon View Biodiversity Area – 168 ha; and • Crescent Head Biodiversity Area – 190.4 ha. 	8		

5.2 Domain Rehabilitation Objectives

Rehabilitation 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 5.1** are defined in **Table 18**.

Table 18 Domain Rehabilitation Objectives

Domain	Rehabilitation Objectives
Primary Domains	
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 – 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	Rehabilitation Objectives
Domain 3 – Overburden Emplacement Area	<ul style="list-style-type: none"> • Safe, stable and non-polluting. • Final landform will be developed with recognition of the pre-mining landform features and will incorporate the existing rehabilitated landforms to ultimately be consistent with the surrounding landscape features. • 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. • Vegetation communities will be established on overburden emplacements generally in accordance with the conceptual final landform depicted on MOP Plan 4.
Domain 4 – 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 North. • The rejects and tailings emplacement area will be rehabilitated to pasture and woodland, comparable to appropriate reference sites. Noting that species used will be shallow rooted (<600 mm root depth) to ensure cap integrity. • Rehabilitated TSFs will be integrated into the final landform and revegetation strategy.
Domain 5 – 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 6 – Rehabilitation Pasture	<ul style="list-style-type: none"> • Revegetation with both native and suitable exotic pasture species. • 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.

Domain	Rehabilitation Objectives
Domain 7 – Rehabilitation Woodland	<ul style="list-style-type: none"> • Revegetation with suitable native woodland species. • Revegetate an area of at least 0.14 ha using trees representative of the Swamp Oak Floodplain Forest community on land which adjoins existing riparian vegetation and is suitable for the establishment of this community • 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.
Domain 8 – Offset Areas	<ul style="list-style-type: none"> • Landform generally blends in with surrounding landscape and is stable. • Water quality non-polluting and appropriate for conservation end land use. • Native ecosystems established consistent with reference site vegetation communities. • Ecosystem health satisfying completion criteria. • Ecosystem structure satisfying completion criteria. • Ecosystem composition satisfying completion criteria.
Secondary Domains	
Domain A – 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.
Domain B – Water Management Area	<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 performance criteria established within this document.
Domain C – Rehabilitation Pasture	<ul style="list-style-type: none"> • Approximately 70% of mined land re-established as stable, productive pasture areas. • Mined lands are rehabilitated to their original land capability class or better.
Domain D – Rehabilitation Woodland	<ul style="list-style-type: none"> • Approximately 30% 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 better. • 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 E – Rehabilitation ALRP Class I and II Land	<ul style="list-style-type: none"> • Reinstatement of 63 ha of Class I and II lands in the ALRP - complete and being monitored. • Reinstated 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.

Domain	Rehabilitation Objectives
Domain F – Rehabilitation CWW Class II and III Land	<ul style="list-style-type: none"> 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 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.

5.3 Rehabilitation Phases

The ultimate rehabilitation objective for HVO North 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. 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;
- 2. Landform Establishment** – incorporates slope, aspect, drainage, substrate material characterisation and morphology;
- 3. 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;
- 4. 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;
- 5. 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
- 6. Land Relinquishment** – completion criteria for rehabilitation are met and the land is determined to be suitable to be relinquished from the mining tenement.

Table 19 provides a summary of the expected completion of rehabilitation phases for each primary domain at the end of the MOP term as depicted on **Plan 3C**.

Table 19 Summary of Rehabilitation Phases Proposed for Completion at end of the MOP Term

Domain	Domain 1 – Infrastructure / Domain C – Rehabilitation Pasture	Domain 1 – Infrastructure / Domain D – Rehabilitation Woodland	Domain 2 – Active Mining / Domain A – Final Void	Domain 2 – Active Mining / Domain C – Rehabilitation Pasture	Domain 2 – Active Mining / Domain D – Rehabilitation Woodland	Domain 3 – Overburden Emplacement Area / Domain A – Final Void	Domain 3 – Overburden Emplacement Area / Domain C – Rehabilitation Pasture	Domain 3 – Overburden Emplacement Area / Domain D – Rehabilitation Woodland	Domain 4 – Tailings Storage Facility / Domain A – Final Void	Domain 4 – Tailings Storage Facility / Domain C – Rehabilitation Pasture	Domain 4 – Tailings Storage Facility / Domain D – Rehabilitation Woodland	Domain 5 – Water Management Area / Domain B – Water Management Area	Domain 5 – Water Management Area / Domain C – Rehabilitation Pasture	Domain 5 – Water Management Area / Domain D – Rehabilitation Woodland	Domain 6 – Rehabilitation Pasture / Domain C – Rehabilitation Pasture	Domain 6 – Rehabilitation Pasture / Domain D – Rehabilitation Woodland	Domain 6 – Rehabilitation Pasture / Domain E – Rehabilitation Pasture / and II Land	Domain 7 – Rehabilitation Woodland / Domain C – Rehabilitation Pasture	Domain 7 – Rehabilitation Woodland / Domain D – Rehabilitation Woodland	Domain 8 – Offset Areas / Domain D – Rehabilitation Woodland
Rehabilitation Phase																				
Active	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Phase 1 – Decommissioning	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Phase 2 – Landform Establishment	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Phase 3 – Growth Medium Development	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Phase 4 – Ecosystem and Land Use Establishment	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Phase 5 – Ecosystem and Land Use Sustainability	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Phase 6 – Land Relinquishment	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗

6 Performance Indicators and Completion/Relinquishment 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 North are listed in **Tables 20 to 24**. Completion criteria have been developed considering site specific issues and objectives, and regulatory requirements (refer **Section 4.1**). Criteria for pastures rehabilitation has been developed considering the outcomes of *Rehabilitation Monitoring – Grasslands/Pasture Lands* (AECOM 2015) and *A Study of Sustainability of Grazing on Mine Rehabilitated Land in the Upper Hunter NSW* (ACARP 2017).

Woodland rehabilitation criteria associated with the 19 February 2016 to 30 November 2018 HVO North MOP were developed based upon monitoring within the Central Hunter Grey Box-Ironbark Woodland and Central Hunter Ironbark-Spotted Gum-Grey Box Forest Endangered Ecological Communities (EECs). The monitoring program was collectively established for HVO North, HVO South and Mount Thorley Warkworth mines, to reflect the requirement of HVO North and Mount Thorley Warkworth to rehabilitate 2,118 ha to a vegetation community consistent with the EECs. HVO North must rehabilitate the site to pasture and woodland communities with only 4 ha of EEC to be rehabilitated (if triggered).

In 2019 HVO North will implement a new rehabilitation monitoring program that will capture data for suitable reference sites in a commensurate woodland vegetation community. The woodland rehabilitation criteria outlined within this MOP will continue to be refined during the MOP term as suitable data becomes available. Additional detail regarding the proposed rehabilitation monitoring program is provided in **Section 8**.

The achievement (or otherwise) of the completion criteria will be monitored and reported within the Annual Reviews submitted to relevant government agencies.

Table 20 Decommissioning Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
All Domains						
Final landforms are safe, stable, non-polluting and free-draining	Landform Stability	Any final void and associated highwall has been assessed by a qualified geotechnical engineer to validate that it is stable and does not pose any safety risk.	This MOP. Consistent with other Glencore operations.	No	Yes	Not commenced
All infrastructure that is to remain as part of the future land use is made safe through the use of fencing and/or bunding	Site Security	Potential hazards (i.e. electrical, mechanical etc.) have been effectively isolated. The structural integrity of the infrastructure has been inspected by a suitable qualified engineer and determined to be suitable and safe as part of the intended final land use.		No	N/A	Not commenced
Public Safety	Site Security	A public safety risk assessment to be completed with all identified actions implemented and closed out. Appropriate security measures (e.g. adequate fencing) has been implemented (where required) prior to commencing decommissioning and demolition works.		No	N/A	Not commenced
Domain 1 – Infrastructure						
All infrastructure that is not to be utilised as part of the future intended land use is removed to make the site safe and free of hazardous materials.	Removal of infrastructure	Removal of infrastructure at closure unless there is a written agreement with the DPE or RR for infrastructure to remain in situ.	Hunter Valley Operations – West Pit Extension and Minor Modifications EIS (2003)	No	N/A	Not commenced
		All surface infrastructure, including offices and workshops, and services which do not have a potential future use associated with any post mining land use will be removed, unless such removal has a greater environmental impact than rehabilitating the area with the infrastructure remaining in place.		No	N/A	Not commenced

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
All hazardous and/or contaminated materials will be removed or remediated in-situ such that the land is suitable for the intended post mining land use.	Demolition of infrastructure	All demolition work has been carried out in accordance with AS2601-2001: <i>The Demolition of Structures</i> or its latest version.	DA 450-10-2003. Schedule 2, Condition 11	No	N/A	Not commenced
	Disconnect Services	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.	This MOP. Consistent with other Glencore Operations.	No	N/A	Not commenced
	Removal of exploration infrastructure	All drill holes, excavations, and groundwater monitoring bores are decommissioned and sealed in accordance with RR requirements, excluding those being retained for monitoring purposes.	ESG5: <i>Assessment Requirements for Exploration Activities</i>	No	N/A	Not commenced
	Hazardous materials	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).	This MOP. Consistent with other Glencore Operations.	No	N/A	Not commenced
All infrastructure that is to remain as part of the future land use is safe and does not pose any hazard to the community.	Remaining infrastructure safe and suitable	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.		No	N/A	Not commenced

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
There is no residual soil contamination on site that is incompatible with intended land use or that poses a threat of environmental harm.		Appropriate security measures have been implemented to minimise the potential for unauthorised access during the period that the site is transitioned to the intended final land use.		No	N/A	Not commenced
		All potential hazards (i.e. electrical, mechanical etc.) have been effectively isolated.		No	N/A	Not commenced
	Remediation of contaminated soils.	All contaminated soils removed from site or remediated to acceptable contamination levels.		No	N/A	Ongoing
	Carbonaceous Material	Where practical, exposed carbonaceous material will be removed and co-disposed within the mining voids or suitably capped in situ.		No	N/A	Ongoing
There is no residual soil contamination on site that is incompatible with intended land use or that poses a threat of environmental harm.	Removal of hazardous materials	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).	This MOP. Consistent with other Glencore Operations.	No	N/A	Ongoing
Domain 2 – Active Mining						
Public safety is maintained	Public safety	A safety berm and/or security fence is constructed at the void crest (highwalls and endwalls) that provides an adequate engineered barrier for vehicles.	This MOP. Consistent with other Glencore Operations.	No	N/A	Yes
Final voids will be constructed in accordance with an approved Final Void Management Plan	Final Void Management Plan	A <i>Final Void Management Plan</i> and Final Void Design has been developed in consultation with stakeholders and approved by the RR (or contemporary equivalent) at least 5 years prior to closure.		No	N/A	Not commenced
	Exposed Coal Seams	Exposed coal seams will be capped with at least 3 m benign material where required to prevent spontaneous combustion, supported by survey.		No	N/A	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Domain 3 – Overburden Emplacement Area						
No proposed decommissioning activities within this domain.						
Domain 4 – Tailings Disposal Facility						
All tailings pumping infrastructure will be decommissioned and removed.	Tailings infrastructure	All tailings infrastructure (pipelines, pumps and related infrastructure) is decommissioned and removed.	This MOP. Consistent with other Glencore Operations.	No	N/A	Not commenced
	Tailings Storage Facility Capping Design	A Detailed Tailings Capping Design has been developed and approved by the RR (or contemporary equivalent) prior to closure.		No	N/A	Not commenced
Domain 5 – Water Management Area						
Mine water dams and sediment dams are dewatered and desilted prior to being converted to clean water farm dams.	Pumping Infrastructure	All pumps and associated infrastructure is decommissioned and removed from site.	This MOP. Consistent with other Glencore Operations.	No	N/A	Ongoing
	Removal of hazardous materials	All dams, drains and banks not required in the final landform have been demolished and accumulated sediment removed and disposed in the final void.		No	N/A	Ongoing
	Obsolete water management structures	All dams, drains and banks not required in the final landform have been demolished and accumulated sediment removed and disposed in the final void.		No	N/A	Ongoing
	Removal of excess sediment.	Removal of excess sediment from the surface dams for future use by the subsequent land owner or alternatively filling the dams if they are no longer required.	Mine Rehabilitation Handbook (Australian Mining Industry Council 1990) Mine Rehabilitation (Hannan 1995)	No	N/A	Ongoing
Domain 6 – Rehabilitation Pasture						
No proposed decommissioning activities within this domain.						

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Domain 7 – Rehabilitation Woodland						
No proposed decommissioning activities within this domain.						
Domain 8 – Offset Areas						
No proposed decommissioning activities within this domain.						

Table 21 Landform Establishment Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
All Primary Domains						
Landform suitable for final land use and compatible with surrounding landscape as sustainable native ecosystem.	Slopes	Landform is generally compatible within the context of the local topography. Overburden emplacement external slopes will generally be regraded to less than 10°. Internal slopes may be steepened to grades up to 18°. “Note, localised steepening of slopes will occur due to contour bank construction etc.” Avoidance of straight lines and angular corners in profiles of final landforms. Class IV and V lands have slopes of <20%.	Hunter Valley Operations – West Pit Extension and Minor Modifications EIS (2003)	No	Yes	Ongoing
	As built survey	Landform survey verifies constructed landform is generally in accordance with the approved landform design, including heights detailed in the EIS.	This MOP. Consistent with other Glencore Operations.	No	N/A	Ongoing
	Erosion	There is no evidence of slumping or uncontrolled erosion that would cause a safety issue or compromise the land capability.		No	Yes	Ongoing
		Monitoring verifies there are no gully or tunnel erosion features, or rill erosion >300 mm deep; as supported by site records and monitoring.		No	Yes	Ongoing
	Stability	Drainage structures (including drainage lines established in the final landform) are stable and there is no evidence of overtopping or significant scouring as a result of runoff.		No	Yes	Ongoing
		Landforms are assessed to be geotechnically stable and free draining to local watercourses.		No	Yes	Ongoing
				No	Yes	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Domain 1 – Infrastructure						
All hazardous and/or contaminated materials will be removed or remediated in-situ such that the land is suitable for the intended post mining land use.	Carbonaceous Material	ROM and product stockpiles coal bedding layers are capped with inert material and shaped to a free draining landform.	This MOP. Consistent with other Glencore Operations.	No	N/A	Ongoing
Domain 2 – Active Mining						
Final landforms are safe, stable, non-polluting and free-draining.	Exposed coal seams will be covered	Exposed coal seams will be covered with five metres of inert materials to prevent spontaneous combustion where practical.	Mine Rehabilitation (Hannan 1995)	No	N/A	Ongoing
	Safety	Any final void and associated highwall has been assessed by a qualified geotechnical engineer to validate that it is stable and does not pose a safety risk.		No	N/A	Ongoing
Domain 3 – Overburden Emplacement Area						
Overburden areas are geotechnically stable and blend in with the surrounding landscape	Inert Capping	Net acid generating and carbonaceous materials will be capped by a minimum of 5 m of benign material where practical.	This MOP. Consistent with other Glencore Operations.	No	Yes	Ongoing
	Final Landform Survey	Final landform survey is generally in accordance with the approved final landform design.		No	Yes	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Domain 4 – Tailings Disposal Facility						
Final landforms are safe, stable, non-polluting and free-draining.	Tailings Capping	<p>Tailings storage areas have been capped in accordance with an approved Detailed Capping Design outlined in the Tailings Facility Emplacement Application.</p> <p>Preliminary design criteria are to cap tailings with at least:</p> <ul style="list-style-type: none"> 2 m inert material (being clay/select weathered rock); and 100 mm topsoil or suitable growth medium. 	<p>Schedule 3, High Risk Activities, Part 5, Clause 27 Emplacement Areas.</p> <p><i>Work Health and Safety (Mines and Petroleum Sites) Regulations 2014</i></p>	No	N/A	Ongoing
	Free Draining	Capped tailings storage facilities are confirmed by survey to be free draining following the expected settlement period.	<p>Part 2 Division 4 Subdivision 1 Clause 33 (Notification of High Risk Activities)</p> <p><i>Work Health and Safety (Mines and Petroleum Sites) Regulations 2014</i></p>	No	Yes	Ongoing
	Spontaneous Combustion	Monitoring records verify that there is no evidence of spontaneous combustion.	This MOP. Consistent with other Glencore Operations.	No	N/A	Ongoing
	AMD	Capped tailings monitoring and analysis indicates there is no evidence of AMD generation outside of the facility or exposed material, as indicated by triggers set in the monitoring program.		No	N/A	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Domain 5 – Water Management Area						
Final landform drainage will integrate with surrounding catchments and will achieve long term geomorphic stability and minimise erosion.	Final landform drainage design	Final landform drainage structures including drains, banks, drop structures and dams have been designed and constructed in accordance with an approved detailed drainage design and the Blue Book, where applicable.	Blue Book, relevant engineering design standards and site specific requirements.	No	Yes	Ongoing
	Geomorphic stability	Monitoring verifies that drainage structures stable with no active gully heads, tunnel erosion or bank failure.		No	Yes	Ongoing
		Creek Diversions are assessed to be 'stable' as defined by the CSIRO Ephemeral Stream Assessment.	CSIRO 2008	No	Yes	Ongoing
Domain 6 – Rehabilitation Pasture						
Pasture rehabilitation areas will be capable of sustainable grazing.	Surface rock density	Rehabilitation records verify that surface spoils and soils are rock raked (where required) to remove rocks and produce a friable surface.	This MOP. Consistent with other Glencore Operations.	No	N/A	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Domain E – Rehabilitation ALRP Class I and II Lands						
Reinstatement of 63 ha of Class I and II lands in the ALRP area.	Slope will be aligned to land capability.	Class I lands have slopes of < 1% and are shorter than 1,000 m in length with no erosion problems. Class II lands have short, low slopes 1-3% less than 500 m in length.	DA 7/93 (applicable to the ALRP. DA 7/93 was surrendered in 2006).	Yes	N/A	Complete and being monitored
	Surface condition will be aligned to land capability.	Class I and II lands are free of rock outcrops and large stones that would restrict farm machinery operations.	Central West CMA – Land Capability Description (2008) <i>Land and Soil Capability Assessment Scheme</i> (OEH 2012) <i>ALRP Final Report</i> (Coal & Allied Dec 2007)	Yes	N/A	Complete and being monitored
Domain F – Rehabilitation CWV Class II and III Lands						
Reinstatement of 65 ha of Class II and 65 ha of Class III lands in the CWV Extension Area.	Slope will be aligned to land capability.	Class II lands have short, low slopes 1-3% less than 500m in length. Class III lands have slopes 3-10% less than 250m in length. Slopes longer than 250m require structural soil conservation works.	Central West CMA – Land Capability Description (2008) <i>Soil Survey and Land Resource Assessment</i> (GSS Environmental 2010)	No	N/A	Not commenced
	Surface condition will be aligned to land capability.	Class II and III lands are free of rock outcrops and large stones that would restrict farm machinery operations.		No	N/A	Not commenced
	Landform settlement will be aligned to land capability.	Dump heights in Class II and III lands are a maximum of 15 metres, and the final two dump lifts are a maximum height of 10 metres	HVO North ALRMP	No	N/A	Not commenced

Table 22 Growth Medium Development Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
All Domains						
Growing media is capable of supporting sustainable vegetation growth	Growing media development	The rehabilitation surface is a suitable growing medium. Soil pH to be in the range of analogue sites. Monitoring demonstrates soil profile development in rehabilitated areas (e.g. development of organic layer, litter layer).	This MOP. Consistent with other Glencore Operations.	No	N/A	Ongoing
Erosion is minimised	Temporary ESC	Rehabilitation records verify that topsoiled rehabilitation areas are sown with either the approved pasture mix or a non-persistent cover crop promptly following topsoil spreading.	Blue Book	No	N/A	Ongoing
All Secondary Domains						
Growing media appropriate for the intended final land use is reinstated at all rehabilitation areas.	Topsoil depth	Topsoil or a suitable alternative has been spread uniformly at the depth of 100mm, as supported by site record form/site GIS.	This MOP. Consistent with other Glencore Operations.	No	N/A	Ongoing
	Topsoil characterisation	Topsoil's and topsoil substitutes have been tested to assess suitability for post mining land use.		No	N/A	Ongoing
	Amelioration	Rehabilitation records verify that appropriate soil ameliorants (e.g. gypsum, fertilisers, mulch) have been applied (where required) in accordance with specifications.		No	N/A	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Domain E – Rehabilitation ALRP Class I and II Lands						
Reinstatement of 63 ha of Class I and II lands in the ALRP area.	Topsoil and subsoil is placed as per DA 7/93 requirements for Class I and II lands.	63 ha of Class I and II lands have 252,000 m ³ of topsoil 0.4 m deep. 63 ha of Class I and II lands have 630,000 m ³ of subsoil 1 m deep.	DA 7/93 (applicable to the ALRP. DA 7/93 was surrendered in 2006). Central West CMA – Land Capability Description (2008) <i>ALRP Final Report</i> (Coal & Allied Dec 2007)	Yes	N/A	Complete and being monitored
Domain F – Rehabilitation CWW Class II and III Lands						
Reinstatement of 65 ha of Class II and 6.5 ha of Class III lands in the CWW Extension Area.	Topsoil and subsoil is placed as per HVO North ALRMP requirements for Class II and III lands.	130 ha of Class II and III lands have 520,000 m ³ of topsoil 0.4 m deep. 130 ha of Class II and III lands have 1,300,000 m ³ of subsoil 1 m deep.	HVO ALRMP Central West CMA – Land Capability Description (2008)	No	N/A	Not commenced

Table 23 Ecosystem and Land Use Establishment Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
All Domains (excluding Domain A – Final Void and Domain B – Water Management Area)						
Weeds and feral animal species do not present a risk to rehabilitation.	Weed presence	Monitoring verifies there are no significant weed infestations.	This MOP. Consistent with other Glencore Operations.	No	Yes	Ongoing
		Records indicate that noxious weeds are controlled in accordance with legislation and the MOP.		No	Yes	Ongoing
	Feral animal density	Records indicate that feral animal pests are controlled in accordance with legislation and the MOP.		No	N/A	Ongoing
Vegetation is managed to control fire for the establishment and maintenance of selected vegetation species.	Vegetation is managed to control fire.	Actions are implemented as per the <i>Bushfire Management Plan</i> .	<i>HVO Bushfire Management Plan Rural Fires Act 1997</i>	No	Yes	Ongoing
Soil fertility and soil structure is comparable between rehabilitation areas and reference sites	EC	Testing verifies that EC of surface soils is below 1,000 mS/cm at Year 5.	Tongway & Hindley 1996	No	N/A	Ongoing
	Nutrients	Nitrogen, potassium and phosphorus are within 20% of analogue sites at Year 5.		No	N/A	Ongoing
	Soil carbon	Testing indicates that organic carbon levels are broadly trending toward 20% of levels at reference sites at Year 5.		No	N/A	Ongoing
Domain B – Water Management Area						
Final landform drainage will integrate with surrounding catchments, achieve long term geomorphic stability and minimise erosion.	Discharge water quality	Records indicate that discharge water quality meets EPL requirements.	EPL	No	Yes	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Domain C – Rehabilitation Pasture						
Revegetation is progressing towards being sustainable in the long term.	Approximately 70% of mined land re-established as stable, productive pasture areas.	70% of disturbed mining areas returned to productive pasture areas.	Hunter Valley Operations – West Pit Extension and Minor Modifications EIS (2003)	No	N/A	Ongoing
	Species suitable for agricultural land use.	Species used are compatible with agricultural outcomes.		No	N/A	Ongoing
	Land capability.	The site productivity, based on Potential Carrying Capacity, is comparable to that of analogue sites (Dry Sheep Equivalent).		No	N/A	Ongoing
Domain D – Rehabilitation Woodland						
Establishment and germination of selected vegetation species: <ul style="list-style-type: none">Approximately 70% of mined land re-established as stable, productive pasture areas; and	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation.	LFA Stability Index is comparable to or trending towards that of analogue sites (%).	Ecosystem Function Analysis (EFA) (Tongway 2004). Rehabilitation Monitoring – Grasslands/Pasture Lands (AECOM 2015)	No	N/A	Ongoing
		The Landscape Organisation Index is comparable to that of reference sites.		No	N/A	Ongoing
<ul style="list-style-type: none">Approximately 30% of mined land re-established as woodland areas.	Nesting structures (mammal and avian)	Species specific habitat and/or nesting features are incorporated where relevant in areas across the site.		No	N/A	Ongoing
	Coarse Woody Debris and rocks	Coarse woody debris and / or rocks are placed to optimise inter connectivity across the landscape.		No	N/A	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Revegetation is progressing towards being sustainable in the long term.	Approximately 30% of mined land re-established as woodland areas.	Approximately 30% of mined land re-established as woodland areas.	Hunter Valley Operations – West Pit Extension and Minor Modifications EIS (2003) This MOP. Consistent with other Glencore Operations.	No	N/A	Ongoing
	Species diversity	The number of tree species comprising the vegetation community is comparable to that of analogue sites (no. species/area).		No	N/A	Ongoing
		The number of grass species comprising the vegetation community is comparable to that of analogue sites (no. species/area).		No	N/A	Ongoing
	Tree density	The density of trees is comparable to that of analogue sites (no./area).		No	N/A	Ongoing
	Species suitable for agricultural or native biodiversity land use.	Species used are compatible with native biodiversity conservation outcomes.		No	N/A	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Domain E – Rehabilitation ALRP Class I and II Lands						
Soil fertility and soil structure is comparable between rehabilitation areas and reference sites	Soil fertility	<p>Soil structure is comparable between mined and unmined sites as determined by:</p> <ul style="list-style-type: none"> • Surface horizons • Peds shape and size • Porosity and cracking • Root depth • Presence of pans or compact layers <p>Monitoring results show soil fertility is optimal for the growing of Lucerne hay to produce 15t/ha:</p> <ul style="list-style-type: none"> • Available phosphorous – Colwell test (mg/kg) – 50mg/kg • Organic carbon (%) - 2.0 -2.5 • pH of topsoils – range 6.5- 7.5 • EC (dS/m) - < 1.2 • Sulfur KCL40 (mg/kg) – 8-10 	ALRP Final Report (Coal & Allied Dec 2007)	Yes	N/A	Ongoing
Domain F – Rehabilitation CWW Class II and III Lands						
Soil properties of the reinstated Class II and III lands are comparable to reference sites.	Soil properties	<p>Soil structure is comparable between mined and unmined sites as determined by: peds shape and size; permeability measured directly by hydraulic conductivity or inferred from bulk density measurements – moderate permeability.</p> <p>Monitoring results show soil fertility is comparable between mined and unmined sites and suitable for the growing of crops as determined by soil testing results. Nutrient accumulation and recycling processes are occurring as evidenced by: presence of a litter layer; presence of Mycorrhizae or other microsymbionts.</p>	Soil Survey and Land Resource Assessment (GSS Environmental 2010)	No	N/A	Not commenced

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Soil fauna reinstated Class II and III lands are comparable to reference sites.	Soil fauna species	Representation of a range of soil species such as earthworms, springtails and fungi relative to unmined reference site.	<i>Soil Survey and Land Resource Assessment</i> (GSS Environmental 2010)	No	N/A	Not commenced

Table 24 Ecosystem and Land Use Sustainability Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Domain C – Rehabilitation Pasture, Domain D – Rehabilitation Woodland						
Weeds are controlled.	Weed presence	Rehabilitation monitoring verifies weed presence is broadly comparable to analogue sites and does not present a risk to rehabilitation.	This MOP. Consistent with other Glencore operations.	No	Yes	Ongoing
Feral animal pests are controlled on HVO lands.	Feral animal density	Records indicate that feral animal pests are controlled in accordance with legislation and the MOP.	<i>Integrated Biodiversity Management Plan</i>	No	N/A	Ongoing
Provide additional habitat for threatened species.	Fauna species	The number of native fauna species observed within the rehabilitation areas is similar to that of the local remnant vegetation.	This MOP. Consistent with other Glencore operations.	No	N/A	Ongoing
Management measures will be implemented to minimise bushfire risks in rehabilitation areas.	Bushfire risk management	Bushfire mitigation actions have been implemented including managing fuel loads, maintaining fire breaks and access roads.	<i>HVO Bushfire Management Plan</i>	No	Yes	Ongoing
	Access	Firefighting access is maintained across rehabilitation areas and to water storages (dams).		No	N/A	Ongoing
Monitoring demonstrates soils are self-sustaining	Soil Quality	Rehabilitation monitoring verifies soil characteristics (pH, EC and ESP, nitrogen and phosphorus) vary no more than 20% from relevant analogue site after 5 years.	This MOP. Consistent with other Glencore operations.	No	N/A	Ongoing
	Soil Quality	Soil testing indicates soil organic carbon is no less than 20% of levels in adjacent analogue site after 10 years.		No	N/A	Ongoing
	Surface cover	Rehabilitation monitoring verifies ground cover (vegetation, leaf litter, mulch) is in the range of analogue sites at Year 10.		No	Yes	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Monitoring demonstrates soils are self-sustaining	Nutrient Recycling	Rehabilitation monitoring indicates evidence of nutrient recycling (e.g. presence of fungi).	Tongway & Hindley 1996	No	N/A	Ongoing
	Management Inputs	Rehabilitation records verify that management inputs (e.g. ameliorants, fertilizers) required to maintain vegetation health are comparable to analogue sites.	This MOP. Consistent with other Glencore operations.	No	N/A	Ongoing
Final landforms are safe, stable, non-polluting and free-draining.	Landform Stability	Landforms are assessed to be stable and free draining to local watercourses.		No	Yes	Ongoing
	Erosion and sediment control	No significant erosion is present that constitutes a safety hazard or compromises the capability of the supporting the end land use.	Blue Book	No	Yes	Ongoing
Domain B – Water Management Area						
Final landform drainage will integrate with surrounding catchments, achieve long term geomorphic stability and minimise erosion	Water Quality	Discharge water quality meets EPL requirements.	EPL	No	Yes	Ongoing
	Geomorphic stability	Drainage structures are assessed to be stable at Year 10.	Blue Book, relevant engineering design standards and site specific requirements.	No	Yes	Ongoing
Domain C – Rehabilitation Pasture						
Revegetation is sustainable for the long term and only requires maintenance that is consistent with the intended final land use.	LFA Infiltration	LFA Infiltration index indicates that it is comparable to or trending towards that of analogue sites.	CSIRO Methodology for Landscape Function Analysis (Tongway 2004)	No	N/A	Ongoing
	LFA Nutrient Recycling	LFA nutrient recycling index indicates that it is comparable to or trending towards that of analogue sites.		No	N/A	Ongoing
	Total Groundcover	Total groundcover is the sum of protective ground cover components (dead and live plant material, rocks and logs) and is comparable to that of analogue sites (% Cover).		No	Yes	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Revegetation is sustainable for the long term and only requires maintenance that is consistent with the intended final land use.	Species Abundance	The abundance of understorey species (non-weed) per square metre, averaged across the site, provides an indication of the heterogeneity of the site and that the number of non-weed species is comparable to analogue sites (no. species/m ²).	CSIRO Methodology for Landscape Function Analysis (Tongway 2004)	No	Yes	Ongoing
Domain D – Rehabilitation Woodland						
Establishing a network of tree corridors to ensure connectivity of woodland community areas.	Vegetation communities in areas of rehabilitation have been designed to enhance connectivity across the site and to adjoining landscape.	Align vegetation communities on areas of rehabilitation to adjacent landscape. GIS data reflects connectivity of vegetation communities.	Hunter Valley Operations – West Pit Extension and Minor Modifications EIS (2003)	No	N/A	Ongoing
Woodland Rehabilitation Areas will contribute to habitat linkage objectives of the 'Synoptic Plan'.	Connectivity	Woodland rehabilitation area features are considered compatible with adjacent operations rehabilitation objectives and the objectives of the "Synoptic Plan-Integrated Landscape for Coal Mine Rehabilitation in the Hunter Valley of NSW", to the satisfaction of the RR.	Andrews Neil Architects Planners 1999	No	N/A	Ongoing
	Approximately 30% of mined land re-established as woodland areas.	Approximately 30% of mined land re-established as woodland areas.	Hunter Valley Operations – West Pit Extension and Minor Modifications EIS (2003) This MOP. Consistent with other Glencore Operations.	No	N/A	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
Revegetation is sustainable for the long term and only requires maintenance that is consistent with the intended final land use.	Revegetation of Swamp Oak Floodplain Forest area.	Revegetate an area of at least 0.14 ha using trees representative of the Swamp Oak Floodplain Forest community on land which adjoins existing riparian vegetation and is suitable for the establishment of this community.	DA-45-10-2003	No	No	Ongoing
	Native fauna resources	Rehabilitation monitoring verifies that habitat resources for target species (e.g. food sources and shelter resources) are comparable to analogue sites.	This MOP. Consistent with other Glencore operations.	No	N/A	Ongoing
	LFA Infiltration	LFA Infiltration index indicates that it is comparable to or trending towards that of analogue sites.	This MOP. Consistent with other Glencore operations.	No	N/A	Ongoing
	LFA Nutrient Recycling	LFA nutrient recycling index indicates that it is comparable to or trending towards that of analogue sites.		No	N/A	Ongoing
	Total Groundcover	Total groundcover is the sum of protective ground cover components (dead and live plant material, rocks and logs) and is comparable to that of analogue sites (% Cover).		No	Yes	Ongoing
	Native Understorey Abundance	The abundance of native species per square metre averaged across the site is within 70% of analogue sites.		No	Yes	Ongoing
	Tree Diversity	The diversity of maturing trees and shrubs with a stem diameter greater than 5cm is comparable to that of analogue sites (no./area).		No	N/A	Ongoing
		The percentage of maturing trees and shrubs with a stem diameter greater than 5cm that are local endemic species is comparable to analogue sites.		No	N/A	Ongoing
	Tree Health	The percentage of the tree population which are in healthy condition and that the percentage is comparable to analogue sites.		No	N/A	Ongoing
				No	N/A	Ongoing

Domain Objective	Performance Indicator	Completion Criteria	Justification / Source	Complete (Yes/No)	TARP Element	Progress at Start of MOP
		The percentage of the tree population which are in a medium health condition and that the percentage is comparable to analogue sites.		No	N/A	Ongoing
		The percentage of the tree population which are in a state of advance dieback and that the percentage is comparable to analogue sites.		No	N/A	Ongoing
Revegetation is sustainable for the long term and only requires maintenance that is consistent with the intended final land use.	Reproductive Structures	The presence of reproductive structures such as buds, flowers or fruit on trees and shrubs provides evidence that the ecosystem is maturing, capable of recruitment and can provide habitat resources and that the % population is comparable to that of analogue sites.	This MOP. Consistent with other Glencore operations.	No	N/A	Ongoing
Domain E – Rehabilitation ALRP Class I and II Lands						
Lucerne hay yield of 'at least equivalent to the average crop productivity yields for the Upper Hunter Region for three consecutive years'.	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.	ALRP Final Report (Coal & Allied Dec 2007)	Yes	N/A	Complete
Domain F – Rehabilitation CWW Class II and III Lands						
Lucerne hay yield from the CWW reinstated Class II and III lands are comparable to reference sites.	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.	HVO Agricultural Land Reinstatement Management Plan	No	N/A	Not commenced

7 Rehabilitation Implementation

7.1 Status at MOP Commencement

The status of each operational Primary and Secondary Domains at the commencement of this MOP term is shown on **Plan 2**. Rehabilitation status at the commencement of the MOP for each domain is summarised in **Table 25**.

Table 25 Status of Primary and Secondary Domains at MOP Commencement

Domain	Status at MOP Commencement
Primary Domains	
Domain 1 – Infrastructure	This domain includes existing infrastructure and facilities including workshops, administration buildings, access roads, haul roads, hardstand/laydown areas, topsoil stockpiles, and general operational infrastructure. The domain is currently active and subject to ongoing operations. At MOP commencement, 420.9 ha is classified as infrastructure.
Domain 2 – Active Mining	This domain is currently active and subject to ongoing operations. Active mining areas are located at West Pit. At MOP commencement, 347.3 ha is classified as active mining.
Domain 3 – Overburden Emplacement Area	This domain is currently active and subject to ongoing operations. At MOP commencement, 972.1 ha is classified as overburden.
Domain 4 – Tailings Storage Facility	Tailings are transported to the North Pit TSF, Dam 6W TSF or Cumnock Void TSF. This domain is currently active and subject to ongoing operations. At MOP commencement, 171.5 ha is classified as tailings.
Domain 5 – Water Management Area	This domain is currently active and subject to ongoing operations. At MOP commencement 66.0 ha is classified as water management.
Domain 6 – Rehabilitation Pasture	This domain includes all rehabilitated pasture areas at MOP commencement. At MOP commencement, 1,203.7 ha is classified as current pasture rehabilitation.
Domain 7 – Rehabilitation Woodland	This domain includes all rehabilitated woodland areas at MOP commencement. At MOP commencement, 602.9 ha is classified as current woodland rehabilitation.
Domain 8 – Offset Areas	Includes all offsets related to HVO North. At MOP commencement there were 490.4 ha of established offsets
Secondary Domains	
Domain A – Final Void	There is currently no final void at HVO North.
Domain B – Water Management Area	This domain refers to the surface water management structures (dams) that will be retained in the final landform following mine closure. This domain is active and subject to ongoing operations. The locality of the structures that will be retained in the final landform have been shown on Plan 4 (refer Appendix C).
Domain C – Rehabilitation Pasture	Plan 2 outlines areas of current pasture rehabilitation in relation to the proposed final landform at MOP commencement.
Domain D – Rehabilitation Woodland	Plan 2 outlines areas of current woodland rehabilitation in relation to the proposed final landform at MOP commencement.
Domain E – Rehabilitation ALRP Class I and II Land	Plan 2 outlines areas of current Rehabilitation ALRP Class I and II Land. This is currently complete and is being monitored and managed by HVO North.
Domain F – Rehabilitation CWW Class II and III Land	The establishment of rehabilitation CWW Class II and III Land has not been triggered at the commencement of the MOP term.

7.2 Proposed Rehabilitation Activities during the MOP Term

Short to medium term mining and rehabilitation activities (the term of this MOP) are shown on **Plans 3A to 3C** (refer **Appendix C**). **Table 26** summarises activities within each primary and secondary domain during the MOP term. **Table 27** outlines forecast rehabilitation and disturbance at HVO North during the MOP term.

Table 26 Proposed Rehabilitation Activities during the MOP Term

Domain	Proposed Rehabilitation Activities
Primary Domains	
Domain 1 – Infrastructure	The existing HVO North infrastructure will remain in place during the MOP term. No decommissioning or rehabilitation is proposed in this domain during the MOP term.
Domain 2 – Active Mining	This domain is active and subject to ongoing operations during the MOP term. Disturbance and active mining during the MOP term is shown on Plans 3A – 3C . Active mining is located in the West Pit.
Domain 3 – Overburden Emplacement Area	Overburden materials will continue to be managed consistently with the current management practices. Rehabilitation of overburden will follow the process outlined in Section 7.5 . Areas to be rehabilitated during the MOP term are shown on Plans 3A – 3C .
Domain 4 – Tailings Storage Facility	Tailings management methods during the MOP term are outlined in Section 2.2.5 . Dam 6W TSF, North Pit TSF and Cumnock Void TSF will continue to be used during the MOP term. In-pit tailings will commence at Carrington Pit in early 2019. Initial capping of South East TSF is expected to recommence during 2019.
Domain 5 – Water Management Area	Four erosion and sediment control structures (two existing at MOP commencement and two proposed in 2019) to the south-east of West Pit will be disturbed as part of active mining the area. No further rehabilitation of dams or water management features is planned during the MOP term.
Domain 6 – Rehabilitation Pasture	Existing pasture rehabilitation areas at MOP commencement will undergo monitoring and maintenance during the MOP term. Approximately 70.7 ha of new pasture rehabilitation will be established along the north-western edge of the West Pit during the MOP term.
Domain 7 – Rehabilitation Woodland	Existing woodland rehabilitation areas at MOP commencement will undergo monitoring and maintenance during the MOP term. Approximately 12.9 ha of new woodland rehabilitation will be established along the north-western edge of the West Pit during the MOP term.
Domain 8 – Offset Areas	Includes all offsets related to HVO North. There is no proposed rehabilitation to occur within the offset areas.
Secondary Domains	
Domain A – Final Void	No final voids will be formed during the MOP term.
Domain B – Water Management Area	This domain is associated with the surface water management structures (dams) that will be retained in the final landform following mine closure. This domain is active and subject to ongoing operations.
Domain C – Rehabilitation Pasture	Plans 3A – 3C show the areas to be rehabilitated as pasture during the MOP term. These areas are located along the north-western edge of West Pit.
Domain D – Rehabilitation Woodland	Plans 3A – 3C show the areas to be rehabilitated as woodland during the MOP term. These areas are located along the north-western edge of West Pit.
Domain E – Rehabilitation ALRP Class I and II Land	All rehabilitation for this secondary domain is complete and being monitored and managed by HVO North.

Domain	Proposed Rehabilitation Activities
Domain F – Rehabilitation CWW Class II and III Land	Works in this domain are associated with the CWW Extension. This has not commenced and is not planned during the MOP term.

Table 27 Summary of Disturbance and Rehabilitation Proposed during the MOP Term

Year	Total Disturbance (ha)	Rehabilitation (ha)	Cumulative Rehabilitation Area (ha)
Start of MOP Term (1 January 2019) – Plan 2	1,977.8	N/A	1,806.6
End of 2019 – Plan 3A	2,009.8	21.4	1,811.6
End of 2020 – Plan 3B	1,999.3	42.2	1,853.8
End of 2021 – Plan 3C	2,062.3	36.4	1,890.2
Total	8,049.2	100.1	7,362.2

7.3 Summary of Rehabilitation

The change in the areas of rehabilitation in each domain during the MOP term are summarised in **Table 28**.

Table 28 Summary of Rehabilitation Proposed during the MOP Period

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Total Area at MOP start (ha)	Area at end of MOP (ha)	Comment
Infrastructure (1)	Rehabilitation Pasture (C)	1C	Active	359.6	368.9	Increase in infrastructure associated with the enlargement of the ROM coal loop at HCPP and Light Vehicle separation road along main road link.
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	-	-	
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total			
Infrastructure (1)	Rehabilitation Woodland (D)	1D	Active	61.4	60.6	-
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	-	-	
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total			
Active Mining (2)	Final Void (A)	2A	Active	67.2	67.2	No change.
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Total Area at MOP start (ha)	Area at end of MOP (ha)	Comment
Active Mining (2)	Rehabilitation Pasture (C)	2C	Ecosystem and Land Use Establishment	-	-	Increase to domain associated with extension of mining in West Pit to the south-east and commencement of mining in Mitchell Pit.
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total	67.2	67.2	
			Active	140.4	238.3	
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	-	-	
			Ecosystem and Land Use Sustainability	-	-	
Active Mining (2)	Rehabilitation Woodland (D)	2D	Relinquished Lands	-	-	Increase to domain associated with extension of mining in West Pit to the south-east and commencement of mining in Mitchell Pit.
			Domain Total	140.4	238.3	
			Active	139.7	261.3	
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	-	-	
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total	139.7	261.3	
Overburden Emplacement Area	Final Void (A)	3A	Active	153.4	74.4	Decrease associated with extension of active mining
			Decommissioning	-	-	

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Total Area at MOP start (ha)	Area at end of MOP (ha)	Comment
(3)			Landform Establishment	-	-	areas in West Pit to the south-east and commencement of mining in Mitchell Pit.
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	-	-	
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total	153.4	74.4	
Overburden Emplacement Area (3)	Rehabilitation Pasture (C)	3C	Active	382.6	267.6	Decrease associated with extension of active mining areas in West Pit to the south-east and commencement of mining in Mitchell Pit.
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	-	-	
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total	382.6	267.6	
Overburden Emplacement Area (3)	Rehabilitation Woodland (D)	3D	Active	436.2	408.5	Decrease associated with extension of active mining areas in West Pit to the south-east and commencement of mining in Mitchell Pit.
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	-	-	
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total	436.2	408.5	

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Total Area at MOP start (ha)	Area at end of MOP (ha)	Comment
Tailings Storage Facility (4)	Final Void (A)	4A	Active	-	79.0	Change associated with the importation of tailings to the Carrington Pit commencing in early 2019.
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	-	-	
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total			
Tailings Storage Facility (4)	Rehabilitation Pasture (C)	4C	Active	108.6	108.6	No change.
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	-	-	
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total			
Tailings Storage Facility (4)	Rehabilitation Woodland (D)	4D	Active	62.9	62.9	No change.
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	-	-	
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total			

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Total Area at MOP start (ha)	Area at end of MOP (ha)	Comment
			Relinquished Lands	-	-	
			Domain Total	62.9	62.9	
Water Management Area (5)	Water Management Area (B)	5B	Active	19.0	19.0	No change.
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	-	-	
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total	19.0	19.0	
Water Management Area (5)	Rehabilitation Pasture (C)	5C	Active	45.7	44.8	Decrease associated with rehabilitation of dams mined out by south-eastern extension of West Pit.
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	-	-	
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total	45.7	44.8	
Water Management Area (5)	Rehabilitation Woodland (D)	5D	Active	1.4	1.4	No change.
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Total Area at MOP start (ha)	Area at end of MOP (ha)	Comment
Rehabilitation Pasture (6)	Rehabilitation Pasture (C)	6C	Ecosystem and Land Use Establishment	-	-	Increase associated with rehabilitation along north-west extent of the West Pit.
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total	1.4	1.4	
			Active	976.4	1,040.9	
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	180.3	261.4	
			Ecosystem and Land Use Establishment	667.5	665.1	
			Ecosystem and Land Use Sustainability	128.6	114.4	
Rehabilitation Pasture (6)	Rehabilitation Pasture (D)	6D	Relinquished Lands	-	-	Increase associated with rehabilitation along north-west extent of the West Pit.
			Domain Total	976.4	1,040.9	
			Active	155.0	161.2	
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	107.5	113.7	
			Ecosystem and Land Use Establishment	0.1	0.1	
			Ecosystem and Land Use Sustainability	47.4	47.4	
			Relinquished Lands	-	-	
			Domain Total	155.0	161.2	
Rehabilitation Pasture (6)	Rehabilitation ALRP Class I and II Land (E)	6E	Active	72.3	72.3	No change.
			Decommissioning	-	-	

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Total Area at MOP start (ha)	Area at end of MOP (ha)	Comment
			Landform Establishment	-	-	
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	72.3	72.3	
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total	72.3	72.3	
Rehabilitation Woodland (7)	Rehabilitation Pasture (C)	7C	Active	104.8	107.6	Increase associated with rehabilitation along north-west extent of the West Pit.
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	0.3	3.1	
			Ecosystem and Land Use Establishment	36.2	36.2	
			Ecosystem and Land Use Sustainability	68.3	68.3	
			Relinquished Lands	-	-	
			Domain Total	104.8	107.6	
Rehabilitation Woodland (7)	Rehabilitation Woodland (D)	7D	Active	498.1	508.2	Increase associated with rehabilitation along north-west extent of the West Pit.
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	71.9	82.0	
			Ecosystem and Land Use Establishment	273.8	273.8	
			Ecosystem and Land Use Sustainability	152.4	152.4	
			Relinquished Lands	-	-	
			Domain Total	498.1	508.2	

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Total Area at MOP start (ha)	Area at end of MOP (ha)	Comment
Offset Areas (8)	Rehabilitation Woodland (D)	8D	Active	490.4	490.4	No change.
			Decommissioning	-	-	
			Landform Establishment	-	-	
			Growth Medium Development	-	-	
			Ecosystem and Land Use Establishment	-	-	
			Ecosystem and Land Use Sustainability	-	-	
			Relinquished Lands	-	-	
			Domain Total			
Overall Total			4,274.8	4,442.9		

7.4 Relinquishment Phase Achieved during the MOP Term

As mining activities at HVO North are planned to continue past the MOP term, no areas are anticipated to meet the required rehabilitation obligations for lease relinquishment.

7.5 Landform Design

The final landform design for HVO North was prepared as part of the EIS (ERM 2003) 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 4** (refer **Appendix C**).

Overburden is shaped to be compatible with adjacent land surfaces and final landform. The final landscape will consist of a series of hills, ridges and minor valley systems designed to be consistent with the pre-mining local and regional landscape. 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°.

Drainage from the elevated rehabilitated overburden dumps will be achieved by the use of drainage routes at a slope of 1-10%. Drainage lines will be constructed to be compatible with the surrounding drainage network.

Surface Shaping

Following truck dumping activities, the overburden piles are reshaped to form the final landscape. Dumps are generally developed in approximate 10-15 m lifts over dragline spoil peaks by the truck and shovel operation, enabling good control over the final land shaping process. When dumping is completed in an area, the mine surveyor places batter pegs to guide the final land formation. Slopes are then bulldozed to the design slopes after which large rocks that have been exposed are heaped, picked up and removed.

No materials recovered through mining at HVO North are expected to be toxic. However, precautions are still taken to avoid potential hazards, with all unsuitable materials buried at least 5 m below the surface in accordance with the EMS rehabilitation procedures.

Water Management

Drainage patterns on rehabilitated areas are designed to be compatible with the surrounding drainage network, in approximate location of the pre-mining flow lines. Drainage is generally divided into a number of small catchments that feed into a large channel. This 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 to cater for a 1 in 5 year event with an approximate slope of up to 2% to minimise erosion.

Sedimentation dams are incorporated into the final landform where considered appropriate to collect water runoff and allow time for any suspended sediment to settle out prior to the water leaving the site. Sedimentation dams will be designed to engineering standards sufficient to withstand floods of 1 in 20 year Average Recurrence Interval (ARI) and bypass spillways constructed to withstand floods of 1 in 100 year ARI.

Erosion control is primarily achieved through the establishment of productive vegetation cover on the rehabilitated slopes. Graded erosion banks are constructed as a temporary erosion control measure during the early stages of the revegetation process.

7.6 Topsoil Management

Topsoil must 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. All soil stripping has already been removed from the North Pit TSF area and reused during rehabilitation activities. As such, soil/topsoil from the North Pit TSF area is not discussed in the following sections.

A detailed Topsoil Management Plan will be prepared for the CWW Extension Area (prior to any disturbance) to document topsoil management procedures to help achieve the desired rehabilitation outcomes. It should be noted that the CWW Extension project is not scheduled to commence during the MOP term.

7.6.1 Soil Types

Soil assessments have been undertaken as part of previous environmental assessments for the West Pit Extension Area (ERM 2003), the Carrington Pit Area (ERM 2005) and the CWW Extension Area (EMGA Mitchell McLennan 2010). The dominant soil types present within West and Carrington Pits areas are presented in **Table 29**.

Table 29 Soil Types

West Pit Area	Carrington Pit Area	CWW Extension Area
Red Duplex Clay Loam (77%)	Black Earth (43%)	Brown Uniform Silty Clay (42%)
Yellow Gradational Loam (11%)	Brown Clay (29%)	Brown Uniform Silty Clay Loam (32%)
Brown Duplex Loam (12%)	Red-Brown Earth (28%)	Red/Brown Duplex Loam (26%)

7.6.2 Topsoil Suitability for Rehabilitation

Structural and textural properties of soils within the study area are the most significant limiting factors for determination of topdressing suitability. The previous soil investigations identified that soil types suitable for stripping in West Pit and Carrington Pit were limited due to the extensive sheet erosion that is characteristic of the area and the inherent chemical and physical deficiencies of the soils.

In the West Pit area, topdressing suitability of the Duplex soils is limited and varies across the landscape, with limited stripping potential (0.1 m) available on the ridge and upper-slope areas and greater depth of suitable surface horizon (0.2 m) on mid and footslope areas. The Yellow Gradational Loam shows the best potential for topdressing and can be stripped to a depth of 0.3 m.

In the Carrington Pit area, the Red-Brown Earth and Brown Clay units are generally not suitable for stripping and reuse during rehabilitation. The topsoil layers of the Black Earth unit can be stripped to an average depth of 0.8 m for reuse as topdressing material.

In the CWW Extension area, all soil units are suitable for stripping and reuse during rehabilitation. All of the material excavated in test pits (1.2 m depth) in the Brown Uniform Silty Clay Loam was suitable for use as topsoil material. The recommended topsoil stripping depths for the Brown Uniform Silty Clay and Red/Brown Duplex Loam was 0.2 m and 0.1 m respectively. The subsoils, making up the alluvium, from the Brown Uniform Silty Clay Loam and Brown Uniform Silty Clay soil units will be stripped and used to reinstate the Class II and Class III soil profile. All suitable topsoil and subsoil materials will be stripped from the Brown Uniform Silty Clay Loam soil unit and excess quantities will be used to alleviate soil deficits on other areas of HVO North.

7.6.3 Soil Stripping

Soil testing will be undertaken to determine what soil amelioration is required prior to re-use for rehabilitation activities. Areas that are planned to be disturbed will be stripped of soil prior to disturbance. Advance clearing and soil removal is kept to a minimum to reduce dust generation and potential impacts on fauna species. Soil will be stripped using appropriately sized earthmoving equipment, preferably bull dozers. Where practicable, soil will be stripped when moist, but not saturated; and no stripping will occur in excessively dry or wet conditions. Prior to stripping of soil, appropriate controls such as sediment controls will be put in place to prevent off-site loss of soil sediments.

7.6.4 Soil Treatment

Soil modifiers, such as gypsum, compost are applied where required to improve topsoil condition. The ameliorant type and application rate are confirmed by testing of topsoil and re-contoured areas.

Revegetation will be undertaken progressively as the surface preparation of mine spoil is completed. The compost material generally provides enough nutrition for vegetation establishment at time of sowing. The addition of up to 400 kg/ha of “Starter 15”, “Grower 11” or equivalent fertiliser may be required at the time of sowing for pasture revegetation areas in the absence of compost treatment.

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 structure. Suitable organic additives may also be used in accordance with industry lead practice and research findings to improve soils in areas to be returned to native vegetation.

7.6.5 Soil Handling and Management

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 will be transferred directly from stripping to re-spreading operations, eliminating the need for storage. However in some cases, mining operations dictate that soil storage will be necessary for extended periods. Where stockpiling is required, the following procedures will be adopted:

- Stockpiles will be located away from trafficable or mine areas, trees or watercourses and placed on areas of flat topography or along the contour to prevent erosion;
- Good quality topsoil, marginal topsoil and subsoils will be stockpiled separately and recorded as such;
- Soil stockpiles and volumes will be identified and monitored for weed control;
- Where possible, stockpiles will be limited to a maximum height of 3 m;
- Where necessary and/or practical, sediment fencing or other appropriate sediment controls are installed around the base of the stockpile to minimise soil loss; and
- Stockpiles will be sown with cover crop to help maintain topsoil viability and minimise erosion and weed infestation if not being reused for prolonged periods.

7.6.6 Soil Budgeting

Due to the shallow nature of the in situ duplex topsoils there is a potential for significant topsoil loss. However, with the use of marginal material, mulch, compost and adequate controls sufficient growth medium is available for rehabilitation.

Priority areas for the redeployment of topsoil will be on areas planned to be returned to pastures and areas with potentially hostile spoil properties that make it difficult to establish vegetation. For the purposes of topsoil budgeting, it is assumed that:

- The primary objective of the mine rehabilitation programme is to create a structurally stable landform;
- A secondary objective is to maximise post-mine land capability and restore a productive land use (primarily pastoral use);
- The total area projected as being disturbed over mine life is the area to be rehabilitated;
- The area to be rehabilitated excludes the final voids and areas already rehabilitated; and
- Topsoil is only available from mining areas and rehabilitated areas to be stripped over the mine life.

The area to be rehabilitated over this MOP term is estimated to be approximately 100.1 ha. Based on an average thickness of 100 mm of topsoil, it is expected that there will be sufficient suitable topsoil to provide for the area of rehabilitation. For areas being returned to native vegetation, mine spoil improved with ameliorants such as green waste or municipal waste composts or timber mulch will be trialled as a suitable growth medium.

7.7 Surface Preparation

All surface preparations and vegetation clearing is undertaken as a staged operation immediately in advance of mining operations.

Pre-clearing surveys are undertaken prior to vegetation removal to identify reusable timber and important habitat. Where present, suitable microhabitats such as trees with hollows, fallen logs and bat roosts are identified and relocated for use in rehabilitation. Habitat trees are also surveyed and marked to determine if fauna are using them. Any marked trees that show signs of current or recent use are reserved for latest possible removal to encourage fauna to abandon the area of their own accord.

Following the removal of useable timber for fence posts and stag trees, as well as collection of viable seed for use in rehabilitation, the remaining smaller vegetation is generally mulched and incorporated into the topsoil, or may be cleared by bulldozers, broken up and placed on rehabilitation areas to form fauna habitat or dumped in pit. Suitable logs may also be supplied to river restoration projects within the Hunter Valley for the construction of in-stream structures.

Vegetation clearing ahead of mine workings will be kept to a minimum, consistent with the space requirements of the pre-stripping fleet, which is usually about one mining strip (approximately 100 m). Clearing also allows for the establishment of mine infrastructure ahead of the mining operations and may include clearing for haul roads and access tracks, powerlines, pipelines, transformers and drainage control structures.

A Vegetation Clearance Plan was approved in October 2016 in accordance with Condition 2 of EPBC 2016/7640. Measures implemented from the Vegetation Clearance Plan provide for the effective management of CHVEF, Regent Honeyeater, Swift Parrot, and Green and Golden Bell Frog during the vegetation clearance for extension areas in West Pit and Carrington Pit.

7.8 Revegetation

HVO North 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 grazing pressures and improve animal productivity. Native vegetation areas utilise local native species and are designed to increase biodiversity values. Rehabilitation of shelter belts are designed to provide protection for stock and link native bush areas. Shelter belts can consist of a mixture of native and exotic species.

Initial sacrificial cover crops may be used to provide quick stability to rehabilitation areas and provide additional opportunities for weed control prior to sowing to long term seed mixes. Cover crops will be selected to suit the season i.e. millet for sowing in Spring/Summer and ryegrass, barley or triticale for sowing in Autumn/Winter.

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).

7.8.1 Rehabilitation Pasture

Pasture will be sown in spring or autumn, depending on rainfall. This gives the best opportunity for seeds to germinate and successfully grow. Grass seeds are mixed with fertiliser and spread from a tractor-mounted broadcaster working along contour where possible for uniform seed distribution. Typical pasture species and rates of application are shown in **Table 30**. 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. Species will be selected from those listed in **Table 30**.

Table 30 Typical Pasture Species and Application Rates

Species	Autumn Sowing Rate (kg/ha)	Spring Sowing Rate (kg/ha)
Exotic Species		
Wimmera Rye	5	N/A
Siroso Phalaris	5	N/A
Lucerne	4	4
Sephi Medic	3	N/A
Haifa White Clover	3	N/A
Seaton White Clover	2	4
Kikuyu *	4	4
Setaria (Kazungula)	4	3
Woolly Pod Vetch	N/A	4
Couch (hulled)	N/A	1
Green Panic	N/A	3
Native Species		Grassy Mix (kg/ha)

Species		Autumn Sowing Rate (kg/ha)	Spring Sowing Rate (kg/ha)
Grasses primary colonising	<i>Austrostipa densiflora</i> , <i>Austrostipa scabra</i> , <i>Bothriochloa macra</i> , <i>Chloris truncata</i> , <i>Digitaria brownii</i> , <i>Elymus scaber</i> , <i>Panicum effusum</i>		6
Grasses long term understorey	<i>Aristida ramosa</i> , <i>Austrodanthonia fulva</i> , <i>Austrodanthonia setacea</i> , <i>Austrostipa ramosissima</i> , <i>Bothriochloa decipiens</i> , <i>Capillipedium spicigerum</i> , <i>Chloris ventricosa</i> , <i>Cymbopogon refractus</i> , <i>Dicanthium sericeum</i> , <i>Dichelachne crinita</i> , <i>Eragrostis leptostachya</i> , <i>Poa labillardieri</i> , <i>Sporobolus creber</i> , <i>Themeda triandra</i>		10.5
Native Species			Grassy Mix (kg/ha)
Grasses long term understorey shade tolerant	<i>Austrostipa verticillata</i> , <i>Aristida vagans</i> , <i>Dichelachne micrantha</i> , <i>Echinopogon caespitosus</i> , <i>Echinopogon intermedius</i> , <i>Echinopogon ovatus</i> , <i>Entolasia stricta</i> , <i>Imperata cylindrica</i> , <i>Joycea pallida</i> , <i>Microleana stipoides</i> , <i>Oplismenus aemulus</i>		1.5

* Mainly in drainage areas.

7.8.2 Woodland Rehabilitation

Native woodland rehabilitation within HVO North, 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;
- Rehabilitate 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 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 developed in accordance with **Table 31**. 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.

Table 31 lists the pool of about 130 species from which any given mix of 40-60 species will be selected. The list is compiled from previous studies undertaken for HVO North as well as the vegetation lists for locally mapped communities. It is not an exhaustive list of species recorded from these communities and will be further refined over time.

As outlined in **Section 6**, the requirement to rehabilitate to these vegetation communities is specific to HVO North and Mount Thorley Warkworth mines. In 2019, HVO North will implement a new rehabilitation monitoring program that will capture data for suitable reference sites in a commensurate woodland vegetation community. The woodland rehabilitation criteria outlined within this MOP will continue to be refined during the MOP term as suitable data becomes available. This may also result in further refinements to the HVO North woodland seed mix.

Table 31 Rehabilitation Woodland Species Options and Numbers

Category	Woodland Mix (Min. no. species/ genera)	Pasture/ Light Woodland Mix (Min. no. species/ genera)	Reference List / Species Pool
Trees			
Dominant tall trees	3 species / 1 genera	3 species / 1 genera	<i>Eucalyptus crebra</i> , <i>Eucalyptus fibrosa</i> , <i>Eucalyptus moluccana</i> , <i>Corymbia maculata</i>
Sub-dominant tall trees	2 species / 1 genera	1 species / 1 genera	<i>Angophora floribunda</i> , <i>Eucalyptus dawsonii</i> , <i>Eucalyptus glaucina</i> , <i>Eucalyptus punctata</i> , <i>Eucalyptus tereticornis</i>
Small trees nitrogen fixing	2 species / 1 genera	1 species / 1 genera	<i>Acacia implexa</i> , <i>Acacia parvipinnula</i> , <i>Acacia salicina</i> , <i>Allocasuarina leuhmanii</i> , <i>Allocasuarina littoralis</i>
Small trees non-nitrogen fixing	1 species / 1 genera	1 species / 1 genera	<i>Brachychiton populneus</i> , <i>Callitris endlicheri</i> , <i>Geijera parviflora</i> , <i>Notelaea microcarpa</i>
Shrubs			
Primary colonising and/or short lived Acacias	1 species / 1 genera	1 species / 1 genera	<i>Acacia cultriformis</i> , <i>Acacia falcata</i> , <i>Acacia leiocalyx</i>
Long lived and/or understory Acacias	2 species / 1 genera	2 species / 1 genera	<i>Acacia amblygona</i> , <i>Acacia brownii</i> , <i>Acacia decora</i> , <i>Acacia paradoxa</i> , <i>Acacia pravifolia</i>
Nitrogen fixing shrubs-non-Acacias (<i>Fabaceae</i> family)	3 species / 2 genera	2 species / 1 genera	<i>Daviesia genistifolia</i> , <i>Daviesia ulicifolia</i> , <i>Hardenbergia violacea</i> , <i>Indigofera australis</i> , <i>Jacksonia scoparia</i> , <i>Podolobium ilicifolium</i> , <i>Pultenaea microphylla</i> , <i>Pultenaea spinosa</i>
Non-nitrogen fixing shrubs	4 species / 3 genera	N/A	<i>Breynia oblongifolia</i> , <i>Cassinia aculeata</i> , <i>Cassinia arcuata</i> , <i>Cassinia quinquefaria</i> , <i>Clematis glycinoides</i> , <i>Dodonaea viscosa</i> , <i>Hakea sericea</i> , <i>Melaleuca decora</i> , <i>Melaleuca nodosa</i> , <i>Melichrus urceolatus</i> , <i>Myoporum montanum</i> , <i>Olearia elliptica</i> , <i>Ozothamnus diosmifolius</i> , <i>Pandorea pandorana</i>
Subshrubs			
Subshrubs	2 species / 1 genera	N/A	<i>Einadia hastata</i> , <i>Einadia nutans</i> , <i>Einadia trigonos</i> , <i>Enchylaena tomentosa</i> , <i>Eremophila debilis</i> , <i>Hibbertia obtusifolia</i> , <i>Hovea linearis</i> , <i>Solanum cinereum</i> , <i>Solanum prinophyllum</i>
Forbs			

Category	Woodland Mix (Min. no. species/ genera)	Pasture/ Light Woodland Mix (Min. no. species/ genera)	Reference List / Species Pool
Forbs	5 species / 4 genera	1 species / 1 genera	<i>Ajuga australis</i> , <i>Arthropodium milleflorum</i> , <i>Arthropodium minus</i> , <i>Asperula conferta</i> , <i>Caesia parviflora</i> , <i>Calotis cuneata</i> , <i>Calotis lappulacea</i> , <i>Chrysocephalum apiculatum</i> , <i>Commelina cyanea</i> , <i>Desmodium brachypodum</i> , <i>Dichondra repens</i> , <i>Glycine clandestina</i> , <i>Glycine tabacina</i> , <i>Hypericum gramineum</i> , <i>Mentha satyroides</i> , <i>Podolepis neglecta</i> , <i>Pomax umbellata</i> , <i>Sida corrugata</i> , <i>Swainsona galegifolia</i> , <i>Vittadinia cuneata</i> , <i>Vittadinia sulcata</i> , <i>Wahlenbergia communis</i> , <i>Wahlenbergia gracilis</i> , <i>Wahlenbergia stricta</i>
Grasses			
Grasses primary colonising	4 species / 3 genera	4 species / 3 genera	<i>Austrostipa densiflora</i> , <i>Austrostipa scabra</i> , <i>Bothriochloa macra</i> , <i>Chloris truncata</i> , <i>Digitaria brownii</i> , <i>Elymus scaber</i> , <i>Panicum effusum</i>
Grasses long term understorey	4 species / 3 genera	4 species / 3 genera	<i>Aristida ramosa</i> , <i>Austrodanthonia fulva</i> , <i>Austrodanthonia setacea</i> , <i>Austrostipa ramosissima</i> , <i>Bothriochloa decipiens</i> , <i>Capillipedium spicigerum</i> , <i>Chloris ventricosa</i> , <i>Cymbopogon refractus</i> , <i>Dicanthium sericeum</i> , <i>Dichelachne crinita</i> , <i>Eragrostis leptostachya</i> , <i>Poa labillardieri</i> , <i>Sporobolus creber</i> , <i>Themeda triandra</i>
Grasses long term understorey shade tolerant	3 species / 3 genera	1 species / 1 genera	<i>Austrostipa verticillata</i> , <i>Aristida vagans</i> , <i>Dichelachne micrantha</i> , <i>Echinopogon caespitosus</i> , <i>Echinopogon intermedius</i> , <i>Echinopogon ovatus</i> , <i>Entolasia stricta</i> , <i>Imperata cylindrica</i> , <i>Joycea pallida</i> , <i>Microleana stipoides</i> , <i>Oplismenus aemulus</i>
Mono			
	3 species / 2 genera	2 species / 1 genera	<i>Carex fascicularis</i> , <i>Cyperus gracilis</i> , <i>Dianella caerulea</i> , <i>Dianella revoluta</i> , <i>Dianella longifolia</i> , <i>Fimbristylis dichotoma</i> , <i>Gahnia aspera</i> , <i>Lepidosperma laterale</i> , <i>Lomandra confertifolia</i> , <i>Lomandra filiformis</i> , <i>Lomandra longifolia</i> , <i>Lomandra multiflorus</i>

Recommended quantities of seed to establish woodland and light woodland areas are provided in **Table 32**.

Table 32 Seed Quantities

	Woodland Mix (kg/ha)	Pasture / Light Woodland Mix (kg/ha)
Trees		
Dominant tall trees	0.4	0.1
Sub-dominant tall trees	0.1	0.05
Small trees- nitrogen fixing	0.25	0.2
Small trees- non-nitrogen fixing	0.25	0.05
<i>Trees total</i>	1.0	0.4
Shrubs		
Primary colonising and/or short lived Acacias	0.5	0.25
Long lived and/or understory Acacias	0.5	0.25
Nitrogen fixing shrubs-non-Acacias (Fabaceae family)	0.75	0.25
Non-nitrogen fixing shrubs	0.75	0
<i>Shrubs total</i>	2.5	0.75
Subshrubs		
<i>Subshrubs total</i>	0.5	0
Forbs		
<i>Forbs total</i>	0.5	0
Grasses		
Grasses primary coloniser	5.0	5.0
Grasses long term understorey	5.5	10.5
Grasses long term understorey shade tolerant	1.5	1.5
<i>Grasses total</i>	12.0	17.0
Monocots (Other than Grasses)		
<i>Monocots (other than grasses) total</i>	0.5	0.25
Total	17.0	18.5

7.9 Rehabilitation Maintenance

On 3 October 2018, the RR issued a Notice under Section 240(1)(c) of the *Mining Act 1992* (Section 240 Notice). The Section 240 Notice related to the unsatisfactory establishment of target vegetation species and the unsatisfactory weed presence at rehabilitation areas at HVO North and HVO South.

The RR stated the following issues must be addressed:

- Unsatisfactory establishment of target vegetation species at woodland and pasture rehabilitation areas, including (but not necessarily limited to):
 - HVORIV201403 – HVO South;
 - HVORIV201404 – HVO South;
 - HVORIV201405 – HVO South;
 - HVOCHE201201 – HVO South; and
 - HVOWES201601 – HVO North.
- Unsatisfactory weed presence at woodland and pasture rehabilitation areas, including (but not necessarily limited to):
 - HVORIV201402 – HVO South;
 - HVORIV201403 – HVO South;
 - HVORIV201501 – HVO South;
 - HVORIV201503 – HVO South;
 - HVOWES201604 – HVO North;
 - HVOLEM201601 – HVO South;
 - HVOCAR200902 – HVO North;
 - HVORIV201401 – HVO South; and
 - HVOWES201601 – HVO North.

Note: the Section 240 Notice incorrectly referenced HVORIV201604 instead of HVOWES201604 and HVORIV201601 instead of HVOLEM201601.

Cumberland Plain Seeds (CPS) were engaged by HVO to undertake an assessment of mine rehabilitation quality at HVO North and HVO South. The report assessed the key issues associated with the rehabilitation areas identified in the Section 240 Notice and provided recommendations to improve the quality of the rehabilitation.

Table 33 summarises the proposed rehabilitation maintenance to be undertaken at HVO North. Additional detail regarding planned rehabilitation maintenance and identified issues are provided in **Appendix E**.

Table 33 Rehabilitation Maintenance at HVO North

Site Name	Key Issues	Recommendation
HVOWES201601	<ul style="list-style-type: none"> • Soil issues. • Poor plant health and growth. • Threatening weeds present in significant density. 	<ul style="list-style-type: none"> • Investigate soil issues and ameliorate as necessary. • Control Galenia (spot spraying). Aerate to prepare a seed bed and stimulate germination of natives. • Three seeding options include: <ol style="list-style-type: none"> 1. Oversow with native seed mix. 2. Sow only chenopods, trees and shrubs to enable treatment of grass weeds with selective herbicide, then following 1-2 seasons of weed control sow grasses. 3. Spray out entire block, prepare seedbed and resow either entire suite of natives or staged native sowing such as grasses and herbs only, followed by trees and shrubs as required.
HVOWES201604	<ul style="list-style-type: none"> • Stable native vegetation with good grass cover, low shrub and tree diversity and low stem density. • Some threat from weeds. 	<ul style="list-style-type: none"> • Following soil analysis, build on existing native vegetation to increase diversity and cover. • Control weed threats.
HVOCAR200902	<ul style="list-style-type: none"> • Well established canopy but stem density too high for continued success. • Under storey and ground layer have low diversity dominated by threatening weeds (Green Panic). • Contour banks and swales without significant native cover. 	<ul style="list-style-type: none"> • Thin Eucalypts using mechanical means or fire. • Control weed threats. • Increase shrub layer diversity (fire would stimulate Acacia germination). • Increase shrub and ground layer diversity with soil disturbance and sowing.

8 Rehabilitation Monitoring and Research

8.1 Rehabilitation Monitoring

The rehabilitation monitoring program outlined in the *19 February 2016 to 30 November 2018 HVO North MOP* was collectively established for HVO North, HVO South and Mount Thorley Warkworth mines. The program was designed to reflect the requirement of HVO North and Mount Thorley Warkworth to rehabilitate 2,118 ha to a vegetation community consistent with the Central Hunter Grey Box-Ironbark Woodland and Central Hunter Ironbark-Spotted Gum-Grey Box Forest EECs. All analogue sites for this rehabilitation monitoring program were established within EECs. HVO North must rehabilitate the site to pasture and woodland communities with only 4 ha of EEC to be rehabilitated (if triggered). Accordingly, suitable analogue sites need to be established in commensurate areas to allow the development of site specific criteria. This approach was discussed with the RR during a meeting 24 October 2019 and it was agreed that a new HVO North rehabilitation monitoring program would be developed.

The proposed rehabilitation monitoring program will commence in spring 2019 and will:

- Continue monitoring existing rehabilitation sites (refer **Figure 4**);
- Establish pasture rehabilitation monitoring sites; and
- Establish HVO North woodland and pasture analogue sites.

Sections 8.1.1 – 8.1.7 provide an overview of the rehabilitation monitoring methodology implemented at HVO North in 2018. It is proposed that a similar methodology will be implemented during the MOP term to ensure data continuity; however options to improve the effectiveness of the program will be investigated. This may include but will not be limited to use of new technology such as drones to support traditional transects.

8.1.1 Methodology

The monitoring methodology implemented at HVO North in 2018 is largely consistent with the methodology detailed in *Monitoring Methodology - Post-mined Lands MTW and HVO North Mine Sites* (AECOM 2012).

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

- LFA;
- Accredited soil analysis and various measures of ecosystem diversity and habitat values;
- Canopy Development;
- Biobanking - Site Value Scores;
- Visual Inspections; and
- Photographic Monitoring.

This combination of approaches allows a site to be assessed over time with the resultant data enabling the user to assess the trajectory of the ecosystem being monitored whilst also providing an overall assessment of land capability. This data can be used to decide if the site is converging on a target functional state or requires further works. An overview of the monitoring methodology is provided below.

8.1.2 LFA Methodology

LFA is a monitoring procedure developed by the CSIRO (Tongway and Hindley 2004) that uses rapidly acquired field-assessed indicators to assess the biogeochemical functioning of landscapes at the hillslope scale. It provides a rapid, reliable, and easily applied method for assessing and monitoring landscape restoration or rehabilitation projects. LFA examines the way physical and biological resources are acquired, used, cycled and lost from a landscape.

Soil Surface Condition Indicators (SSCIs) focusing on the measurement of specific biological and/or physical processes are used to calculate three LFA indices – soil stability, soil infiltration and nutrient cycling. The three indices have scores of 0 to 100, which represent the ecosystem function of the area. These scores provide quantitative measures that may be used to compare rehabilitated areas with reference sites throughout the course of a monitoring program.

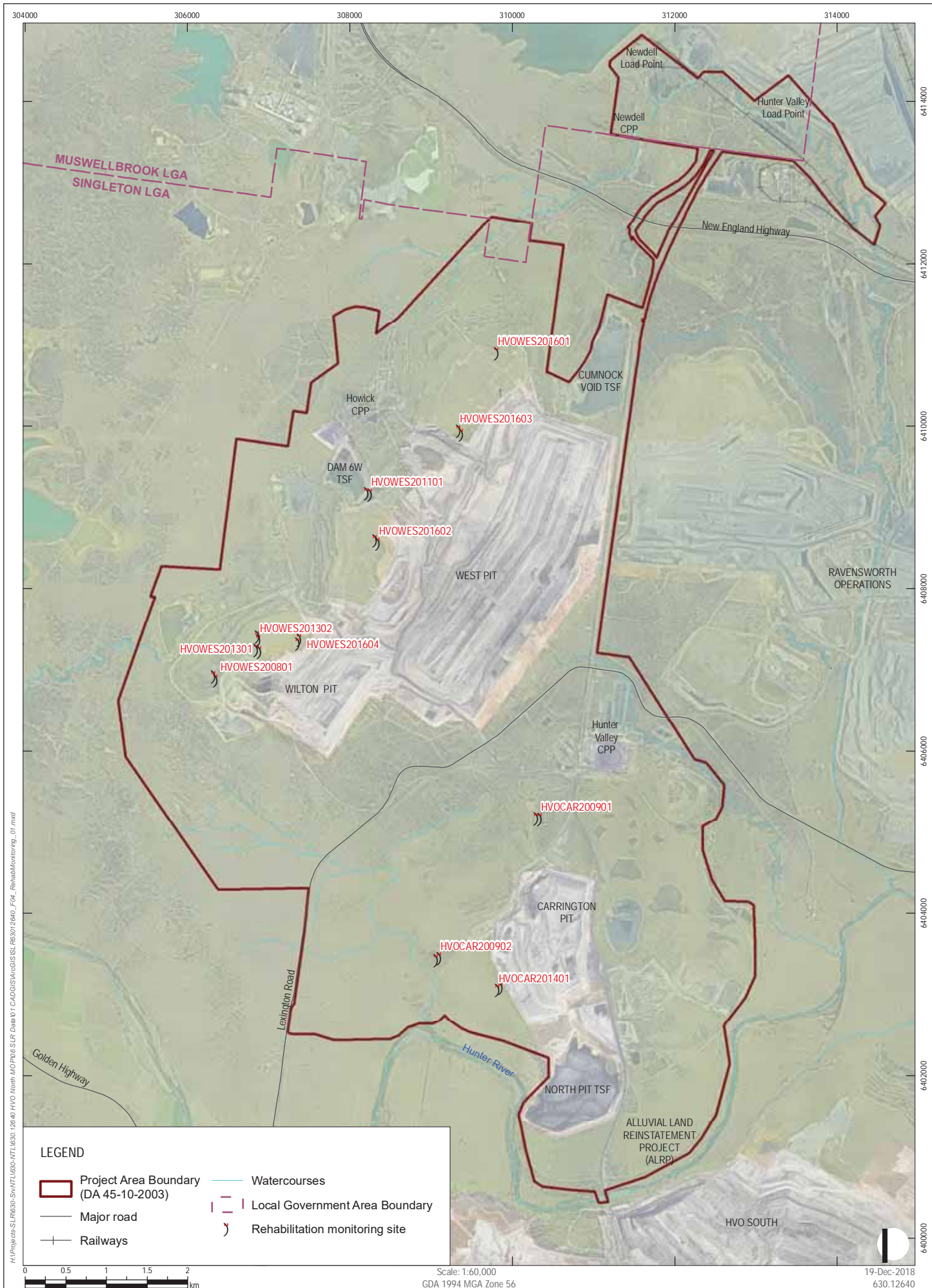
An LFA plot and transect is completed at each rehabilitation and reference site.

8.1.3 Soil Analysis

Soil characterisation and analysis is performed to determine the physical and chemical properties of the growing media. Soil samples are collected from all monitoring sites (rehabilitation and reference sites). A composite sample, consisting of a minimum of nine sub-samples collected 10 m to 15 m apart, are collected within a 20 m radius. The radius is based on a central point 5 m in from the 20 m quadrat tape. All samples are placed in a bucket, and are mixed. The sample is then placed in a plastic bag, labelled, and sent for analysis.

The following soil parameters are tested:

- pH;
- Electrical conductivity (EC);
- Cation balance;
- Sodidity;
- Soil organic matter content; and
- Soil texture including clay content.



8.1.4 Canopy Development

To understand the adequacy of canopy development at rehabilitation sites in terms of species diversity, stem density, size and habitat values, two additional assessment techniques were introduced.

One captures the adequacy of canopy recruitment, whilst the other captures canopy development and maturity:

- Introduction of stem density counts along two, 2 m strips along the length of the 50 m centre tape. The number and species of each individual canopy tree was counted. Where individuals could not be identified to species level, they were identified to genus.
- Information pertaining to canopy development; diversity and density, average trunk diameter, condition of the tree population, and percent of the endemic canopy with reproductive structures. This was undertaken in the nested 20 m x 20 m plot and each tree labelled with a metal tree tag or flagging tape with an ID number to allow for follow-up monitoring. Trees with a DBH less than 5 cm were not included in the count.

8.1.5 BioBanking

The NSW Biodiversity Banking and Offsets Scheme – known as ‘BioBanking’ was introduced by the NSW government in 2008. The BioBanking Assessment Methodology (BAM) assesses biodiversity values. These values include the composition, structure and function of ecosystems. They also include (but are not limited to) threatened species, threatened populations and threatened ecological communities, and their habitats.

AECOM (2012) refers to the use of ‘site value’ to provide a quantitative measure of the condition of the vegetation within each rehabilitation area. The site value for a particular zone is calculated based on quantitative measures of ten site attributes which are measured along a transect and within a survey plot, and assessed against benchmark values (refer **Table 34**). A minimum number of plots are required based on the area of the site being assessed. It was thought to be more valuable to present results for each of the BioBanking criteria rather than just the site value score. In accordance with the relevant MOP performance criteria, the results for rehabilitation areas are compared to reference site benchmarks.

Table 34 BioBanking Assessment Value Scores

Attribute	Explanation
Native plant species richness (NPS)	Number of native species recorded within a nested 20 m x 20 m quadrat.
Native over-storey % cover (NOS)	Recorded at 5 m intervals along a 50 m tape
Native mid-storey % cover (NMS)	Recorded at 5 m intervals along a 50 m tape
Native ground cover (grass) % cover (NGCG)	Recorded at 1 m intervals along a 50 m tape
Native ground cover (other) % cover (NGCO)	Recorded at 1 m intervals along a 50 m tape
Native ground cover (shrubs) % cover (NGCS)	Recorded at 1 m intervals along a 50 m tape
Exotic plant cover % cover (EPC)	Recorded at 1 m intervals along a 50 m tape

Attribute	Explanation
Overstorey regeneration	Regeneration is measured as the proportion of over-storey species present in the zone that are regenerating (i.e. with diameter at breast height < 5 cm). For example, if there are three tree species present in the zone but only one of these species is regenerating, then the value is 0.33. The maximum value for this measure is 1.
Fallen logs (m) Length of logs (m) (FL)	Total length of logs recorded within the 20 m x 50 m quadrat. To be eligible for inclusion, logs must be >10 cm diameter and longer than 50 cm.
Number of trees with hollows (NTH)	Number of trees with hollows within the 20 m x 50 m quadrat.

8.1.6 Visual Inspections

Species Composition

The dominant species present in the monitoring area are identified to obtain a 'picture' of the species composition. In rehabilitation areas, this allowed confirmation that the species establishing conformed to the target vegetation types being re-established.

Additionally, notes are made on the general health and sustainability of vegetation as indicated by presence/absence of flowering/fruited adult plants. The presence of plants at reproductive stage is an indication that the ecosystem is recruiting and, as such, capable of self-regeneration.

Habitat and Fauna Monitoring

Artificial habitat features installed throughout the site as part of the rehabilitation activities (e.g. stag trees) are recorded.

Notes are also made on the presence and extent of habitat features such as free standing water, coarse woody debris, rocks, mistletoes and whether plants were flowering or fruiting.

Disturbance Monitoring

Disturbance monitoring is undertaken using the visual monitoring tool developed by AECOM (2012). This technique is a field-based, rapid assessment tool to visually assess and award a score to various contributors. The objective of this monitoring is to identify factors and processes that occur at the landscape/catchment scale and have the potential to impact on the monitoring site. The disturbance monitoring aims to cover those aspects that are not adequately covered in the BioBanking and LFA monitoring tools. The following disturbance categories (and associated disturbance factors) are monitored and assessed at each site:

- Disturbance related to mining activities, including:
 - Evidence of wheeled vehicles, tracked vehicles and foot disturbance;
 - Excavation; and
 - Presence of mine rubbish;
- Disturbance related to non-mining activities, including:
 - Evidence of grazing;
 - Presence of animal pads;
- Presence of exotic weeds and feral animal species;

- Presence of domestic litter/rubbish;
- Fire disturbance;
- Evidence of nearby maintenance activities (i.e. chemical treatments, fencing, earthworks);
- Surface stability and erosion issues, including:
 - Eroding factor (i.e. wind, water); and
 - Erosion type (i.e. sheet, rill/gully, pedestal, terracette, scalding).

8.1.7 Photographic Monitoring

Photographic monitoring is a simple and useful tool that allows for direct visual comparison of a specific site between monitoring events. Digital photographs are taken at the start and finish transect points at each monitoring site. This included:

- A photograph with the tape (and star picket) in the centre of the frame
- Photograph to the left and right of the centre tape.

8.2 Research and Rehabilitation Trials and Use of Analogue Sites

Key learnings from previous rehabilitation trials and studies at HVO will be incorporated into rehabilitation planning during the MOP term, including landform design, grazing trials, seed mixes and the use of ameliorants. Rehabilitation trials continue at HVO South and other Glencore operations in the Hunter Valley, with this information to be shared across Glencore operations.

9 Intervention and Adaptive Management

Where rehabilitation monitoring indicates that rehabilitation outcomes are not trending toward the nominated completion criteria, HVO North 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.

9.1 Threats to Rehabilitation

Where rehabilitation performance is not trending to the nominated completion criteria this may indicate that there is a threat to long term rehabilitation success. Threats to rehabilitation may include events such as periods of drought, bushfire events, or pressures from weeds and feral animals.

Sections 3.2 and **3.3** provide examples of key threats to rehabilitation. Where rehabilitation monitoring indicates that there is a significant threat to rehabilitation, HVO North will undertake adaptive management in accordance with the TARP (refer **Section 9.2**).

9.2 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 developed during the preparation of the MOP and the rehabilitation monitoring program. Monitoring of the TARP will be undertaken as outlined in the rehabilitation monitoring program (refer **Section 8.1**). The rehabilitation monitoring program will trigger response actions, as specified in the TARP to ensure that threats to rehabilitation do not become unmanageable.

The TARP is provided as **Table 35**, and will be reviewed and may be revised as conditions at HVO North change or new threats to rehabilitation are identified.

Table 35 Trigger Action Response Plan

Aspect/ Category	Key Element	Trigger Response	Condition Green	Condition Amber	Condition Red
Landform stability	Slope gradient	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°.
		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.
	Erosion control	Trigger	No gully or tunnel erosion present.	Minor gully or tunnel erosion present and/or rilling <300 mm deep.	Significant gully or tunnel erosion present and/or rilling >300 mm deep.
		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.

Aspect/ Category	Key Element	Trigger Response	Condition Green	Condition Amber	Condition Red
	Drainage Condition	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.
		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.
Water Quality	Monitoring parameters	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.
		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	Monitoring parameters	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.
		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.

Aspect/ Category	Key Element	Trigger Response	Condition Green	Condition Amber	Condition Red
Vegetation (Woodland)	Surface cover	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 60% in rehabilitated areas.	Five years following revegetation to woodland, total ground cover (vegetation, leaf litter, mulch) is a minimum of 50% within rehabilitated areas.
		Response	No response required. Continue monitoring program.	Review rehabilitation procedures where required to increase vegetation cover. Assess opportunities for corrective actions as appropriate.	A suitably trained person to inspect the site. Investigate use of appropriate management options to remediate. Remediate as appropriate.
Vegetation (Pasture)	Surface cover	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 within 20-40% 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.	Review procedures where required to increase vegetation cover.	An inspection of the site will be undertaken by a suitably trained person. Investigate use of appropriate management options to remediate. Remediate as appropriate.
	Weed presence	Trigger	Twelve months following revegetation, no significant weed infestations present.	Twelve months following revegetation, >25% but <50% cover of undesirable species present.	Twelve months following revegetation, >50% cover of undesirable species present.
		Response	No response required. Continue routine maintenance and monitoring program.	Review monitoring report to identify the nature of the weeds present and recommendations from monitoring report. Undertake weed control to remove noxious and problematic weeds if required.	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.

Aspect/ Category	Key Element	Trigger Response	Condition Green	Condition Amber	Condition Red
	Species composition	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.	Five years following revegetation to woodland, native tree and shrub species composition comprises <50% species diversity of reference sites
		Response	No response required. Continue monitoring program.	Review rehabilitation records to identify possible causal factors. Review native seed mix and amend if necessary. Consider remedial actions such as tubestock planting or re-seeding to achieve required species composition.	An inspection of the site will be undertaken by a suitably trained person. Investigate remedial options to achieve required species composition.
Vegetation	Species composition	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, <75% 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 <50% appropriate to the district and recognised as suitable for beef cattle grazing
		Response	No response required. Continue monitoring program.	Investigate additional weeding and re-seeding where required and ensure seed mix utilised is consistent with desired species composition.	An inspection of the site will be undertaken by a suitably trained person. Investigate remedial options to achieve required species composition.
Biodiversity	Habitat Corridors	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 not 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.
		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.

Aspect/ Category	Key Element	Trigger Response	Condition Green	Condition Amber	Condition Red
Topsoil Availability	Topsoil Quantity	Trigger	Sufficient topsoil identified for rehabilitation over the MOP term and for 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 MOP term.
		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	Fuel Load	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.
		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.
Tailings	Inadequate capping	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.
		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.

Aspect/ Category	Key Element	Trigger Response	Condition Green	Condition Amber	Condition Red
Groundwater	Void water balance	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.
		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.

9.3 Continual Improvement and Adaptive Management

HVO manages environment and community aspects, impacts and performance in accordance with the *Hunter Valley Operations Environmental Management Strategy* (EMS). This document provides an overview of the EMS implementation, which ensures that the operations at HVO North are undertaken in accordance with relevant policies, standards, licences and approvals.

The HVO EMS has been developed generally in accordance with the ISO 14001 environmental management framework. The ISO 14001 framework requires the following:

- Commitment and leadership;
- Planning and policy;
- Implementation;
- Measurement and evaluation; and
- Review and improvement.

10 Reporting

10.1 Annual Review

The Annual Review, which is submitted to relevant government agencies and made publically available on the HVO website (<https://insite.hvo.com.au/>), reports on the following information relating to rehabilitation:

- An overview of rehabilitation undertaken each year;
- Overview of adaptive management and key learnings from rehabilitation;
- Results of annual rehabilitation inspections and monitoring;
- Outcomes of the annual ecological monitoring; and
- Progress against the projected rehabilitation in the approved MOP.

10.2 Incident Reporting

Incidents will be reported in accordance with relevant mining leases and Schedule 5, Condition 7 of DA 450-10-2003 which states that HVO North must immediately notify the Secretary and any other relevant agencies of any incident. Within 7 days of the date of the incident, HVO North must provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.

Non compliances and incidents will be reported within the Annual Review and (if relevant) the EPL Annual Return. If an incident causes or threatens serious environmental harm, then incident management and reporting will be completed as per the *Pollution Incident Response Management Plan*.

11 Plans

HVO North is classified as a Level 1 Mine, and therefore the following Plans have been prepared:

- Plans 1A – 1C show the location and pre-mining natural and physical environment of HVO North;
- Plan 2 shows the mine domains and mining features at commencement of the MOP term;
- Plans 3A – 3C are a series of Plans which show the annual sequence of mining and rehabilitation activities over the MOP term;
- Plan 4 shows the proposed post mining land use and landform (following the cessation of mining operations); and
- Plan 5 shows vertical and longitudinal cross sections.

These Plans are contained in **Appendix C**.

12 Review and Implementation of the MOP

12.1 Review of the MOP

This section provides the protocol for periodic review of this MOP. Reviews are conducted to assess the effectiveness of the procedures against the objectives of this MOP. The MOP may be reviewed, and if necessary revised, following the submission of the following:

- Annual Review;
- Incident report;
- Audit; or
- Any modification to the conditions of the Development Consent.

This MOP 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
- Change in the activities or operations.

Prior to completing any amendment to the MOP, HVO North will liaise with DPE to confirm the requirements for submission and consultation (in accordance with Schedule 5, Condition 3 of DA 450-10-2003). Following any amendments, a copy of the revised MOP will be provided to the DPE for approval.

Any major amendments to the MOP that affect its application will be undertaken in consultation with the appropriate regulatory authorities and stakeholders. Any amendments would be completed in accordance with the latest RR guidelines.

12.2 Implementation

Table 36 defines the personnel who are responsible for the monitoring, review and implementation of this MOP.

Table 36 Responsibilities for Implementation of this MOP

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; Construct landforms in accordance with this MOP; and Develop mine plans to allow for progressive rehabilitation of mined land.
Technical Service Manager	<ul style="list-style-type: none"> Implement the procedures referenced in this MOP; Undertake training in relevant Management Plans and procedures as required; Provide resources required to implement these procedures; 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.

13 References

- AECOM (2012) *Monitoring Methodology - Post-mined Lands MTW and HVO North Mine Sites*
- AECOM (2015) *Rehabilitation Monitoring – Grasslands/Pasture Lands*
- Andrews Neil Architects Planners (1999) *Synoptic Plan: Integrated landscapes for coal mine rehabilitation in the Hunter Valley of NSW*
- ATC Williams (2018) *Life of Mine Fine Reject Management Strategy*
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- Australian Mining Industry Council (1990) *Mine Rehabilitation Handbook, Australian Mining Industry Council, Dickson ACT*
- Central West Catchment Management Authority (2008) *Land classifications of the Central West*
- CSIRO (2008) *Ephemeral Stream Assessment*
- Department of Planning and Environment – Resources Regulator (2013) *ESG3: Mining Operations Plan Guidelines, September 2013 Guideline*
- Department of Planning and Environment – Resources Regulator (2015) *ESG5: Assessment Requirements for Exploration Activities*
- EMM (2010) *Carrington West Wing Environmental Assessment*
- EMM (2016) *Hunter Valley Operations North – Modification 6*
- EMGA Mitchell McLennan (2010) *Carrington West Wing – Environmental Assessment*
- ERM (2003) *Hunter Valley Operations – West Pit Extension and Minor Modifications EIS*
- ERM (2005) *Carrington Pit Extended – Statement of Environmental Effect*
- GSS Environmental (2010) *Soil Survey and Land Resource Assessment*
- Hannan J.C (1995) *Mine rehabilitation: a handbook for the coal mining industry*
- Landcom (2004) *'Blue Book': Managing Urban Stormwater: soils and construction (Volume 1 and 2E – Mines and Quarries)*
- Nichols, O.G. (2005) *Development of rehabilitation completion criteria for native ecosystem establishment on mineral mines in the Hunter Valley*. Australian Centre for Minerals Extension and Research. ACARP Project No. C13048, Queensland
- Office of Environment and Heritage (2012) *Land and Soil Capability Assessment Scheme*
- Tongway, D.J. and Hindley, N.L. (1996) *Rehabilitation of semi-arid landscapes in Australia*

Tongway, D.J. and Hindley, N.L. (2004) *Landscape Function Analysis: Procedure for Monitoring and Assessing Landscapes, with special reference to Minesites and Rangelands*, CSIRO Australia, Canberra

Umwelt (2010) *HVO River Red Gum Rehabilitation and Restoration Strategy*

APPENDIX A

Development Consent DA 450-10-2003

Development Consent

Section 80 of the *Environmental Planning and Assessment Act 1979*

I, the Minister for Infrastructure, Planning and Natural Resources, approve the Development Application referred to in schedule 1, subject to the conditions in schedules 3 to 6.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the on-going environmental management of the development.

Craig Knowles MP
Minister for Infrastructure and Planning
Minister for Natural Resources

Sydney,

2004

File No: S02/02690

SCHEDULE 1

Development Application:	DA 450-10-2003.
Applicant:	Coal & Allied Operations Pty Ltd.
Consent Authority:	Minister for Infrastructure and Planning.
Land:	See Appendix 1.
Proposed Development:	<p>The extension of open cut coal mine operations at the West Pit of Hunter Valley Operations in general accordance with the Environmental Impact Statement for the <i>Hunter Valley Operations - West Pit Extension and Minor Modifications</i>, which includes:</p> <ul style="list-style-type: none">• extending open cut mining operations to the east of currently approved development;• using existing mining methods and equipment;• using existing coal preparation facilities at the West Pit to process up to 6 million tonnes per annum (Mtpa) of coal and use of related coal reject disposal facilities;• continuing coal production at the rate of 12 Mtpa at West Pit;• increasing the approved production capacity of the Carrington Pit from 6 Mtpa to 10 Mtpa;• increasing approved coal haulage from mining areas south of the Hunter River to the Hunter Valley Coal Preparation Plant from 8 Mtpa to 16 Mtpa;• upgrading the capacity of the Hunter Valley Coal Preparation Plant from 13 Mtpa to 20 Mtpa;• upgrading the Belt Line Conveyor from the Hunter Valley Coal Preparation Plant to the Hunter Valley Loading Point;• constructing a conveyor between the Hunter Valley Loading Point and the Newdell Loading Point;• hauling coal, on an intermittent basis, between the Hunter Valley Loading Point and Newdell Loading Point and the Ravensworth Coal Terminal;• hauling coal, on an intermittent basis, between the Hunter Valley Coal Preparation Plant and the Hunter Valley Loading Point along a private haul road;

- moving coal and coal rejects between mining areas and facilities of the Hunter Valley Operations, including mining areas and facilities located south of the Hunter River;
- constructing temporary crossings of the Hunter River to allow the relocation of heavy mining equipment; and
- consolidating 15 existing development approvals, applying to Hunter Valley Operations north of the Hunter River, into a single consent.

State Significant Development:

The proposal is classified as State significant development, under section 76A(7) of the *Environmental Planning and Assessment Act 1979*, because it involves coal-mining related development that requires a new mining lease under section 63 of the *Mining Act 1992*.

Integrated Development:

The proposal is classified as integrated development, under section 91 of the *Environmental Planning and Assessment Act 1979*, because it requires additional approvals under the:

- *Protection of the Environment Operations Act 1997*;
- *National Parks and Wildlife Act 1974*;
- *Water Act 1912*;
- *Rivers and Foreshores Improvement Act 1948*;
- *Roads Act 1993*; and
- *Mine Subsidence Compensation Act 1961*.

Designated Development:

The proposal is classified as designated development, under section 77A of the *Environmental Planning and Assessment Act 1979*, because it is for a coal mine that would “produce or process more than 500 tonnes of coal a day”, and consequently meets the criteria for designated development in schedule 3 of the *Environmental Planning and Assessment Regulation 2000*.

BCA Classification:

Class 10b: Coal conveyor

Note:

- 1) To find out when this consent becomes effective, see section 83 of the *Environmental Planning and Assessment Act 1979* (EP&A Act);
- 2) To find out when this consent is liable to lapse, see section 95 of the EP&A Act; and
- 3) To find out about appeal rights, see section 97 of the EP&A Act.

Red type represents August 2005 modification
 Blue type represents June 2006 modification
 Green type represents March 2013 modification
 Light blue type represents January 2014 modification
 Orange type represents December 2016 modification
 Navy type represents January 2017 modification
 Purple type represents July 2017 modification

DEFINITIONS

Annual Review	The review required by condition 9 of Schedule 6
Applicant	Coal & Allied Operations Pty Ltd
ARTC	Australian Rail Track Corporation
BCA	Building Code of Australia
Bore	Any bore or well or excavation or other work connected or proposed to be connected with sources of sub-surface water, and used or proposed to be used or capable of being used to obtain supplies of such water whether the water flows naturally at all times or has to be raised whether wholly or at times by pumping or other artificial means
CCC	Community Consultative Committee
Council	Singleton Shire Council
DA	Development Application
Day	Day is defined as the period from 7am to 6pm on Monday to Saturday, and 8am to 6pm on Sundays and Public Holidays
Department	Department of Planning and Environment
DPI	Department of Primary Industries
DPI Water	Department of Primary Industries - Water
DRG	Division of Resources and Geoscience of the Department
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPL	Environment Protection Licence
EPL 640	Environment Protection Licence No. 640 issued for HVO's operations north of the Hunter River or any subsequent replacement for, or variation of, EPL 640
Evening	Evening is defined as the period from 6pm to 10pm
Feasible	Feasible relates to engineering considerations and what is practical to build or carry out
GTA	General Term of Approval
HVO	Hunter Valley Operations
Incident	A set of circumstances that: <ul style="list-style-type: none"> • causes or threatens to cause material harm to the environment; and/or • breaches or exceeds the limits or performance measures/criteria in this consent
Land	As defined in the EP&A Act, except for where the term is used in the noise and air quality conditions in schedules 3 and 4 of this consent where it is defined to mean the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at Land and Property Information at the date of this consent
LPB	Low Permeability Barrier
Mining operations	Includes the removal of overburden and extraction, processing, handling, storage and transportation of coal on site
MOP	Mining Operations Plan
MSC	Muswellbrook Shire Council
MSB	Mine Subsidence Board
Negligible	Small and unimportant, such as to be not worth considering
Night	Night is defined as the period from 10pm to 7am on Monday to Saturday, and 10pm to 8am on Sundays and Public Holidays
NP&W Act	National Parks and Wildlife Act 1974
OEH	Office of Environment and Heritage
PCA	Principal Certifying Authority appointed under Section 109E of the Act
POEO Act	Protection of the Environment Operations Act 1997
Privately owned land	Land that is not owned by a public agency, or a mining company, or its subsidiary
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
ROM coal	Run-of-mine coal
RMS	Roads and Maritime Services
Secretary	Secretary of the Department, or nominee
Site	The land described in Appendix 1
Vacant land	Vacant land is defined as the whole of the lot in a current plan registered at the Land Titles Office that does not have a dwelling situated on the lot and is permitted to have a dwelling on that lot at the date of this consent.

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SCHEDULE 2 ADMINISTRATIVE CONDITIONS

Obligation to Minimise Harm to the Environment

1. The Applicant **must** implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the development.

Terms of Approval

2. The Applicant **must** carry out the development generally in accordance with the:
 - (a) DA 450-10-2003;
 - (b) EIS titled *Hunter Valley Operations – West Pit Extension and Minor Modifications*, volumes 1 – 4, dated October 2003, and prepared by Environmental Resources Management Australia;
 - (c) the section 96(1A) modification application for the Hunter Valley Loading Point, dated 30 June 2005, and prepared by Matrix Consulting;
 - (d) *Carrington Pit Extended Statement of Environmental Effects* volumes 1 & 2, dated October 2005, and prepared by Environmental Resources Management Australia;
 - (e) *Carrington Pit Extension Response to Submissions Report*, dated May 2006, and prepared by Environmental Resources Management Australia;
 - (f) Summary of Commitments for Carrington Pit as Extended, dated 28 May 2006 and prepared by the Applicant;
 - (g) *Carrington West Wing Environmental Assessment* dated 1 October 2010, *Carrington West Wing Response to Submissions* dated 21 December 2010, *Carrington West Wing Agricultural Impact Assessment* dated 10 June 2011, *Carrington West Wing Statement of Commitments* dated 4 March 2013;
 - (h) *HVO North – Fine Reject Emplacement Modification Environmental Assessment* dated June 2013 and *HVO North – Fine Reject Emplacement Modification Response to Submissions* dated August 2013;
 - (i) modification application DA 450-10-2003 Modification 5 and accompanying environmental assessment entitled *Hunter Valley Operations North Modification 5 HVLP Sediment Basin and HVO North Communication Towers Environmental Assessment* and dated November 2016;
 - (j) modification application DA 450-10-2003 Modification 6 and accompanying Environmental Assessment entitled *Hunter Valley North Operations Modification 6 Environmental Assessment Report* dated November 2016 and *Hunter Valley North Operations Modification 6 Response to Submissions* dated December 2016 and January 2017; and
 - (k) modification application DA 450-10-2003 Modification 7 and accompanying Environmental Assessment entitled *Proposed modification 7 to Hunter Valley Operations North development consent (DA 450-10-2003) to amend historical boundary errors and update the Schedule of Lands* dated June 2017.
- 2A. The Applicant **must** carry out the development in accordance with the conditions of this consent.
3. If there is any inconsistency between the documents listed in condition 2, the most recent document shall prevail to the extent of the inconsistency. The conditions of this consent shall prevail over the documents in condition 2 to the extent of any inconsistency.
4. The Applicant **must** comply with any reasonable requirement/s of the Secretary arising from the Department's assessment of:
 - (a) any strategies, plans, programs, reviews, audits, reports or correspondence that are submitted in accordance with this consent (including any stages of these documents);
 - (b) any reviews, reports or audits commissioned by the Department regarding compliance with this consent; and
 - (c) the implementation of any actions or measures contained in these documents.

Surrender of Consents

5. Within 3 months of the submission of the revised West Pit extension MOP to the DRE, the Applicant **must** surrender all existing development consents and existing use rights associated with Hunter Valley Operations' (HVO's) mining operations and related facilities north of the Hunter River in accordance with clause 97 of the *EP&A Regulation*.

Limits on Approval

6. The Applicant **may** carry out mining operations on the site until 12 June 2025.

*Note: Under this consent, the Applicant is required to rehabilitate the site and carry out additional undertakings to the satisfaction of both the **Secretary** and **DRE**. Consequently, this consent will continue to apply in all other respects other than the right to conduct mining operations until the rehabilitation of the site and those additional undertakings have been carried out satisfactorily.*

7. The Applicant **must** not extract more than 12 million tonnes per annum (Mtpa) of ROM coal from the West Pit and 10 Mtpa of ROM coal from the Carrington Pit.
8. The Applicant **must** ensure that the Hunter Valley Coal Preparation Plant does not receive more than 16 Mtpa of coal from mining operations south of the Hunter River, and process more than 20 Mtpa of coal.
9. The Applicant **must** ensure that the West Pit Coal Preparation Plant does not process more than 6 Mtpa of coal.

Structural Adequacy

10. The Applicant **must** ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.

Notes:

- 1) Under Part 4A of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the proposed building works.
- 2) Part 8 of the EP&A Regulation sets out the requirements for the certification of development.
- 3) ¹The development is located in the Patrick Plains Mine Subsidence District. Under section 15 of the Mine Subsidence Compensation Act 1961, the Applicant is required to obtain the Mine Subsidence Board's approval before constructing or relocating any improvements on the site.

Demolition

11. The Applicant **must** ensure that any demolition work is carried out in accordance with AS 2601-2001: *The Demolition of Structures*, or its latest version.

Operation of Plant and Equipment

12. The Applicant **must** ensure that all plant and equipment used at the site, or to transport coal off-site, are:
 - (a) maintained in a proper and efficient condition; and
 - (b) operated in a proper and efficient manner.

Community Enhancement Contribution

13. Before carrying out any development, or as agreed otherwise by Council, the Applicant **must** pay Council \$15,000 for the provision of stream improvement works in the Hunter River or its tributaries. If Council has not carried out these enhancement works within 12 months of payment, the Applicant may retrieve the funds from Council.

14. Deleted

EVIDENCE OF CONSULTATION

15. Where consultation with any stakeholder identified in the conditions of this consent is required by any conditions of this consent, the Applicant must:
 - (a) consult with the relevant stakeholder prior to submitting the required document to the Secretary for approval;
 - (b) submit evidence of such consultation as part of the relevant document;
 - (c) describe how matters raised by the stakeholder have been addressed and identify any matters that have not been resolved; and
 - (d) include details of any outstanding issues raised by the stakeholder and an explanation of disagreement between any stakeholder and the Applicant.

COMPLIANCE

16. The Applicant must ensure that all employees, contractors and sub-contractors are aware of, and comply with, the conditions of this consent relevant to their respective activities.

¹ Incorporates MSB GTA.

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from any landowner of the land listed in Table 1, the Applicant **must** acquire the land in accordance with the procedures in conditions 6-7 of schedule 5 and condition 5 of schedule 5 for property 8.

Table 1: Land subject to acquisition upon request

8 - Holz	10 - Moses
9 - Dallas	12 - Barry

Note: To identify the locations referred to in Table 1, see Appendix 2.

2. While the land listed in condition 1 is privately-owned, the Applicant **must** implement all practicable measures to ensure that the impacts of the development comply with the predictions in the EIS, to the satisfaction of the **Secretary**.

AIR QUALITY & GREENHOUSE GAS

Odour

3. The Applicant **must** ensure that no offensive odours are emitted from the site, as defined under the POEO Act.

Greenhouse Gas Emissions

4. The Applicant **must** implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site to the satisfaction of the **Secretary**.

Air Quality Criteria

- 4A. Except for the air quality affected land in Table 1, the Applicant **must** ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not exceed the criteria listed in Tables 2, 3 or 4 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.

In this condition 'reasonable and feasible avoidance and mitigation measures' includes, but is not limited to, the operational requirements in Condition 5 of Schedule 4 and the requirements in Conditions 5 and 6 of Schedule 4 to develop and implement a real-time air quality management system that ensures effective operational responses to the risks of exceedance of the criteria.

Table 2: Long term criteria for particulate matter

Pollutant	Averaging Period	^d Criterion
Total suspended particulate (TSP) matter	Annual	^a 90 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	Annual	^a 30 µg/m ³

Table 3: Short term criterion for particulate matter

Pollutant	Averaging Period	^d Criterion
Particulate matter < 10 µm (PM ₁₀)	24 hour	^a 50 µg/m ³

Table 4: Long term criteria for deposited dust

Pollutant	Averaging Period	Maximum increase in deposited dust level	Maximum total deposited dust level
^c Deposited dust	Annual	^b 2 g/m ² /month	^a 4 g/m ² /month

Notes to Tables 2–4:

- ^a Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources);
- ^b Incremental impact (i.e. incremental increase in concentrations due to the development on its own);

- ^c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.
- ^d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the **Secretary**.

Air Quality Acquisition Criteria

- 4B. If particulate matter emissions generated by the development exceed the criteria in Tables 5, 6 or 7 on a systemic basis at any residence on privately-owned land or on more than 25 percent of any privately-owned land, then upon receiving a written request for acquisition from the landowner the Applicant **must** acquire the land in accordance with the procedures in Conditions 7 and 8 of Schedule 5.

Table 5: Long term acquisition criteria for particulate matter

Pollutant	Averaging Period	^d Criterion
Total suspended particulate (TSP) matter	Annual	^a 90 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	Annual	^a 30 µg/m ³

Table 6: Short term acquisition criteria for particulate matter

Pollutant	Averaging period	^d Criterion
Particulate matter < 10 µm (PM ₁₀)	24 hour	^a 150 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	24 hour	^b 50 µg/m ³

Table 7: Long term acquisition criteria for deposited dust

Pollutant	Averaging Period	Maximum increase in deposited dust level	Maximum total deposited dust level
^c Deposited dust	Annual	^b 2 g/m ² /month	^a 4 g/m ² /month

Notes to Tables 5-7:

- ^a Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources);
- ^b Incremental impact (i.e. incremental increase in concentrations due to the development on its own);
- ^c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.
- ^d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the **Secretary**.

Mine-owned Land

- 4C. The Applicant **must** ensure that particulate matter emissions generated by the development do not exceed the criteria listed in Table 2, Table 3 and Table 4 at any occupied residence on any mine-owned land (including land owned by adjacent mines) unless:
- the tenant and landowner has been notified of health risks in accordance with the notification requirements under Schedule 5 of this consent;
 - the tenant on land owned by the Applicant can terminate their tenancy agreement without penalty, subject to giving reasonable notice, and the Applicant uses its best endeavours to provide assistance with relocation and sourcing of alternative accommodation;
 - air mitigation measures (such as air filters, a first flush roof water drainage system and/or air conditioning) are installed at the residence, if requested by the tenant and landowner (where owned by another mine other than the Applicant);
 - particulate matter air quality monitoring is undertaken to inform the tenant and landowner of potential health risks; and
 - monitoring data is presented to the tenant in an appropriate format, for a medical practitioner to assist the tenant in making an informed decision on the health risks associated with occupying the property,
- to the satisfaction of the **Secretary**.

Air Quality Operating Conditions

5. The Applicant **must**:
- (a) implement best management practice to minimise the off-site odour, fume and dust emissions of the development, including best practice coal loading and profiling and other measures to minimise dust emissions from coal transportation by rail;
 - (b) operate a comprehensive air quality management system on site that uses a combination of predictive meteorological forecasting, predictive and real time air dispersion modelling and real-time air quality monitoring data to guide the day to day planning of mining operations and implementation of both proactive and reactive air quality mitigation measures to ensure compliance with the relevant conditions of this approval;
 - (c) manage PM_{2.5} levels in accordance with any requirements of any EPL;
 - (d) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note d above under Table 5-7);
 - (e) minimise any visible off-site air pollution;
 - (f) minimise the surface disturbance of the site generated by the development; and
 - (g) co-ordinate air quality management on site with the air quality management at nearby mines (Mount Thorley Warkworth, Wambo, Ravensworth and HVO South mines) to minimise the cumulative air quality impacts of these mines and the development,
- to the satisfaction of the **Secretary**.

Air Quality & Greenhouse Gas Management Plan

6. The Applicant **must** prepare a detailed Air Quality & Greenhouse Gas Management Plan for the development to the satisfaction of the **Secretary**. This plan must:
- (a) be prepared in consultation with the EPA, and submitted to the **Secretary** for approval by the end of June 2013;
 - (b) describe the measures that would be implemented to ensure:
 - best management practice is being employed;
 - the air quality impacts of the development are minimised during adverse meteorological conditions and extraordinary events; and
 - compliance with the relevant conditions of this consent.
 - (c) describe the proposed air quality management system;
 - (d) include a risk/response matrix to codify mine operational responses to varying levels of risk resulting from weather conditions and specific mining activities;
 - (e) include commitments to provide summary reports and specific briefings at CCC meetings on issues arising from air quality monitoring;
 - (f) include an air quality monitoring program that:
 - uses a combination of real-time monitors and supplementary monitors to evaluate the performance of the development;
 - adequately supports the proactive and reactive air quality management system;
 - includes PM_{2.5} monitoring;
 - includes monitoring of occupied development-related residences and residences on air quality-affected land listed in Table 1, subject to the agreement of the tenant;
 - evaluates and reports on the effectiveness of the air quality management system; and
 - includes a protocol for determining any exceedances of the relevant conditions in this approval; and
 - (g) include a protocol that has been prepared in consultation with the owners of nearby mines (Mt Thorley Warkworth, Wambo, Ravensworth and HVO South mines) to minimise the cumulative air quality impacts of these mines and the development.

The Applicant **must** implement the approved management plan as approved from time to time by the **Secretary**

NOISE

Noise Impact Assessment Criteria

7. The Applicant **must** ensure that the noise generated by the development does not exceed the noise impact assessment criteria presented in Table 9 at any privately-owned land.

Table 9: Noise impact assessment criteria dB(A)

Day/Evening/Night <i>L_{Aeq}(15 minute)</i>	Night <i>L_{A1}(1 minute)</i>	Land Number
40	46	4 – Muller (from year 1 to year 7) 7 – Stapleton Jerrys Plains Village – represented by residence locations 13 and 14 on Figure 24, volume 4 of the EIS (years 20 & 21). 1 – Hayes (years 20 & 21) 18 – Bennet (years 20 & 21) 51 – Nicholls (years 20 & 21) 52 – Old – (years 20 & 21)
39	46	2 – Skinner 3 – Elisnore 11 – Fisher 19 – Biralee Feeds 31 – Cooper 36 – Garland 54 – Skinner
38	46	1 – Hayes (from year 1 to year 19) 18 – Bennet (from year 1 to year 19) 51 – Nicholls (from year 1 to year 19) 52 – Old (from year 1 to year 19)
36	46	4 – Muller (from year 8 to year 21)
35	46	All other residential or sensitive receptors, excluding the receptors listed in condition 1 above.

Notes:

- The years referenced in Table 9 are to be considered as the position of mining operations as set out in the EIS for that year. If mining operations are delayed or accelerated from the planned location as shown in the EIS for a particular year, then the noise assessment criteria will be adjusted in accordance with the location of actual mining operations. The location of actual mining operations in relation to locations predicted in the EIS, will be indicated in the *Annual Review* (see schedule 6, condition 5).
- The noise limits in Table 9 are for the noise contribution of the West Pit extension and all Hunter Valley Operations north of the Hunter River and coal haulage identified in the EIS from the south side of the Hunter River.
- Noise from the development is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the *boundary*, to determine compliance with the *L_{Aeq}(15 minute)* noise limits in the above table.
- To determine compliance with the *L_{Aeq}(15 minute)* noise limits in the above table. Where it can be demonstrated that direct measurement of noise from the development is impractical, the EPA may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy must also be applied to the measured noise levels where applicable.
- Noise from the development is to be measured at 1 metre from the dwelling façade to determine compliance with the *L_{A1}(1 minute)* noise limits in the above table.
- The noise limits in Table 9 are to be applied in accordance with the limitations and requirements set out in Appendix 3.

Land Acquisition Criteria

- If the noise generated by the development exceeds the criteria in Table 10, the Applicant *must*, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in Conditions 6 and 7 of Schedule 5.

Table 10: Land acquisition criteria dB(A)

Day/Evening/Night <i>L_{Aeq}(15 minute)</i>	Property
43	11 – Fisher
42	7 - Stapleton
41	All residential or sensitive receptors, excluding the receptors listed in condition 1 above

Note: See notes (c) to (f) to Table 9.

Noise Operating Conditions

9. The Applicant **must**:
- (a) implement best management practice to minimise the operational, low frequency, road and rail traffic noise of the development;
 - (a) operate a comprehensive noise management system on site that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this approval;
 - (b) maintain the effectiveness of any installed noise suppression equipment on plant at all times and ensure defective plant is not used operationally until fully repaired;
 - (c) ensure that any noise attenuated plant on site is deployed preferentially in locations relevant to sensitive receivers;
 - (d) minimise the noise impacts of the development during meteorological conditions when the noise limits in this approval do not apply;
 - (e) ensure that the site is only accessed by locomotives that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL (No. 3142);
 - (f) use its best endeavours to ensure that the rolling stock supplied by service providers is designed, constructed and maintained to minimise noise;
 - (g) co-ordinate the noise management on site with the noise management at nearby mines (Mt Thorley Warkworth, Wambo, Ravensworth and HVO South mines) to minimise the cumulative noise impacts of these mines and the development, to the satisfaction of the **Secretary**.

Noise Management Plan

10. The Applicant **must** prepare a Noise Management Plan for the development to the satisfaction of the **Secretary**. This plan must:
- (a) be prepared in consultation with the EPA, and submitted to the **Secretary** for approval by the end of June 2013;
 - (b) describe the measures that would be implemented to ensure:
 - best management practice is being employed;
 - the noise impacts of the development are minimised during meteorological conditions when the noise criteria in this consent do not apply; and
 - compliance with the relevant conditions of this consent.
 - (c) describe the proposed noise management system in detail, including:
 - nomination of the real-time noise monitoring locations and the noise levels that would trigger additional noise management actions;
 - a matrix of predetermined actions to be employed when trigger levels are exceeded; and
 - procedures for varying the rates and locations of attended monitoring should the real-time monitoring data suggest that the relevant noise limits are being exceeded;
 - (d) include a risk/response matrix to codify mine operational responses to varying levels of risk resulting from weather conditions and specific mining activities;
 - (e) include a noise monitoring program that:
 - uses attended monitoring to evaluate the performance of the development, including a minimum of four days attended monitoring per quarter at locations agreed to by the **Secretary**, or more regularly where required;
 - uses real-time monitoring to support the proactive and reactive noise management system on site;
 - evaluates and reports on the effectiveness of the noise management system on site;
 - provides for the annual validation of the noise model for the development; and
 - (f) include a protocol that has been prepared in consultation with the owners of nearby mines (Mt Thorley Warkworth, Wambo, Ravensworth and HVO South mines) to minimise the cumulative noise impacts of these mines and the development.

The Applicant **must** implement the approved management plan as approved from time to time by the **Secretary**.

METEOROLOGICAL MONITORING

11. The Applicant **must** maintain a permanent meteorological station at a location approved by the EPA, and to the satisfaction of the **Secretary**, to monitor the parameters specified in Table 13, using the specified units of measure, averaging period, frequency, and sampling method in the table.

Table 11: Meteorological monitoring

Parameter	Units of measure	Averaging period	Frequency	Sampling method ¹
Lapse rate	°C/100m	1 hour	Continuous	Note ²
Rainfall	mm/hr	1 hour	Continuous	AM-4
Sigma Theta @ 10 m	°	1 hour	Continuous	AM-2
Siting	-	-	-	AM-1
Temperature @ 10 m	K	1 hour	Continuous	AM-4
Temperature @ 2 m	K	1 hour	Continuous	AM-4
Total Solar Radiation @ 2m	W/m ²	1 hour	Continuous	AM-4
Wind Direction @ 10 m	°	1 hour	Continuous	AM-2
Wind Speed @ 10 m	m/s	1 hour	Continuous	AM-2

¹ NSW EPA, 2001, Approved Methods for the Sampling and Analysis of Air Pollutants in NSW.

² The Applicant **must** calculate lapse rate from measurements made at 2m and 10m or any improved system of the determination of inversions.

BLASTING & VIBRATION

Airblast Overpressure Limits

12. The Applicant **must** ensure that the airblast overpressure level from blasting at the development does not exceed the criteria in Table 14 at any residence on privately-owned land.

Table 12: Airblast overpressure impact assessment criteria

Airblast overpressure level (dB(Lin Peak))	Allowable exceedance
115	5% of the total number of blasts in a 12 month period
120	0%

Ground Vibration Impact Assessment Criteria

13. The Applicant **must** ensure that the ground vibration level from blasting at the development does not exceed the criteria in Table 15 at any residence on privately-owned land.

Table 13: Ground vibration impact assessment criteria

Peak particle velocity (mm/s)	Allowable exceedance
5	5% of the total number of blasts in a 12 month period
10	0%

Blasting Hours

14. The Applicant **must** only carry out blasting at the development between 7 am and 6 pm Monday to Saturday inclusive. No blasting is allowed on Sundays, Public Holidays or any other time without the written approval of the EPA.

Blasting Frequency

- 14A. The Applicant may carry out a maximum of:
- (a) 3 blasts a day, unless an additional blast is required following a blast misfire; and
 - (b) 12 blasts a week,
- for all open cut mining operations at the HVO North mine.

This condition does not apply to blasts that generate ground vibration of 0.5 mm/s or less at any residence on privately-owned land, or to blasts required to ensure the safety of the mine or its workers.

Note: For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.

Interactions With Adjoining Mines

15. Prior to carrying out any mining or associated development within 500 metres of active mining areas at Ravensworth Operations, the Applicant **must** enter into an agreement with Ravensworth Operations Pty Ltd (or its assigns or successors in title) to address the potential interactions between the two mines. If during the course of entering into this agreement, or subsequently implementing this agreement, there is a dispute between the parties about any aspect of the agreement, then either party may refer the matter to the **Secretary** for resolution.
16. Prior to carrying out any mining or associated development within 500 metres of active mining areas at Cumnock No. 1 Colliery, the Applicant **must** enter into an agreement with Cumnock No. 1 Colliery Pty Ltd (or its assigns or successors in title) to address the potential interactions between the two mines. If during the course of entering into this agreement, or subsequently implementing this agreement, there is a dispute between the parties about any aspect of the agreement, then either party may refer the matter to the **Secretary** for resolution.

Property Inspections

- 16A. If the Applicant receives a written request from the owner of any privately-owned land within 2 kilometres of the approved open cut mining pit/s on site for a property inspection to establish the baseline condition of any buildings and/or structures on his/her land, or to have a previous property inspection updated, then within 2 months of receiving this request the Applicant **must**:
 - (a) provide the **Secretary** with a report that:
 - establishes the baseline condition of any buildings and other structures on the land, or updates the previous property inspection report; and
 - identifies measures that should be implemented to minimise the potential blasting impacts of the development on these buildings and/or structures; and
 - (b) provide the landowner with a copy of the new or updated property inspection report.

The report is to be prepared by a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties. If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the inspection report, either party may refer the matter to the **Secretary** for resolution.

If the Applicant considers that an extension of time is required to complete the report, the Applicant may apply in writing to the **Secretary** for an extension. The Applicant **must** provide a copy of the request and of the **Secretary's** decision to the landowner.

Property Investigations

- 16B. If the owner of any privately-owned land within 3 kilometres of any approved open cut mining pit on the site or any other privately-owned land where the **Secretary** is satisfied that an investigation is warranted, claims that buildings and/or structures on his/her land have been damaged as a result of blasting on the site, then within 2 months of receiving this claim the Applicant **must**:
 - (a) provide the **Secretary** with a report that:
 - investigates the claim; and
 - identifies measures or works that should be implemented to rectify any blasting impacts of the development on these buildings and/or structures; and
 - (b) provide the landowner with a copy of the claim inspection report and recommendations.

If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Applicant **must** repair the damage to the satisfaction of the **Secretary**.

The report is to be prepared by a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties. If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the claim inspection report, either party may refer the matter to the **Secretary** for resolution.

If the Applicant considers that an extension of time is required to complete the report, the Applicant may apply in writing to the **Secretary** for an extension. The Applicant **must** provide a copy of the request and of the **Secretary's** decision to the landowner.

Blasting Operating Conditions

17. During mining operations on site, the Applicant **must**:
 - (a) implement best management practice to:
 - protect the safety of people and livestock in the surrounding area;

- protect public or private infrastructure/property in the surrounding area from any damage; and
 - minimise the dust and fume emissions of any blasting;
 - (b) minimise the frequency and duration of any road closures, and avoid road closures during peak traffic periods;
 - (c) co-ordinate the timing of blasting on site with the timing of blasting at nearby mines (including the Mt Thorley Warkworth, Wambo, Ravensworth and HVO South mines) to minimise the cumulative blasting impacts of these mines and HVO North mine; and
 - (d) operate a suitable system to enable the public to get up-to-date information on the proposed blasting schedule on site, to the satisfaction of the **Secretary**.
18. The Applicant **must** not undertake blasting on site within 500 metres of:
- (a) any public road without the approval of the appropriate road authority; or
 - (b) any land outside the site that is not owned by the Applicant; unless
 - the Applicant has a written agreement with the relevant landowner to allow blasting to be carried out closer to the land, and the Applicant has advised the Department in writing of the terms of this agreement, or
 - the Applicant has:
 - demonstrated to the satisfaction of the **Secretary** that the blasting can be carried out closer to the land without compromising the safety of the people or livestock on the land, or damaging the buildings and/or structures on the land; and
 - updated the Blast Management Plan to include the specific measures that would be implemented while blasting is being carried out within 500 metres of the land.

Blast Management Plan

19. The Applicant **must** prepare a Blast Management Plan for the development to the satisfaction of the **Secretary**. This plan must:
- (a) be submitted to the **Secretary** for approval by the end of September 2013 unless otherwise agreed;
 - (b) propose and justify any alternative ground vibration limits for any public infrastructure in the vicinity of the site;
 - (c) describe the measures that would be implemented to ensure:
 - best management practice is being employed;
 - compliance with the relevant conditions of this consent;
 - that blasting will not cause damage to the Carrington West Wing Groundwater Barrier (LPB) as described in Condition 23 of Schedule 4; and
 - that blasting in the Carrington West Wing does not cause damage or instability to the Carrington In Pit Fine Reject Emplacement embankment;
 - (d) include a road closure management plan for blasting within 500 metres of a public road, that has been prepared in consultation with the RMS and Council;
 - (e) include a specific blast fume management protocol to demonstrate how emissions will be minimised including risk management strategies if blast fumes are generated;
 - (f) include a monitoring program for evaluating the performance of the development, including:
 - compliance with the applicable criteria;
 - minimising the fume emissions from the site; and
 - (g) include a protocol that has been prepared in consultation with the owners of nearby mines (including the Mt Thorley Warkworth, Wambo, Ravensworth and HVO South mines) to minimise the cumulative blasting impacts of these mines and the HVO North mine.

The Applicant must implement the approved management plan as approved from time to time by the **Secretary**.

²SURFACE & GROUND WATER

Note: Under the Water Act 1912 and/or Water Management Act 2000, the Applicant is required to obtain the necessary water licences and approvals for the development.

Pollution of Waters

20. Except as may be expressly provided by an EPA licence, the Applicant **must** comply with section 120 of the *Protection of the Environment Operations Act 1997* during the carrying out of the development.

² Incorporates EPA GTA

Water Supply

- 20A. The Applicant **must** ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of mining operations to match its available water supply, to the satisfaction of the **Secretary**.

Compensatory Water Supply

- 20B. The Applicant **must** provide compensatory water supply to any landowner of privately-owned land whose water supply is adversely and directly impacted (other than an impact that is negligible) as a result of the development, in consultation with **DPI Water**, and to the satisfaction of the **Secretary**.

The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent to the loss attributed to the development. Equivalent water supply should be provided (at least on an interim basis) within 24 hours of the loss being identified, unless otherwise agreed with the landowner.

If the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the **Secretary** for resolution.

If the Applicant is unable to provide an alternative long-term supply of water, then the Applicant **must** provide alternative compensation to the satisfaction of the **Secretary**.

Discharge Limits

21. Except as may be expressly provided by an **EPA** licence or the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002 (or any subsequent version of the Regulation), the Applicant **must**:
- (a) not discharge more than 237 ML/day from the licensed discharge points at HVO north of the Hunter River;
 - (b) ensure that the discharges from licensed discharge points comply with the limits in Table 17:

Table 15: Discharge Limits

Pollutant	Units of measure	100 percentile concentration limit
pH	pH	$6.5 \leq \text{pH} \leq 9.5$
Non-filterable residue	mg/litre	$\text{NFR} \leq 120$

Note: This condition does not authorise the pollution of waters by any other pollutants.

³Water Licensing

22. Prior to the renewal of a licence obtained under the *Water Act*, or 5 years after the issue date (whichever is first), the Applicant must undertake a comparison of predicted impacts, on water resources, in the EIS against actual impacts, to the satisfaction of the **DPI Water**.

Groundwater Barrier

- 22A. Within 2 years of commencing mining in the Carrington Pit Southern Extension, or as otherwise agreed with the **Secretary**, the Applicant **must** construct a groundwater barrier wall across the eastern arm of the palaeochannel of the Hunter River, to the satisfaction of the **Secretary** and at a location no further south than shown in the figure “Carrington River Red Gums, Billabong and Associated Infrastructure” included in the *Carrington Pit Extension Response to Submissions Report*, dated May 2006.
- 22B. By 31 December 2006, or as otherwise agreed with the **Secretary**, the Applicant **must** submit a report to the Department and the **DPI Water** that:
- (a) examines all reasonable and feasible options for the design and construction of the groundwater barrier wall (including matters such as materials, timing and method of construction, costs, projected initial and long-term effectiveness) to the satisfaction of the **Secretary**; and
 - (b) recommends a preferred option for the approval of the **Secretary**.

Carrington West Wing Groundwater Barrier (LPB)

³ Incorporates **DPI Water** GTAs

23. The Applicant **must** design the Carrington West Wing LPB to the satisfaction of **DPI Water** and the **Secretary**. The detailed design must:
- ensure that negligible movement of water can occur through the barrier in either direction over the long term;
 - be prepared by a suitably qualified and experienced expert/s;
 - be endorsed by **DPI Water** and approved by the **Secretary**, prior to construction of the LPB;
 - achieve the relevant performance measures including:
 - applicable permeability of 10^{-8} metres/second or less;
 - applicable Australian Standards (including AS 3798-2007); and
 - hydraulic, geomorphologic and seismic stability which will withstand any blasting-related vibrations, mining operations, fluvial and weather events, decay corrosive and biological attack.

Note: The conceptual low permeability barrier is shown in Appendix 4.

24. Prior to undertaking any mining operations within 100 metres of the western arm of the Hunter River paleochannel, the Applicant **must**:
- install the LPB in the western arm of the paleochannel;
 - submit an as-executed report to the **Secretary** and **DPI Water** by a suitably qualified and experienced practising engineer, certifying that the LPB has been constructed to achieve the relevant performance measures set out in Condition 23(d) of Schedule 4; and
 - obtain endorsement on the installed LPB from **DPI Water**.

If there is evidence after its installation that the LPB is not achieving the performance objective and performance measures in Condition 23 of Schedule 4, mining operations within 100 metres of the western arm of the Hunter River paleochannel must cease until approval to recommence is granted by the **Secretary**.

LPB Monitoring and Management Plan

25. The Applicant **must** prepare a Low Permeability Barrier Monitoring and Management Plan to the satisfaction of **DPI Water** and the **Secretary**. The plan must:
- address the monitoring and management of both the Carrington West Wing LPB and the Carrington Pit Southern Extension LPB;
 - be prepared by a suitably qualified and experienced expert;
 - be endorsed by **DPI Water** and approved by the **Secretary**, prior to construction of the Carrington West Wing LPB;
 - describe the monitoring and maintenance procedures to be implemented and the scheduling of these procedures;
 - demonstrate that the monitoring system is capable of timely detection of any failure or deficiency in either LPB; and
 - describe the contingency measures that will be implemented in the event of a failure or deficiency in either LPB.

The Applicant must implement the approved monitoring and management plan as approved from time to time by the **Secretary**.

Flood Design Works

26. The Applicant **must** design and construct the flood levees and associated flood design works in the Carrington West Wing area at least 1.0 metres higher than the 1 in 100 year ARI flood event, to the satisfaction of **DPI Water**.

Water Management Plan

27. The Applicant **must** prepare a Water Management Plan for the HVO North mine to the satisfaction of the **Secretary**. This plan must be prepared in consultation with **DPI Water** and the EPA by suitably qualified and experienced persons whose appointment has been approved by the **Secretary**, and submitted to the **Secretary** by the end of September 2013 unless otherwise agreed. This plan must include:
- a Site Water Balance that:
 - includes details of:
 - sources and security of water supply, including contingency planning for future reporting periods;
 - water use on site;
 - water management on site, including details of water sharing between neighbouring mining operations;

- any off-site water transfers and discharges;
 - reporting procedures, including comparisons of the site water balance for each calendar year; and
- describes the measures that would be implemented to minimise clean water use on site;
- (b) a Surface Water Management Plan, that includes:
 - detailed baseline data on surface water flows and quality in the waterbodies that could be affected by the development;
 - a detailed description of the water management system on site, including the:
 - clean water diversion systems and their final positioning;
 - erosion and sediment controls; and
 - water storages;
 - detailed plans, including design objectives and performance criteria, for:
 - design and management of the final voids;
 - design and management of the evaporative sink;
 - design and management of any tailings dams;
 - ensuring the stability of high walls adjacent to low permeability barriers;
 - establishment of drainage lines on the rehabilitated areas of the site; and
 - control of any potential water pollution from the rehabilitated areas of the site;
 - performance criteria for the following, including trigger levels for investigating any potentially adverse impacts associated with the development:
 - the water management system;
 - the stability of high walls adjacent to low permeability barriers;
 - surface water quality of the Hunter River; and
 - stream and riparian vegetation health of the Hunter River;
 - a program to monitor:
 - the effectiveness of the water management system; and
 - surface water flows and quality, stream and riparian vegetation health in the Hunter River (in so far as it could potentially be affected by the development); and
 - a plan to respond to any exceedances of the performance criteria, and mitigate and/or offset any adverse surface water impacts of the development.
- (c) a Groundwater Management Plan, which includes:
 - detailed baseline data on groundwater levels, yield and quality in the region, and privately-owned groundwater bores, that could be affected by the development;
 - groundwater assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts;
 - a program to monitor:
 - groundwater inflows to the open cut mining operations;
 - the impacts of the development on:
 - the alluvial aquifers, including additional groundwater monitoring bores as required by **DPI Water**;
 - the effectiveness of the low permeability barrier;
 - base flows to the Hunter River;
 - any groundwater bores on privately-owned land that could be affected by the development; and
 - groundwater dependent ecosystems, including the River Red Gum Floodplain Woodland EEC located in the Hunter River alluvium;
 - the seepage/leachate from water storages, backfilled voids and the final void;
 - a program to validate and recalibrate (if necessary) the groundwater model for the development, including an independent review of the model every 3 years, and comparison of monitoring results with modelled predictions; and
 - a plan to respond to any exceedances of the groundwater assessment criteria.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

Final Void Management Plan

28. At least 5 years before the cessation of open cut coal extraction that will result in the creation of a final void, or as otherwise agreed with the **Secretary**, the Applicant **must** prepare a Final Void Management Plan for each void, in consultation with DRE and **DPI Water**, and to the satisfaction of the **Secretary**. Each plan must:
- (a) assess locational, design and future use options;
 - (b) be integrated with the **Water Management Plan** and the **Rehabilitation Management Plan**;
 - (c) assess short term and long term groundwater and other impacts associated with each option; and
 - (d) describe the measures to be would be implemented to avoid, minimise, manage and monitor potential adverse impacts of the final void over time.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

Fine Reject Management Strategy

28A. The Applicant must prepare a life of mine fine reject management strategy to the satisfaction of the Secretary. The strategy must:

- (a) be prepared in consultation with DRE and DPI Water, and submitted to the Secretary for approval by 30 June 2015;
- (b) describe potential locations and design options for the emplacement of fine reject on site;
- (c) assess any material short term and long term impacts on surface and groundwater resources associated with each option;
- (d) describe the measures that would be implemented to avoid, minimise, manage and monitor any adverse impacts of the fine reject emplacements over time;
- (e) describe how the fine reject emplacements would be rehabilitated and describe potential options for future land uses; and
- (f) be integrated with the Rehabilitation Management Plan and Agricultural Land Reinstatement Management Plan for the mine.

The Applicant must implement the approved management strategy as approved from time to time by the Secretary.

⁴Temporary Crossing of the Hunter River

29. Prior to the commencement of any work within 40 metres of the Hunter River, a permit under Part 3A of the *Rivers and Foreshores Improvement Act 1948* must be obtained from the DPI Water. All works must be:

- (a) undertaken in accordance with the permit application, except as otherwise provided by conditions of the permit;
- (c) designed and constructed such that the works do not cause sedimentation, erosion or permanent diversion of the Hunter River;
- (d) constructed in accordance with section 10.8 (Temporary Crossing of the Hunter River), volume 1 of the EIS, dated October 2003; and titled "*Hunter Valley Operations – West Pit Extension and Minor Modifications*"; and
- (e) constructed in accordance with the Statement of Environmental Effects, prepared by Coal & Allied, dated August 2001, titled "*Proposed relocation of a dragline and electric rope shovel - Ravensworth and Hunter Valley Operations.*"

Notes:

- (a) Should Crown land, as defined under the Crown Lands Act 1989, be included in the temporary crossing, there is a requirement to seek approval from the Department of Lands under the Crown Lands Act; and
- (b) Any works on Crown public roads require the Department of Lands' approval and must satisfy the statutory requirements of the Roads Act 1993.

FAUNA & FLORA

Rehabilitation/Regeneration Strategy

30. The Applicant must not destroy or disturb more than 1 mature river red gum in the river red gum population associated with the Carrington billabong, and ensure that the mining highwall is located at least 150 metres from the standing water line of the billabong.

31. By 30 June 2007, the Applicant must prepare a comprehensive Rehabilitation and Restoration Strategy for the Carrington billabong and river red gum population, in consultation with DPI Water, and to the satisfaction of the Secretary. This strategy must be prepared by suitably qualified expert/s, and must include:

- (a) the rehabilitation and restoration objectives for the billabong and associated river red gum population;
- (b) a description of the short, medium and long term measures that would be implemented to rehabilitate and restore the billabong and associated river red gum population (including measures to address matters which affect the long term health and sustainability of the billabong and river red gums such as surface and ground water supply, and controlling weeds, livestock and feral animals); and
- (c) detailed assessment and completion criteria for the rehabilitation and restoration of the billabong and associated river red gum population.

⁴ Incorporates DPI Water GTAs

The Applicant must implement the approved management strategy as approved from time to time by the Secretary.

Note. The billabong, standing water line and river red gum population referred to are the billabong, standing water line and endangered population of river red gums located on land owned by the Applicant between the Hunter River and Levee 5, as shown in the figure "Carrington River Red Gums, Billabong and Associated Infrastructure" included in the Carrington Pit Extension Response to Submissions Report, dated May 2006.

- 31A. The Applicant must revegetate an area of at least 0.14 hectares using trees representative of the Swamp Oak Floodplain Forest community on land which adjoins existing riparian vegetation and is suitable for the establishment of this community.
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;
 - (b) present a conceptual plan for landscape management and rehabilitation of the site;
 - (c) be integrated with the relevant requirements of the Mining Operations Plan;
 - (d) describe the measures that would be implemented to achieve the objectives (including an indicative timetable for mine closure);
 - (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
 - (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.

The Applicant must implement the approved management strategy as approved from time to time by the Secretary.

Strategic Study Contribution

33. If, during the development, the Department or the OEH commissions a strategic study into the regional vegetation corridor stretching from the Wollemi National Park to the Barrington Tops National Park, then the Applicant **must** contribute a reasonable amount, up to \$10,000, towards the completion of this study.

Operating Conditions

34. The Applicant **must** salvage and reuse as much material as possible from the land that will be mined, such as soil, seeds, tree hollows, rocks and logs. Cleared vegetation must be reused or recycled to the greatest extent practicable. No burning of cleared vegetation **must** be permitted. Reuse options including removing millable logs, recovering fence posts, mulching and chipping unusable vegetation waste for on-site use are to be implemented.

Flora and Fauna Management

35. The Applicant **must** prepare procedures for the management of flora and fauna for the development. These procedures **must**:
- (a) provide details on:
 - delineating areas of disturbance;
 - protecting areas outside of the disturbance areas;
 - identifying when pre-clearance surveys are required for fauna;
 - determining the best time to clear vegetation to avoid nesting/breeding activities of threatened fauna;
 - capturing and releasing fauna;
 - relocating bat roosts;
 - salvaging habitat resources and collecting seed;
 - controlling weeds in regeneration/rehabilitation areas; and
 - controlling access to the regeneration/rehabilitation areas;
 - (b) describe how the land in regeneration areas would be revegetated;
 - (c) describe how the mined areas would be rehabilitated for grazing and biodiversity values;
 - (d) identify actions to minimise the potential impacts of the development on threatened fauna;
 - (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
 - (f) identify who is responsible for monitoring, reviewing, and implementing the procedures.

The Applicant **must** submit a copy of these procedures to the **Secretary** for approval within 6 months of the date of this consent.

The Applicant **must** implement the approved management procedures as approved from time to time by the **Secretary**.

Table 16: Parameters and Units of Measure for Fauna and Flora Monitoring

Parameter	Units of measure
Density of vegetation	Plants/m ²
	Understorey
	Ground cover
Diversity of flora	Species/m ²
Age/maturity of flora	Vegetation height/diameter/form
Vegetation health	-
Disturbance	Weeds/m ²
	Erosion
	Feral animals
	Stock
Density of fauna	Fauna (Avian/Mammals/Reptiles-Amphibians)/m ²
Diversity of fauna	Species/m ²
Density of fauna habitat	Hollow-bearing trees/nesting sites/ logs/dams, etc.
	Habitat Complexity Score
Ecosystem Function	Landscape Function Analysis

Note: The requirements of condition 35 may be satisfied within the Rehabilitation Management Plan required under Condition 62C of Schedule 4.

Annual Review

36. The Applicant **must**:
- review the performance of the flora & fauna management procedures annually, and, if necessary,
 - revise these documents to take into account any recommendations from the annual review.

⁵ABORIGINAL CULTURAL HERITAGE

*Note: The Applicant is required to obtain consent from the **OEH** under the National Parks and Wildlife Act 1974 to destroy Aboriginal sites and objects on the site. The **OEH** has issued General Terms of Approval for the sites listed in condition 37.*

West Pit Extension - Consents to Destroy

37. The Applicant **must** obtain consent from **OEH** to destroy the following sites:
- WPE 1
 - WPE 2
 - WPE 3
 - WPE 4
 - WPE 5
 - WPE 6
 - WPE 7
 - WPE 8
 - WPE 9
 - WPE 10
 - WPE 11
 - 37-2-1964
 - 37-2-1965
 - 37-2-1966
 - 37-2-1967
 - 37-2-0038
 - 37-2-0144
 - 37-2-0894
 - 37-2-0896
 - 37-2-0805

⁵ Incorporates **OEH** GTAs.

West Pit Extension - Salvage

38. Before making application for section 90 consents under NP&W Act, the Applicant **must** prepare a salvage program for the sites listed in condition 37 in consultation with the OEH and Aboriginal communities, and to the satisfaction of the OEH.
39. The Applicant **must** obtain consent under the *National Parks and Wildlife Act 1974* to destroy the following sites:

• 37-2-0145	• 37-2-0787	• TD
• 37-2-0147	• 37-2-0788	• TG
• 37-2-0148	• 37-2-0789	• 37-2-1504
• 37-2-0523	• 37-2-0790	• 37-2-1522
• 37-2-0524	• 37-2-0791	• 37-2-1535
• 37-2-0525	• 37-2-0792	• 37-2-1864
• 37-2-0526	• 37-2-0793	• 37-2-1874
• 37-2-0527	• 37-2-0794	• 37-2-1875
• 37-2-0528	• 37-2-0795	• 37-2-1876
• 37-2-0562	• 37-2-0796	• 37-2-1962
• 37-2-0777	• 37-2-0895	• 37-2-1963
• 37-2-0778	• 37-2-1865	• 37-5-0061
• 37-2-0779	• 37-2-1866	• 37-2-1861
• 37-2-0780	• 37-2-1867	• 37-2-1862
• 37-2-0781	• 37-2-1868	• 37-2-1873
• 37-2-0782	• 37-2-1869	• 37-2-1860
• 37-2-0783	• 37-2-1870	• 37-5-0131
• 37-2-0784	• 37-2-1871	• 37-3-0286
• 37-2-0785	• 37-2-1872	• 37-5-0061
• 37-2-0786	• IF1	• 37-1-0399
• 37-2-2078 (C1)	• 37-2-2085 (C10)	• 37-2-1535 (CM32)
• 37-2-2079 (C2)	• 37-2-1962 (CM45)	• 37-2-2754
• 37-2-2080 (C3)	• 37-2-1963 (CM46)	• 37-2-2755
• 37-5-0494 (C4)	• 37-2-1504 (CM1)	• 37-2-2756
• 37-2-2083 (C8)	• 37-2-1505 (CM2)	• 37-2-2757
• 37-2-2084 (C9)	• 37-2-1522 (CM19)	

Aboriginal Heritage Site 37-2-1877 (CM-CD1)

40. Mining operations and associated activities in the Carrington West Wing area are not permitted to be carried out within 20 metres of Aboriginal heritage site 37-2-1877 (CM-CD1) and the Older Stratum as shown on the plan in Appendix 5.

Note: for clarification purposes, Condition 40 of Schedule 4 does not prohibit heritage surveys and studies to be undertaken within CM-CD1 or within 20 metres of CM-CD1 and the Older Stratum.

- 40A. The Applicant must ensure that mining operations (including blasting) and associated activities do not cause any impact to Aboriginal heritage site 37-2-1877 (CM-CD1) and the Older Stratum.

Heritage Management Plan

41. The Applicant **must** prepare a Heritage Management Plan for the development to the satisfaction of the **Secretary**. This plan must:
- be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the **Secretary**;
 - be prepared in consultation with OEH and the Aboriginal stakeholders (in relation to the management of Aboriginal heritage values);
 - be submitted to the **Secretary** for approval by the end of June 2013, unless the **Secretary** agrees otherwise;
 - include the following for the management of Aboriginal Heritage:
 - a detailed plan of management for Aboriginal heritage site 37-2-1877 (CM-CD1) including a description of the measures that would be implemented to protect, monitor and manage the site from mining operations and associated activities;
 - a description of the measures that would be implemented for:
 - managing heritage items on the site, including any proposed archaeological investigations and/or salvage measures;
 - managing the discovery of any human remains or previously unidentified Aboriginal objects on site;

- maintaining and managing reasonable access for Aboriginal stakeholders to heritage items on site;
- ongoing consultation with the Aboriginal stakeholders on the conservation and management of Aboriginal cultural heritage both on-site and within any Aboriginal heritage conservation areas; and
- ensuring any workers on site receive suitable heritage inductions prior to carrying out any development on site, and that suitable records are kept of these inductions; and
- a strategy for the storage of any heritage items salvaged on site, both during the development and in the long term.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

- 41A. Prior to disturbance by mining, the Applicant must ensure that the scarred tree 37-2-2080 (C3) is removed and relocated to a site where it will be protected from future development, in consultation with the Wonnarua Tribal Council, and to the satisfaction of the Secretary.

Note: In conditions 37 – 41A, all seven-figure numbers refer to Aboriginal site listings in OEH's Aboriginal Heritage Information Management System (AHIMS). All other numbers are site numbers used by the Applicant in on-site Aboriginal heritage studies. Site numbers beginning with C or CM are associated with the Carrington Pit, as shown in Fig 5.1 of Annex G of the Carrington Pit Extended Statement of Environmental Effects.

Trust Fund Contribution

42. Before carrying out the development, or as agreed otherwise by the Secretary, the Applicant must contribute \$20,000 to the Hunter Aboriginal Cultural Heritage Trust Fund for further investigations into Aboriginal cultural heritage, as defined by the Trust Deed.

TRAFFIC & TRANSPORT

New Access Intersection to Hunter Valley Loading Point

Note: The Applicant requires Council approval under the Roads Act 1993 for the new road entry from Liddell Station Road to the Hunter Valley Loading Point.

43. ⁶The Applicant must design, construct and maintain for the duration of this consent, the proposed new access intersection from Liddell Station Road to the Hunter Valley Loading Point to the satisfaction of the Council.

Road Closure

Note: The Applicant requires MSC approval under the Roads Act 1993 prior to closing a section of Pikes Gully Road.

44. Within 12 months of the date of this consent, unless otherwise agreed by the Secretary, the Applicant is to complete the relevant requirements to enable the section of Pikes Gully Road situated in the Muswellbrook local government area to be closed as a public road.
45. The Applicant must not blast within 500 metres of a public road while the road is open to the public. Any road closures with respect of blasting must be subject to a plan of management approved by Council.

Lemington Road

46. The Applicant must reimburse Council for any road upgrading works undertaken on Lemington Road, to a maximum amount of \$30,000.
47. The Applicant must alter or cease mining operations if driver visibility or traffic safety on Lemington Road is adversely affected by dust, in accordance with the requirements of Council.
48. The Applicant must be responsible for the full cost of the maintenance of the Lemington Road deviation undertaken for the Carrington Pit until March 2011, in accordance with the standards and requirements of Council.

Intersection of Lemington Road and the Golden Highway

⁶ Incorporates Council GTA

49. Within 2 years of the date of this consent, the Applicant **must** upgrade the intersection of the Golden Highway (SH 27) and Lemington Road to a type "BAR" intersection with a sealed shoulder to the satisfaction of the RMS.

Road Safety Audit

49A.

- (a) By 31 December 2006, the Applicant **must** prepare and submit a road safety audit to the RMS and Council for all public roads used by mine employees and service vehicles in the vicinity of the development, including an audit of the existing intersections of all mine access roads with public roads;
- (b) any improvement to meet accepted road safety standards required by the relevant road manager (ie the RMS or Council) for public roads as a result of impacts related to the development as identified by the audit **must** be undertaken at the Applicant's cost and to the satisfaction of the road manager;
- (c) any dispute between the Applicant and the relevant road manager in relation to the audit findings and the requirements of the road manager for improvements of public roads is to be determined by the **Secretary**; and
- (d) any maintenance of line marking and sign posting required by the relevant road manager at existing intersections of mine access roads with public roads **must** be undertaken at the Applicant's cost and to the satisfaction of the road manager.

Coal Haulage

50. ⁷The Applicant **must** ensure that spillage of coal from coal haulage vehicles is minimised and that sediment-laden runoff from roads is effectively managed, to the satisfaction of the **Secretary**. Measures that **must** be implemented include:
- (a) covering all loads where loaded coal trucks leave the site and enter public roads;
 - (b) ensuring the gunwhales of all loaded trucks are clean of coal;
 - (c) providing effective wheel wash facilities at all coal load and unload facilities prior to vehicles entering public roads; and
 - (d) sweeping, at regular intervals and at the completion of campaign hauls, public roads used for the transportation of coal.
51. The Applicant **must** enter into an agreement with Council for the maintenance of the sections of Pikes Gully Road and Liddell Station Road whilst used by the Applicant for the haulage of coal, and during the period the roads are owned by Council.

Monitoring

52. The Applicant **must** maintain and include in each **Annual Review** records of the:
- (a) amount of coal transported from the site each year;
 - (b) amount of coal received from Hunter Valley Operations south of the Hunter River;
 - (c) amount of coal hauled by road to the Hunter Valley Loading Point;
 - (d) amount of coal hauled by road to the Newdell Loading Point;
 - (e) amount of coal hauled by road from the Newdell Loading Point to the Ravensworth coal Terminal;
 - (f) amount of coal hauled by road from the Hunter Valley Loading Point to the Ravensworth Coal Terminal; and
 - (g) number of coal haulage truck movements generated by the development.

VISUAL IMPACT

Visual Amenity

53. The Applicant **must** implement measures to mitigate visual impacts including:
- (a) design and construction of development infrastructure in a manner that minimises visual contrasts; and
 - (b) progressive rehabilitation of mine waste rock emplacements (particularly outer batters), including partial rehabilitation of temporarily inactive areas.
54. The Applicant **must** plant trees to provide an effective visual screen from Lemington Road in the vicinity of the Belt Line Road and adjacent to the Mitchell pit area. The plan for this tree planting is to:
- (a) provide for tree planting within 2 years of the date of this consent;
 - (b) achieve an 80% survival rate by the 5th year;

⁷ This may include the use of sediment dams or the incorporation of runoff into the mine water management system.

- (c) be submitted to **DRE** and **Secretary** for review and approval; and
- (d) provide an assessment of whether visual bunds are required to supplement the vegetative visual screen.

Lighting Emissions

- 55. The Applicant **must** take all practicable measures to mitigate off-site lighting impacts from the development.
- 56. All external lighting associated with the development **must** comply with *Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting*.

WASTE MINIMISATION

- 57. The Applicant **must** minimise the amount of waste generated by the development to the satisfaction of the **Secretary**.

HAZARDS MANAGEMENT

Spontaneous Combustion

- 58. The Applicant **must**:
 - (a) take the necessary measures to prevent, as far as is practical, spontaneous combustion on the site; and
 - (b) manage any spontaneous combustion on-site to the satisfaction of **DRE**.

Dangerous Goods

- 59. The Applicant **must** ensure that the storage, handling, and transport of:
 - (a) dangerous goods is done in accordance with the relevant *Australian Standards*, particularly *AS1940* and *AS1596*, and the *Dangerous Goods Code*; and
 - (b) explosives are managed in accordance with the requirements of **DRE**.

BUSHFIRE MANAGEMENT

- 60. The Applicant **must** :
 - (a) ensure that the development is suitably equipped to respond to any fires on-site; and
 - (b) assist the Rural Fire Service and emergency services as much as possible if there is a fire on-site during the development.
- 61. The Applicant **must** ensure that the Bushfire Management Plan for the site, is to the satisfaction of Council and the Rural Fire Service.

REHABILITATION

Rehabilitation Objectives

- 62. The Applicant **must** rehabilitate the site to the satisfaction of **DRE**. The rehabilitation must be generally in accordance with the proposed rehabilitation strategy described by the documents listed in Condition 2 of Schedule 3 (and depicted conceptually in the final landform plans in Appendices 6 and 7) and the objectives in Table 17.

Table 17: Rehabilitation Objectives

Area/Domain	Rehabilitation Objectives
Mine site (as a whole), including the final void	Safe, stable & non-polluting
Carrington West Wing revised proposed extension area	Reinstatement of Rural Land Capability agricultural land values to be measured as: 65.0 hectares of Class II and 65.0 hectares of Class III
Surface infrastructure	To be decommissioned and removed, unless DRE agrees otherwise
Community	Ensure public safety Minimise the adverse socio-economic effects associated with mine closure

Note: The Carrington West Wing revised proposed extension area is shown in Appendix 5.

Operating Conditions

- 62A. The Applicant **must**:
- (a) develop a detailed soil management protocol that identifies procedures for
 - comprehensive soil surveys prior to soil stripping;
 - assessment of top-soil and sub-soil suitability for mine rehabilitation; and
 - annual soil balances to manage soil handling including direct resspreading and stockpiling;
 - (b) maximise the salvage of suitable top-soils and sub-soils and biodiversity habitat components such as bush rocks, tree hollows and fallen timber for rehabilitation of disturbed areas within the site and for enhancement of biodiversity offset areas;
 - (c) ensure that coal reject or any potentially acid forming interburden materials must not be 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; and
 - (d) ensure that no dirty water can drain from an out of pit emplacement area to any offsite watercourse or to any land beyond the lease boundary.

Progressive Rehabilitation

- 62B. The Applicant **must** carry out rehabilitation of the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable and feasible measures must be taken to minimise the total area exposed for dust generation at any time. Interim rehabilitation strategies **must** be employed when areas prone to dust generation cannot yet be permanently rehabilitated.

Note: It is accepted that some parts of the site that are progressively rehabilitated may be subject to further disturbance at some later stage in the development.

Rehabilitation Management Plan

- 62C. The Applicant **must** prepare a Rehabilitation Management Plan for the HVO North mine to the satisfaction of **DRE**. This plan must:
- (a) be prepared in consultation with the Department, **DPI Water**, OEH, Council and the CCC;
 - (b) be submitted to **DRE** by the end of September 2013;
 - (c) be prepared in accordance with any relevant DRE guideline;
 - (d) include an Agricultural Land Reinstatement Management 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);
 - (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;
 - (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;
 - (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;
 - (i) include interim rehabilitation where necessary to minimise the area exposed for dust generation;
 - (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
 - (k) build to the maximum extent practicable on the other management plans required under this consent.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

Agricultural Land Reinstatement Management Plan

- 62D. The Agricultural Land Reinstatement Management Plan required under Condition 62C of Schedule 4 is intended to ensure that the alluvial lands are restored to a productive capacity at least equivalent to their pre-mining state and are able to be managed using techniques and equipment common to management of equivalent lands in the district. The plan must:
- (a) be prepared in consultation with DPI and to the satisfaction of the **Secretary**;
 - (b) be prepared in accordance with any relevant DPI guideline;
 - (c) include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the Carrington West Wing revised proposed extension area, and triggering remedial action (if necessary);
 - (d) include a long-term monitoring programme on the success of reinstating alluvial lands, which must:

- assess a comprehensive suite of indicators of productivity and environmental sustainability (such as soil settling, soil profile development, other soil characteristics, water transmissivity and soil water availability, agricultural productivity, fertilizer needs, weeds and pests) over an extended period (a minimum of 20 years);
 - compare the performance of the reinstated alluvial lands with a reference site; and
 - make monitoring results publicly available.
- (e) in accordance with Condition 4(h) of Schedule 6 provide for reviews of progress against the plan every 3 years (unless otherwise agreed by the **Secretary** after completion of the second review) and for a final review by the end of 2033.

Note: The Carrington West Wing revised proposed extension area is shown in Appendix 5.

MINE EXIT STRATEGY

63. Within 5 years of the date of this consent, the Applicant **must** work with the Council and MSC to investigate the minimisation of adverse socio-economic effects of a significant reduction in local employment levels and closure of the development at the end of its life.

SCHEDULE 4
ADDITIONAL PROCEDURES FOR AIR QUALITY AND NOISE MANAGEMENT

Notification of Landowners/Tenants

1. By the end of September 2013, the Applicant **must**:
 - (a) notify in writing any remaining private owners of:
 - the land listed in Table 1 of schedule 4 that they have the right to require the Applicant to acquire their land at any stage during the development;
 - any residence on the land listed in Table 1 of schedule 4 that they have the right to request the Applicant to ask for additional noise and/or air quality mitigation measures to be installed at their residence at any stage during the development; and
 - any privately-owned land within 2 kilometres of the approved open cut mining pit/s that they are entitled to ask for an inspection to establish the baseline condition of any buildings or structures on their land, or to have a previous property inspection report updated;
 - (b) notify the tenants of any mine-owned land of their rights under this approval; and
 - (c) send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time) to the owners and/or existing tenants of any land (including mine-owned land) where the predictions in the documents listed in condition 2 of schedule 3 identify that dust emissions generated by the development are likely to be greater than any air quality criteria in schedule 4 at any time during the life of the development.
2. Prior to entering into any tenancy agreement for any land owned by the Applicant that is predicted to experience exceedances of the recommended dust and/or noise criteria, or for any of the land listed in Table 1 purchased by the Applicant, the Applicant **must**:
 - (a) advise the prospective tenants of the potential health and amenity impacts associated with living on the land, and give them a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time);
 - (b) advise the prospective tenants of the rights they would have under this approval; and
 - (c) request the prospective tenants consult their medical practitioner to discuss the air quality monitoring data and prediction and health impacts arising from this information, to the satisfaction of the **Secretary**.
3. As soon as practicable after obtaining monitoring results showing:
 - (a) an exceedance of any criteria in schedule 4, the Applicant **must**:
 - notify each affected landowner and/or tenant of the land (including the tenants of any mine-owned land) in writing of the exceedance; and
 - provide each affected party with regular monitoring results until the development is again complying with the relevant criteria; and
 - (b) an exceedance of the air quality criteria in schedule 4, the Applicant **must** additionally provide each affected party with:
 - a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time), if not recently provided; and
 - monitoring data in an appropriate format such that the party's medical practitioner can assist them in making an informed decision on the health risks associated with continued occupation of the property,to the satisfaction of the **Secretary**.

Independent Review

4. If an owner of privately-owned land considers the development to be exceeding the criteria in Schedule 4, then he/she may ask the **Secretary** in writing for an independent review of the impacts of the development on his/her land.

If the **Secretary** is satisfied that an independent review is warranted, then within 2 months of the **Secretary's** decision, the Applicant **must**:

 - (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the **Secretary**, to:
 - consult with the landowner to determine his/her concerns;
 - conduct monitoring to determine whether the development is complying with the relevant impact assessment criteria in Schedule 4; and
 - if the development is not complying with these criteria then:
 - determine if more than one mine is responsible for the exceedance, and if so the relative share of each mine regarding the impact on the land;
 - identify the measures that could be implemented to ensure compliance with the relevant criteria; and
 - (b) give the **Secretary** and landowner a copy of the independent review.

5. If the independent review determines that the development is complying with the criteria in Schedule 4, then the Applicant may discontinue the independent review with the approval of the **Secretary**.

If the independent review determines that the development is not complying with the criteria in Schedule 4, and that the development is primarily responsible for this non-compliance, then the Applicant **must**:

- (a) implement all reasonable and feasible mitigation measures, in consultation with the landowner and appointed independent person, and conduct further monitoring until the development complies with the relevant criteria; or
 - (b) secure a written agreement with the landowner to allow exceedances of the relevant impact assessment criteria,
- to the satisfaction of the **Secretary**.

If the independent review determines that the development is not complying with the relevant acquisition criteria in Schedule 4, and that the development is primarily responsible for this non-compliance, then upon receiving a written request from the landowner, the Applicant **must** acquire all or part of the landowner's land in accordance with the procedures in Conditions 7 and 8 below.

6. If the independent review determines that the relevant criteria are being exceeded, but that more than one mine is responsible for this exceedance, then together with the relevant mine/s the Applicant **must**:

- (a) implement all reasonable and feasible mitigation measures, in consultation with the landowner and appointed independent person, and conduct further monitoring until there is compliance with the relevant criteria; or
 - (b) secure a written agreement with the landowner and other relevant mine/s to allow exceedances of the relevant impact assessment criteria,
- to the satisfaction of the **Secretary**.

If the independent review determines that the development is not complying with the relevant acquisition criteria in Schedule 4, but that more than one mine is responsible for the exceedance, then upon receiving a written request from the landowner, the Applicant **must** acquire all or part of the landowner's land on as equitable a basis as possible with the relevant mine/s in accordance with the procedures in Conditions 7 and 8 below.

Land Acquisition

7. Within 3 months of receiving a written request from a landowner with acquisition rights, the Applicant **must** make a binding written offer to the landowner based on:
- (a) the current market value of the landowner's interest in the land at the date of this written request, as if the land was unaffected by the development, having regard to the:
 - existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and
 - presence of improvements on the land and/or any approved building or structure which has been physically commenced on the land at the date of the landowner's written request, and is due to be completed subsequent to that date;
 - (b) the reasonable costs associated with:
 - relocating within the Singleton or Muswellbrook local government areas, or to any other local government area determined by the **Secretary**; and
 - obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is to be acquired; and
 - (c) reasonable compensation for any disturbance caused by the land acquisition process.

However, if at the end of this period, the Applicant and landowner cannot agree on the acquisition price of the land and/or the terms upon which the land is to be acquired, then either party may refer the matter to the **Secretary** for resolution.

Upon receiving such a request, the **Secretary** will request the President of the NSW Division of the Australian Property Institute (the API) to appoint a qualified independent valuer to:

- consider submissions from both parties;
- determine a fair and reasonable acquisition price for the land and/or the terms upon which the land is to be acquired, having regard to the matters referred to in paragraphs (a)-(c) above;
- prepare a detailed report setting out the reasons for any determination; and
- provide a copy of the report to both parties.

Within 14 days of receiving the independent valuer's report, the Applicant **must** make a binding written offer to the landowner to purchase the land at a price not less than the independent valuer's determination.

However, if either party disputes the independent valuer's determination, then within 14 days of receiving the independent valuer's report, they may refer the matter to the **Secretary** for review. Any request for a review must be accompanied by a detailed report setting out the reasons why the party disputes the independent valuer's determination. Following consultation with the independent valuer and both parties, the **Secretary** will determine a fair and reasonable acquisition price for the land, having regard to the matters referred to in paragraphs (a)-(c) above, the independent valuer's report, the detailed report disputing the independent valuer's determination, and any other relevant submissions.

Within 14 days of this determination, the Applicant **must** make a binding written offer to the landowner to purchase the land at a price not less than the **Secretary's** determination.

If the landowner refuses to accept the Applicant's binding written offer under this condition within 6 months of the offer being made, then the Applicant's obligations to acquire the land shall cease, unless the **Secretary** determines otherwise.

8. The Applicant **must** pay all reasonable costs associated with the land acquisition process described in Condition 7 above, including the costs associated with obtaining Council approval for any plan of subdivision (where permissible), and registration of this plan at the Office of the Registrar-General.
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SCHEDULE 5
ENVIRONMENTAL MANAGEMENT, MONITORING, AUDITING & REPORTING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

1. If the Secretary requires, the Applicant must prepare an Environmental Management Strategy for the development to the satisfaction of the Secretary. This strategy must:
 - (a) be submitted to the Secretary for approval within 6 months of the Secretary requiring preparation of the strategy by notice to the Applicant;
 - (b) provide the strategic framework for the environmental management of the development;
 - (c) identify the statutory approvals that apply to the development;
 - (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;
 - (e) describe the procedures that would be implemented to:
 - keep the local community and relevant agencies informed about the operation and environmental performance of the development;
 - receive, handle, respond to, and record complaints;
 - resolve any disputes that may arise during the course of the development;
 - respond to any non-compliance; and
 - respond to emergencies; and
 - (f) include:
 - copies of any strategies, plans and programs approved under the conditions of this consent; and
 - a clear plan depicting all the monitoring required to be carried out under the conditions of this consent.

The Applicant must implement any Environmental Management Strategy as approved from time to time by the Secretary.

Management Plan Requirements

2. The Applicant must ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:
 - (a) detailed baseline data;
 - (b) a description of:
 - the relevant statutory requirements (including any relevant approval, licence or lease conditions);
 - any relevant limits or performance measures/criteria; and
 - the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;
 - (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
 - (d) a program to monitor and report on the:
 - impacts and environmental performance of the development; and
 - effectiveness of any management measures (see (c) above);
 - (e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;
 - (f) a program to investigate and implement ways to improve the environmental performance of the development over time;
 - (g) a protocol for managing and reporting any:
 - incidents;
 - complaints;
 - non-compliances with statutory requirements; and
 - exceedances of the impact assessment criteria and/or performance criteria;
 - (h) a protocol for periodic review of the plan; and
 - (i) a document control table that includes version numbers, dates when the management plan was prepared and reviewed, names and positions of people who prepared and reviewed the management plan, a description of any revisions made and the date of the Secretary's approval.

Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.

Relationships Between Management Plans

- 2A. With the agreement of the Secretary, the Applicant may combine any strategy, plan, program or Annual Review required by this consent with any similar strategy, plan, program or Annual Review required for HVO South and Mt Thorley Warkworth mines or any other adjoining operation in common ownership or management.

Updating & Staging Submission of Strategies, Plans or Programs

3. To ensure the strategies, plans or programs under this consent are updated on a regular basis, and that they incorporate any appropriate mitigation measures to improve the environmental performance of the development, the Applicant may at any time submit revised strategies, plans or programs to the Secretary for approval. With the agreement of the Secretary, the Applicant may also submit any strategy, plan or program required by this consent on a staged basis.

With the agreement of the Secretary, the Applicant may revise any strategy, plan or program approved under this consent without undertaking consultation with all parties nominated under the applicable conditions in this consent.

Notes:

- While any strategy, plan or program may be submitted on a staged basis, the Applicant will need to ensure that the existing operations associated with the development are covered by suitable strategies, plans or programs at all times.
- If the submission of any strategy, plan or program is to be staged, then the relevant strategy, plan or program must clearly describe the specific stage/s of the development to which the strategy, plan or program applies; the relationship of this stage/s to any future stages; and the trigger for updating the strategy, plan or program.

Revision of Strategies, Plans & Programs

4. Within 3 months of the:
- (a) submission of an incident report under condition 7 below;
 - (b) submission of an Annual Review under condition 9 below; or
 - (c) submission of an audit report under condition 10 below; and
 - (d) approval of a modification to this consent,
- the Applicant must review and if necessary revise, the strategies, plans and programs required under this consent, to the satisfaction of the Secretary.

Within 6 weeks of conducting any such review, the Applicant must advise the Secretary of the outcomes of the review, and provide any documents that have been revised to the Secretary for review and approval.

Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and to incorporate any recommended measures to improve the environmental performance of the development.

Adaptive Management

5. The Applicant must assess and manage development-related risks to ensure that there are no exceedances of the criteria and/or performance measures in Schedule 4. Any exceedance of these criteria and/or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.

Where any exceedance of these criteria and/or performance measures has occurred, the Applicant must, at the earliest opportunity:

- (a) take all reasonable and feasible measures to ensure that the exceedance ceases and does not recur;
- (b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and
- (c) implement remediation measures as directed by the Secretary, to the satisfaction of the Secretary.

COMMUNITY CONSULTATIVE COMMITTEE

6. The Applicant must operate a Community Consultative Committee (CCC) for the development, to the satisfaction of the Secretary. This CCC must be operated in general accordance with the *Community Consultative Committee (CCC) Guidelines for State Significant Projects* (Department of Planning, 2016, or its latest version)

Notes:

- *The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent.*
- *In accordance with the guideline, the committee should be comprised of an independent chair and appropriate representation from the Applicant, Council, and the local community.*
- *With the approval of the Secretary, the CCC may be combined with any similar CCC for the HVO Mine Complex.*

REPORTING

Incident Reporting

7. The Applicant must immediately notify the Secretary and any other relevant agencies of any incident. Within 7 days of the date of the incident, the Applicant must provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.

Regular Reporting

8. The Applicant must provide regular reporting on the environmental performance of the development on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this consent.

Annual Review

9. By the end of March each year, or other timing as may be agreed by the Secretary, the Applicant must submit a report to the Department reviewing the environmental performance of the development to the satisfaction of the Secretary. This review must:
 - (a) describe the development (including any rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year;
 - (b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against the:
 - relevant statutory requirements, limits or performance measures/criteria;
 - requirements of any plan or program required under this consent;
 - monitoring results of previous years; and
 - relevant predictions in the documents listed in condition 2 of Schedule 3;
 - (c) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance;
 - (d) identify any trends in the monitoring data over the life of the development;
 - (e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
 - (f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the development.

The Applicant must ensure that copies of the Annual Review are submitted to Council and are available to the Community Consultative Committee (see condition 6 of Schedule 6) and any interested person upon request.

INDEPENDENT ENVIRONMENTAL AUDIT

10. Prior to 1 December 2019, and every three years thereafter, unless the Secretary directs otherwise, the Applicant must commission, commence and pay the full cost of an Independent Environmental Audit of the development. This audit must:
 - (a) be conducted by suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;
 - (b) include consultation with the relevant agencies and the CCC;
 - (c) assess the environmental performance of the development and whether it is complying with the relevant requirements in this consent and any relevant EPL and/or Water Licences (including any assessment, plan or program required under these approvals);
 - (d) review the adequacy of strategies, plans or programs required under the abovementioned approvals;
 - (e) recommend appropriate measures or actions to improve the environmental performance of the development, and/or any assessment, plan or program required under the abovementioned approvals; and
 - (f) be conducted and reported to the satisfaction of the Secretary.

Note: This audit team must be led by a suitably qualified auditor and include experts in any fields specified by the Secretary.

11. Within 12 weeks of commencing each audit, or as otherwise agreed by the Secretary, the Applicant must submit a copy of the audit report to the Secretary and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of any measures proposed to address the recommendations.

ACCESS TO INFORMATION

12. By 31 December 2016, unless otherwise agreed by the Secretary, the Applicant must:
- (a) make the following information publicly available on its website:
 - the documents listed in condition 2 of Schedule 3;
 - current statutory approvals for the development;
 - approved strategies, plans or programs required under the conditions of this consent;
 - a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs;
 - a complaints register, updated quarterly;
 - the Annual Reviews (over the last 5 years);
 - any independent environmental audit, and the Applicant's response to the recommendations in any audit;
 - any other matter required by the Secretary; and
 - (b) keep this information up-to-date, to the satisfaction of the Secretary.

**APPENDIX 1
SCHEDULE OF LAND**

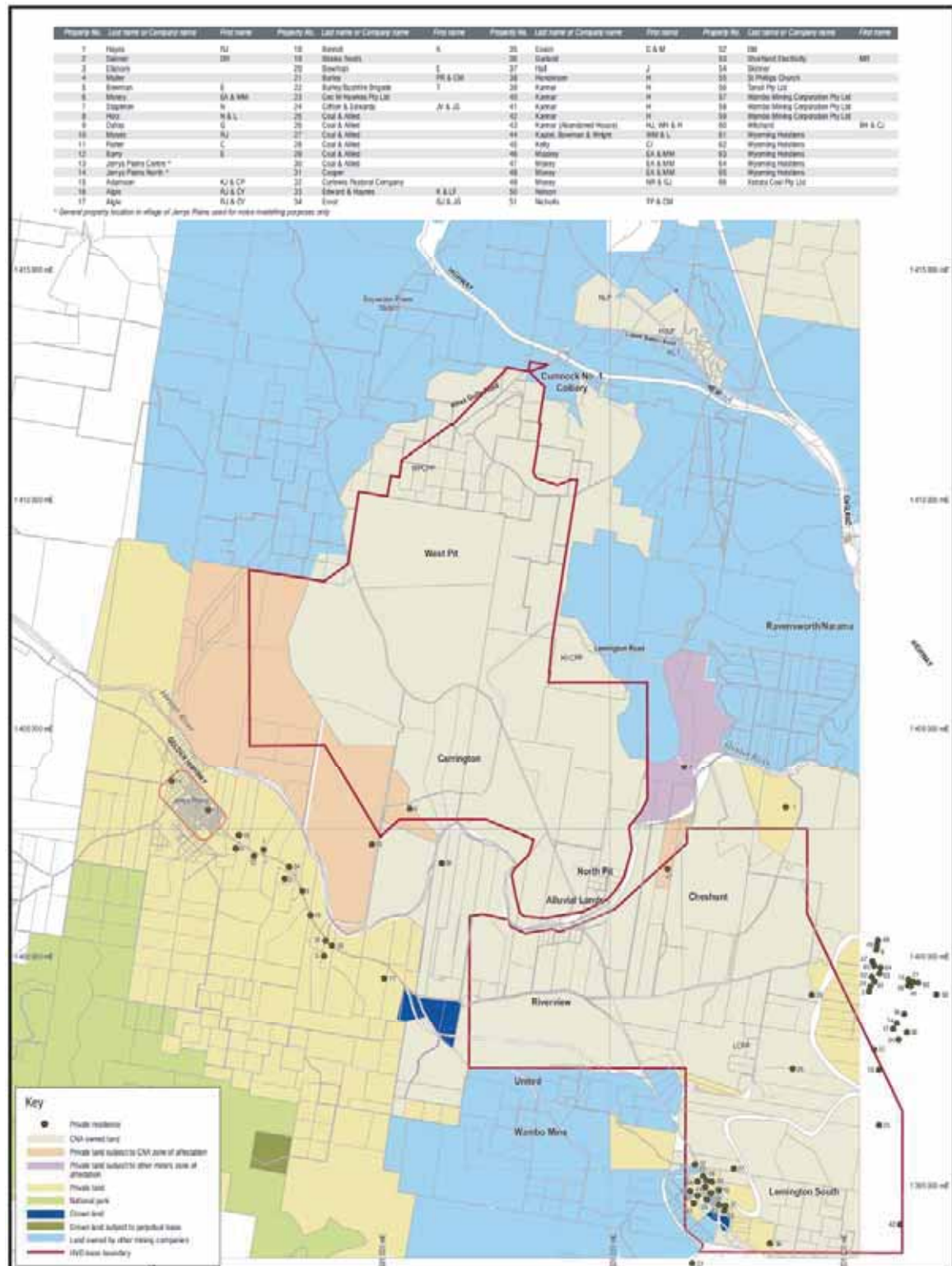
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1	125406	Coal & Allied Operations Pty Ltd and HVO Resources Pty Ltd
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1	211043	Coal & Allied Operations Pty Ltd and HVO Resources Pty Ltd
Part of 1	659810	Coal & Allied Operations Pty Ltd and HVO Resources Pty Ltd
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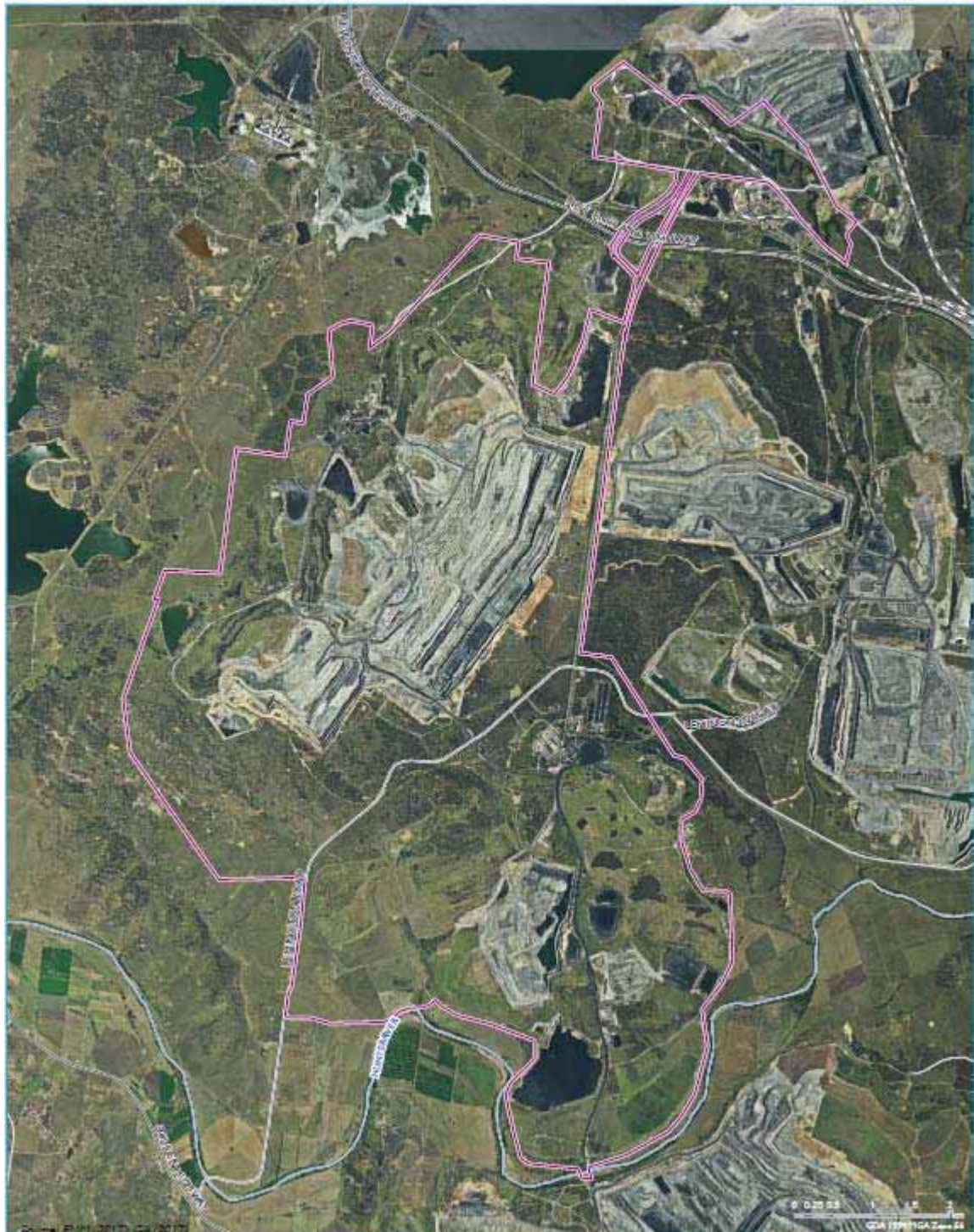
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380	869839	Coal & Allied Operations Pty Ltd and HVO Resources Pty Ltd
Part of 1000	1153575	Coal & Allied Operations Pty Ltd and HVO Resources Pty Ltd
1	574166	AGL Macquarie Pty Ltd
1	1155775	AGL Macquarie Pty Ltd
2	1167986	AGL Macquarie Pty Ltd
Part of 120	1174907	AGL Macquarie Pty Ltd
Part of 601	1019325	AGL Macquarie Pty Ltd
100	700429	Alpha Distribution Ministerial Holding Corporation
89	752470	Charlotte Augusta Bowman
7	48165	Council road - Lemington Road
6	48165	Crown / Council road - Lemington Road
1	776382	Crown / Council Road - Liddell Station Road

2	48165	Crown / Council road - Old Lemington Road
4	48165	Crown / Council road - Old Lemington Road
4	776382	Crown Land
Part of 16	848095	Cumnock No 1 Colliery Pty Limited, ICRA Cumnock Pty Limited
300	856881	Cumnock No 1 Colliery Pty Limited, ICRA Cumnock Pty Limited
Part of 3000	1132357	Cumnock No 1 Colliery Pty Limited, ICRA Cumnock Pty Limited
5	48165	Her most gracious majesty Queen Elizabeth the second - Lemington / Old Lemington Road
8	48165	Her most gracious majesty Queen Elizabeth the second - Lemington Road
Part of 9	48165	Her most gracious majesty Queen Elizabeth the second - Lemington Road
1	48165	Her most gracious majesty Queen Elizabeth the second - Lemington Road
3	48165	Her most gracious majesty Queen Elizabeth the second - Lemington Road
Part of 102	1103268	Liddell Tenements Pty Limited, Mitsui Matsushima Australia Pty Limited, Enex Liddell Pty Limited
Part of 22	869399	Resource Pacific Ltd, Cumnock No.1 Colliery Pty Ltd, Muswellbrook Coal Company Ltd, ICRA Cumnock Pty Ltd
2	1113789	Singleton Council - Council Road - Lemington Road
1	135459	State Rail Authority of New South Wales
1481	1129164	The State of New South Wales
7001	93617	The State of New South Wales
		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
		Hunter River

APPENDIX 2 LANDOWNERSHIP PLAN & RESIDENTIAL RECEIVERS



APPENDIX 2A PROJECT LAYOUT PLAN



KEY

- Local road
- Major road
- - Rail line
- Major waterway
- Modified HVO North
- development consent boundary

Modified HVO North development consent boundary

HVO North Modification 7
Environmental Assessment
Figure 7

**COAL
&
ALLIED**
Managed by the Coal and Allied

APPENDIX 3 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The criteria in Table 9 and 10 apply under all meteorological conditions except:
 - a) during periods of rain or hail;
 - b) when average wind speed at microphone height exceeds 5 m/s;
 - c) when wind speeds greater than 3 m/s are measured at 10 m above ground level; or
 - d) during temperature inversion conditions greater than 3°C/100 m.

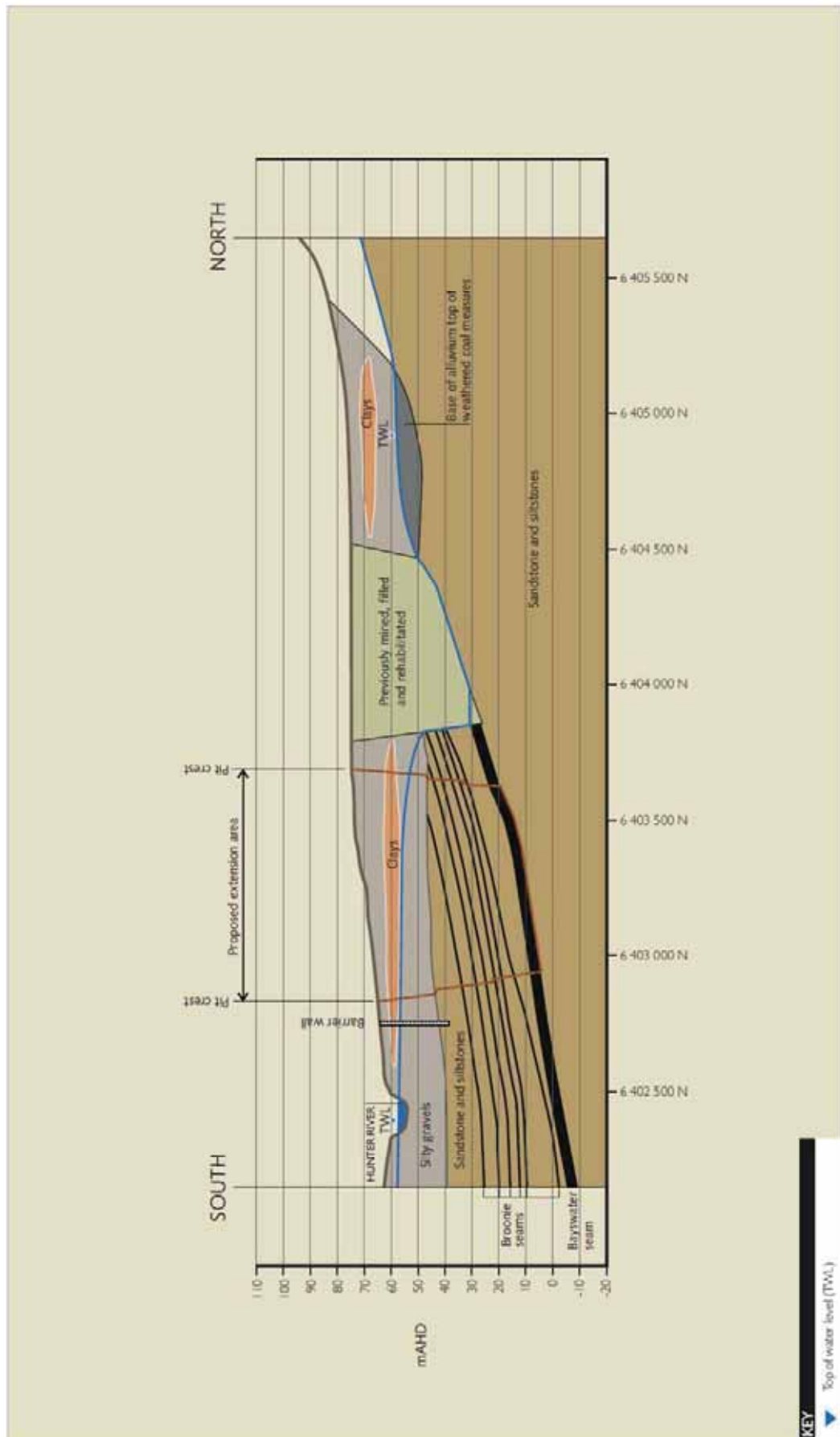
Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions **must** be those recorded by the meteorological station located on the site.

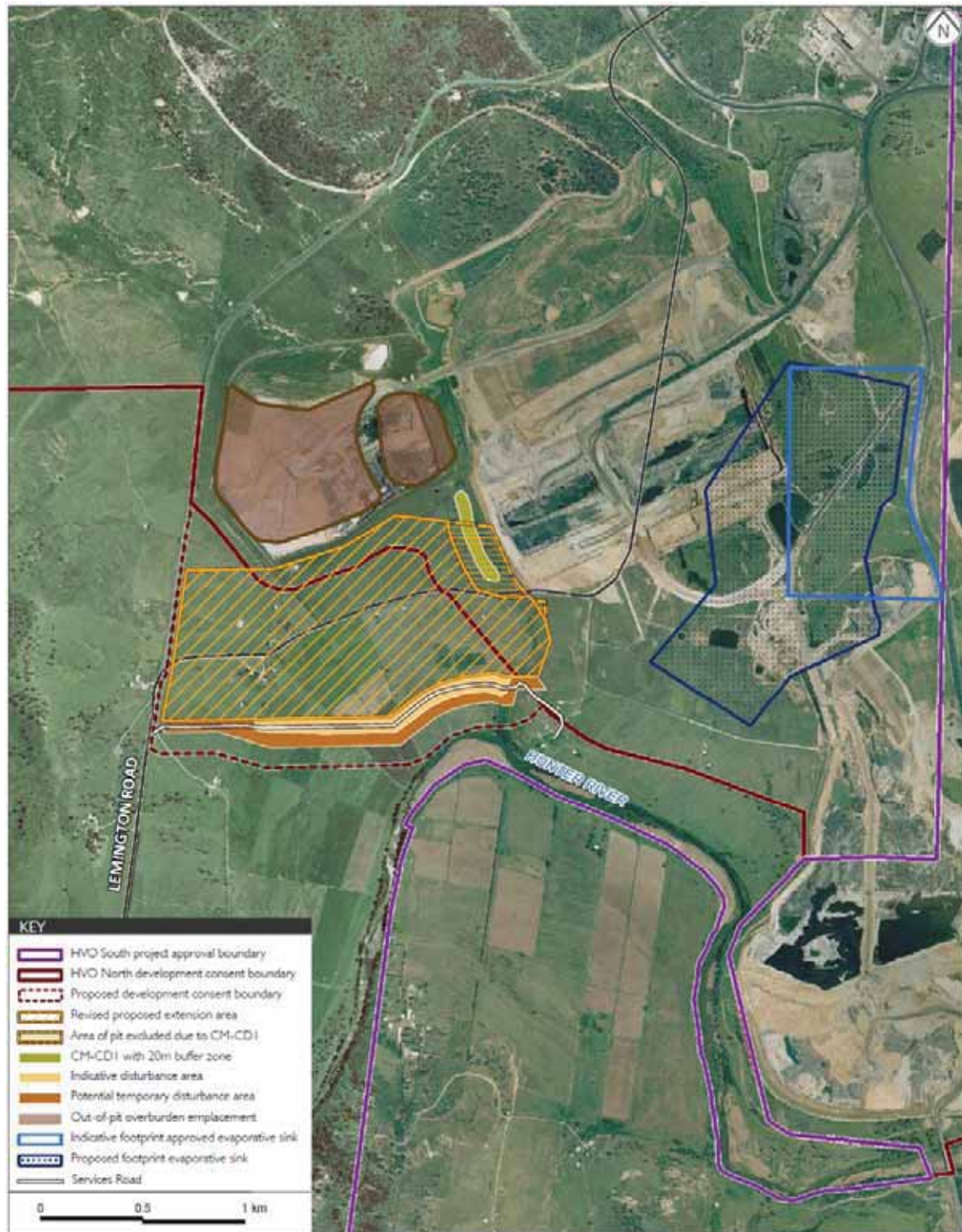
Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.
4. Unless otherwise agreed with the **Secretary**, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW *Industrial Noise Policy* (as amended or replaced from time to time), including the requirements relating to:
 - a) monitoring locations for collection of representative noise data;
 - b) meteorological conditions during which collection of noise data is not appropriate;
 - c) equipment used to collect noise data, and conformation with relevant Australian Standards for such equipment; and
 - d) modifications to noise data collected, including the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

APPENDIX 4 CONCEPTUAL GROUNDWATER BARRIER WALL



APPENDIX 5 REVISED MINE PLAN AVOIDING SITE CM-CD1



Revised key project elements

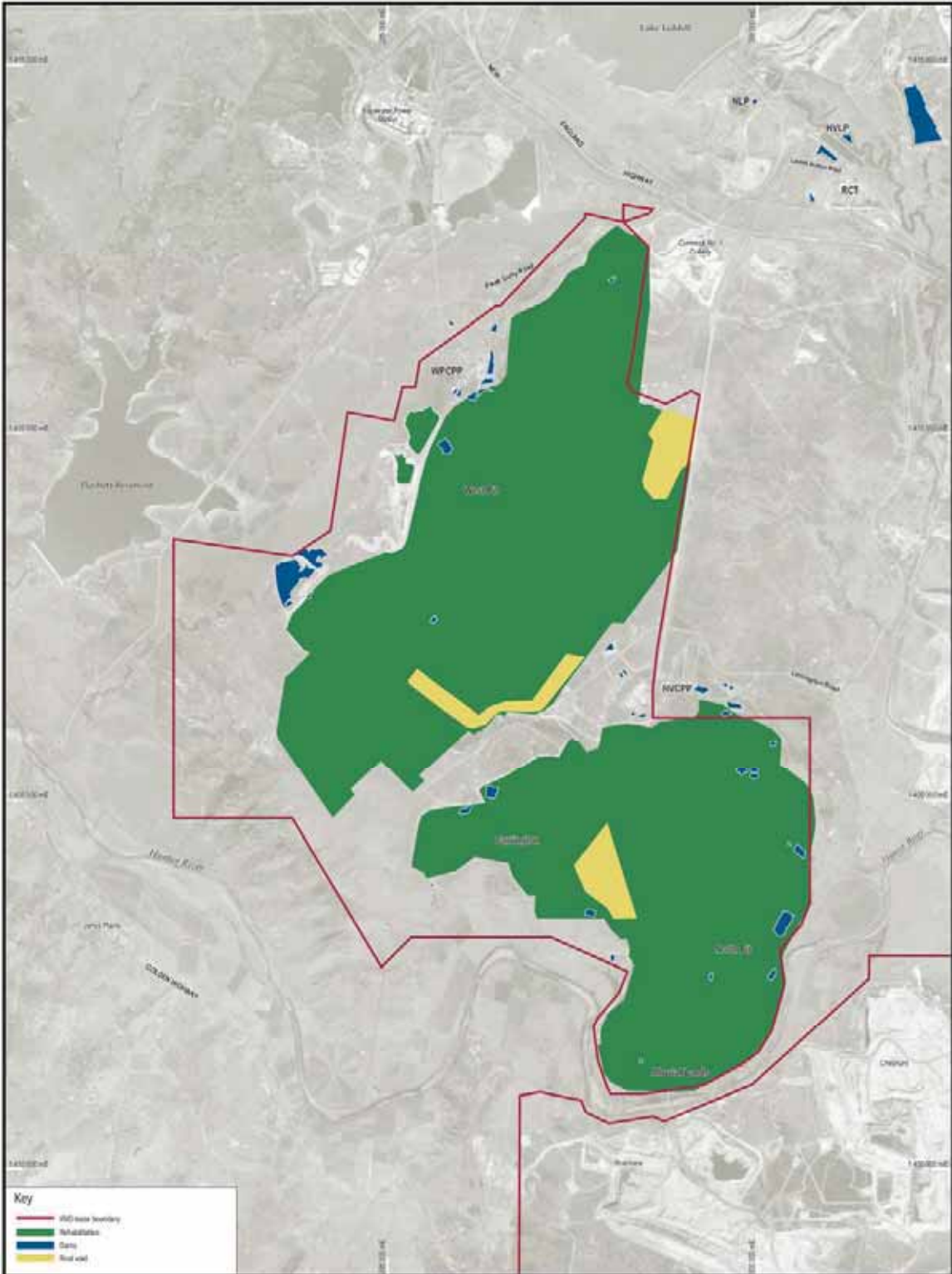


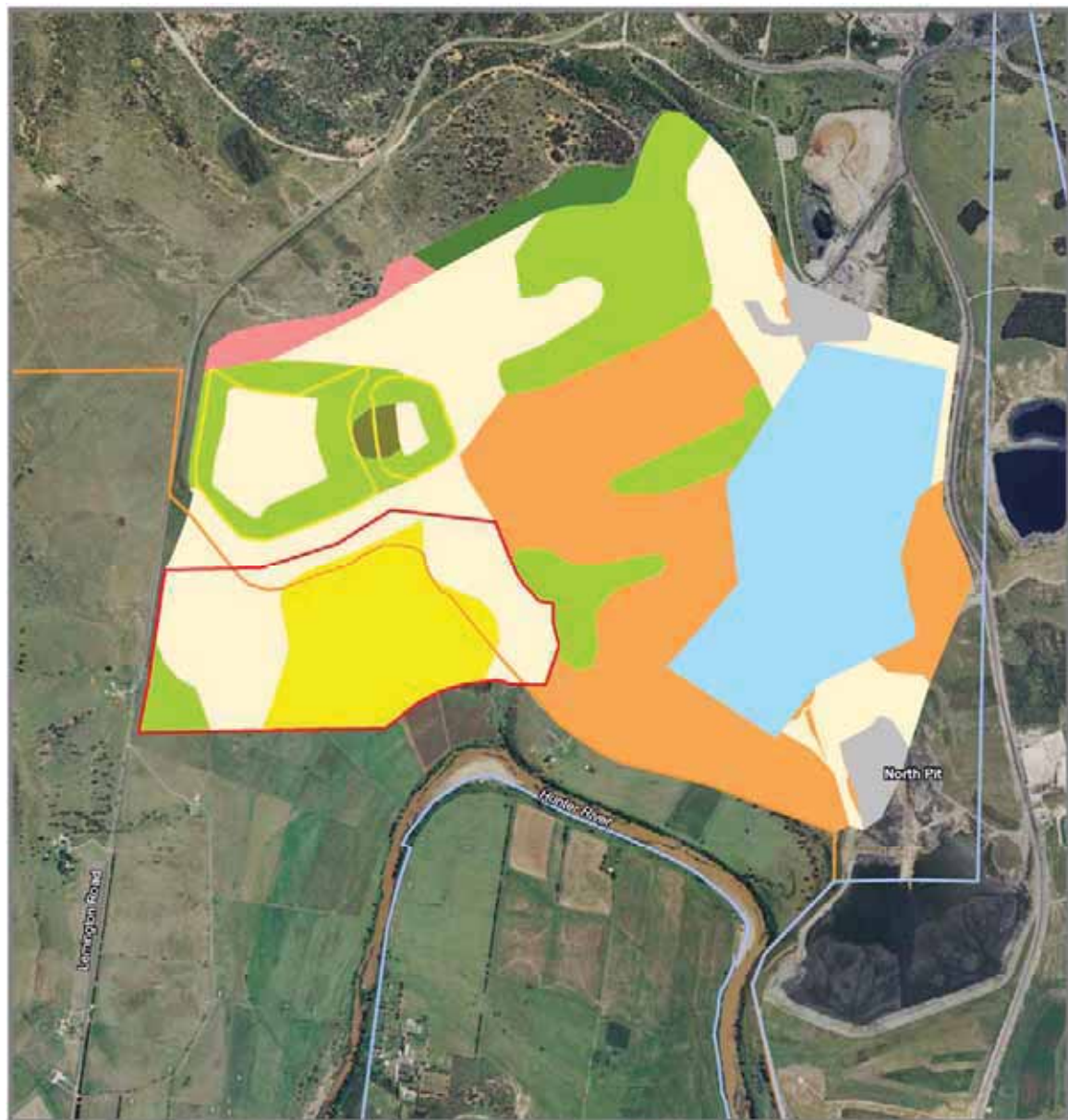
Carrington West Wing

FIGURE I

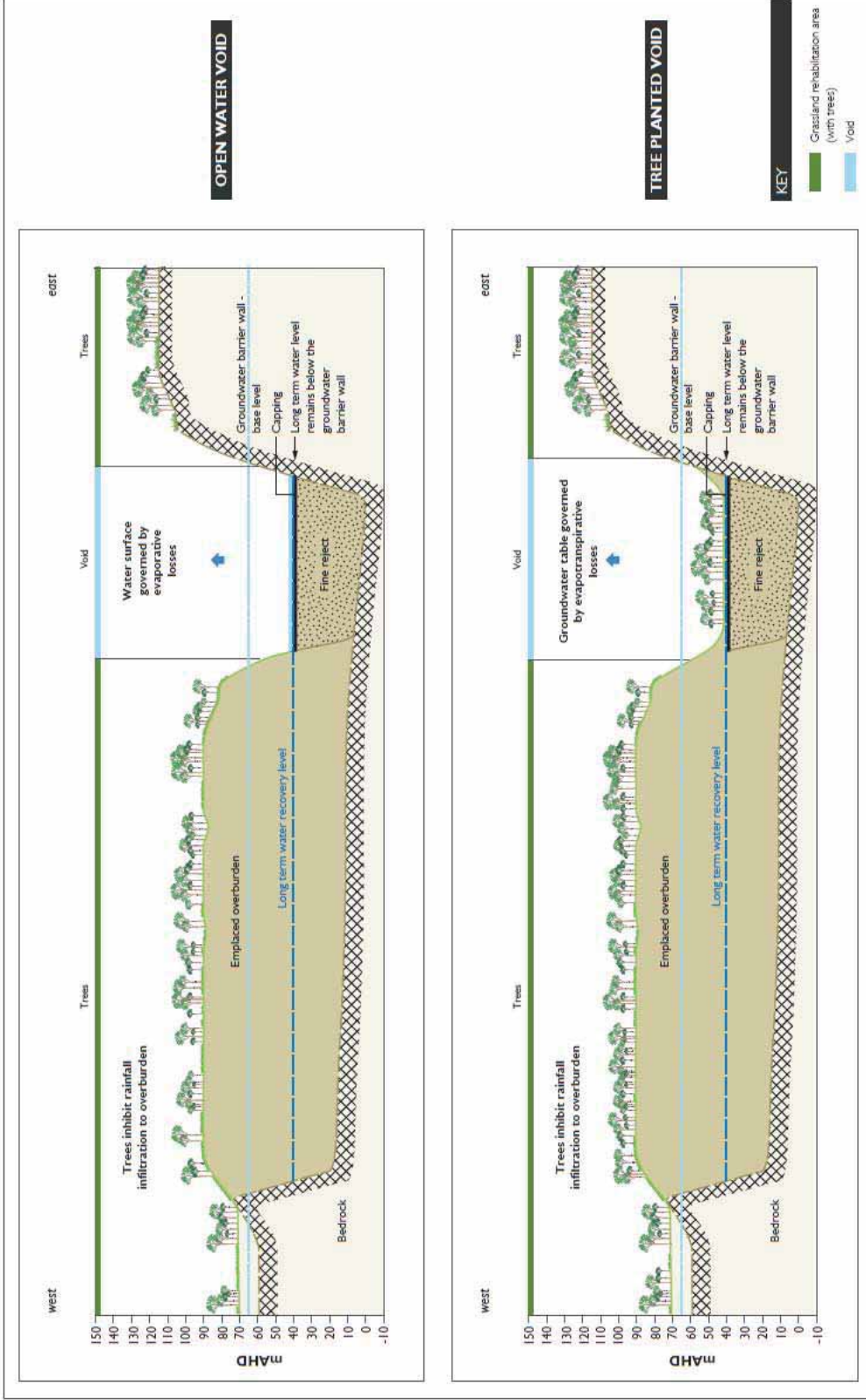
APPENDIX 6

CONCEPTUAL FINAL LANDFORM PLANS





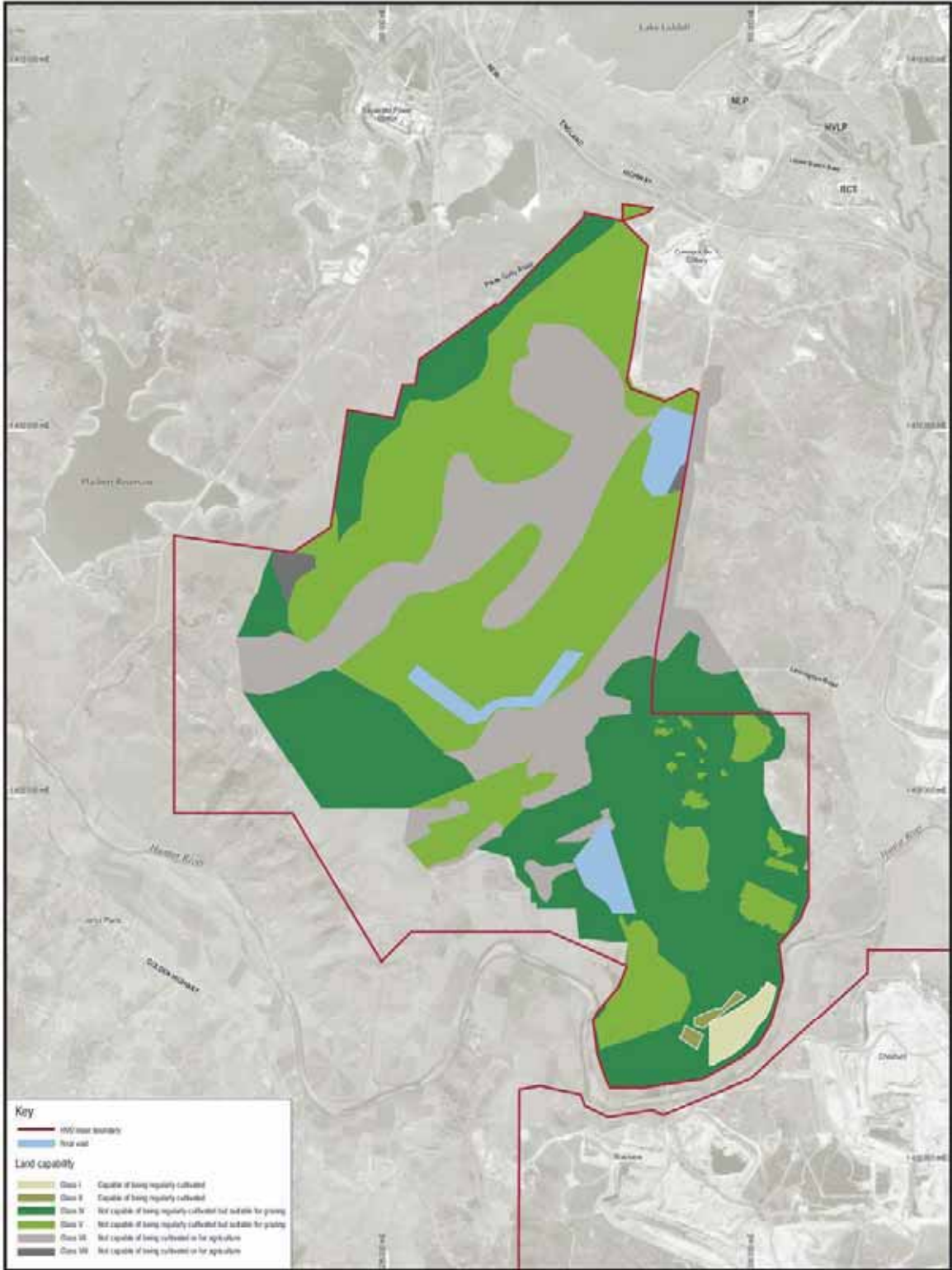
- | | |
|---|--|
| Regenerated Grassland (grazing) | HVO North current development consent boundary |
| Regenerated Woodland (biodiversity) | HVO South project approval boundary |
| Rehabilitated Grassland (grazing/cropping) | Proposed footprint of evaporative sink |
| Rehabilitated Woodland (biodiversity) | Out-of-pit overburden emplacement |
| Rehabilitated Woodland (grazing) | Proposed extension area |
| Void / dam / mining area | |
| Rehabilitated Woodland (Central Hunter Box - Ironbark Woodland) - indicative location | |
| Rehabilitated Grassland (grazing/ cropping) - Class II land capability | |



Carrington Pit final void with fine reject emplacement
Hunter Valley North Operations – Modification 6
Environmental Assessment

APPENDIX 7

CONCEPTUAL FINAL LANDUSE PLANS





Source: Aerial imagery RTCA

Post-mining agricultural suitability classes



Carrington West Wing

FIGURE 2

APPENDIX B

Schedule of Land Ownership

Lot/DP	Property Owner
1/90727	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
1/110662	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
1/114966	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
1/125406	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 1/191982	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
1/211043	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 1/659810	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
1/727260	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 1/729048	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
1/737796	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
1/779625	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
1/794836	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
1/808431	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
1/823767	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 1/1078618	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
1/1113789	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
1/1152619	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 2/48555	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
2/114966	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
2/125406	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
2/574166	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 2/808301	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
2/808431	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
2/1152619	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
3/48555	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
3/125406	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
3/252530	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
3/1113789	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 3/1152619	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
4/48555	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
4/125406	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
4/130831	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
4/252530	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
4/1113789	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 4/1152619	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
5/48555	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
5/125406	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
5/252530	Coal & Allied Operations Pty Ltd and Anotero Pty Limited

Lot/DP	Property Owner
5/1113789	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
6/125406	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
6/1113789	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
7/48555	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
7/125406	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 7/1113789	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
8/125406	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
8/252530	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
9/125406	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
10/125406	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 10/740183	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
11/125406	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
11/858172	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
17/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
18/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 20/1085391	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 21/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
21/786904	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 22/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
22/786904	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
38/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
53/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
54/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
58/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
65/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
66/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
68/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
70/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
71/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
80/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
81/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 82/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
82/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
83/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
83/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
84/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
89/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 93/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited

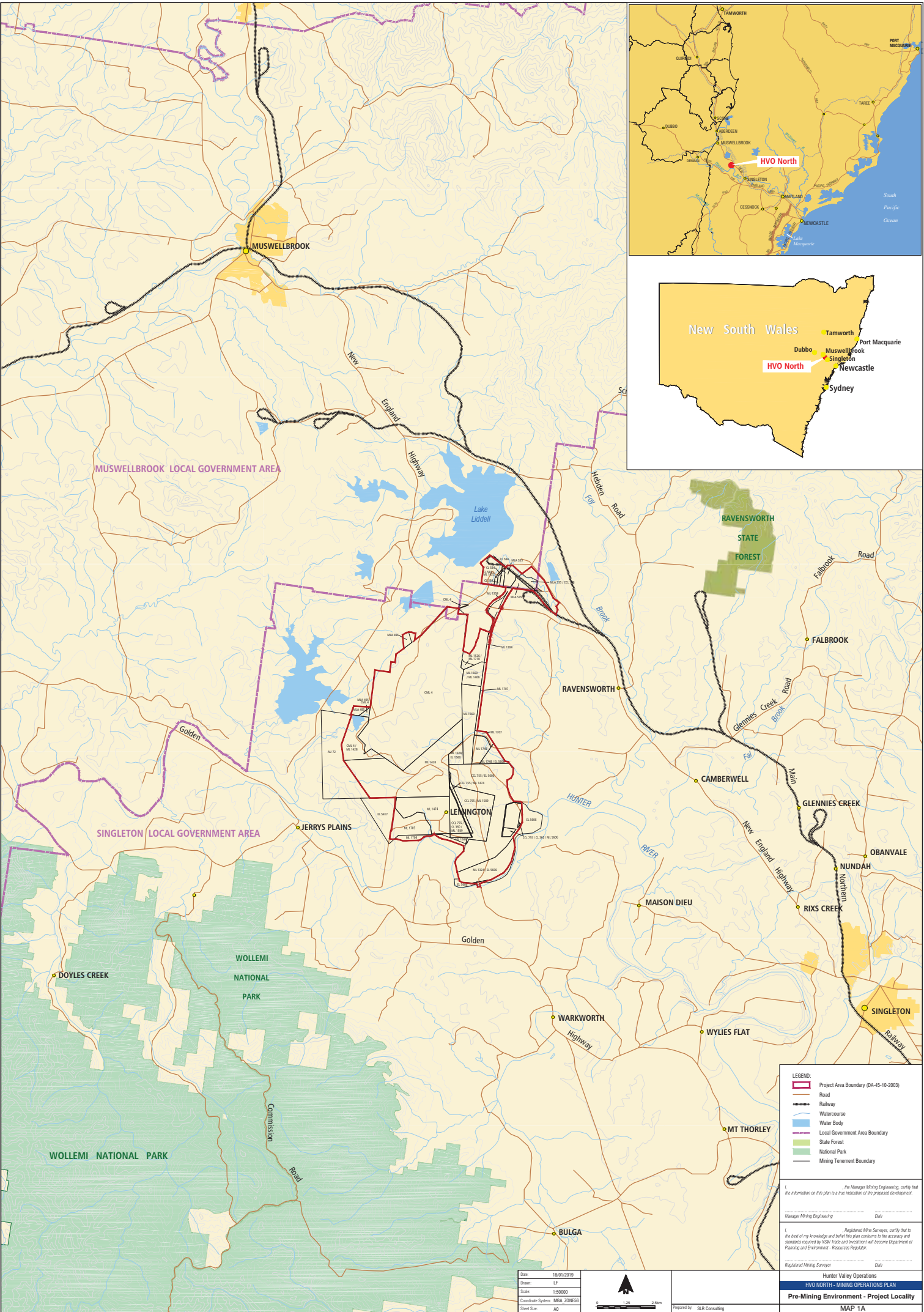
Lot/DP	Property Owner
Part of 94/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 98/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 101/1017998	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
102/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
103/1103268	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 111/1059007	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
117/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
118/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
119/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 120/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 121/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
121/1174907	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
122/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 122/1174907	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
123/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
124/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
125/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
126/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 127/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 127/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 156/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
157/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
158/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
159/752468	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 164/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 170/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
171/752481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
182/975271	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
183/975271	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
184/975271	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
192/975271	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
193/975271	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
200/725481	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
201/544091	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
211/975271	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
212/975271	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
217/975271	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
218/975271	Coal & Allied Operations Pty Ltd and Anotero Pty Limited

Lot/DP	Property Owner
219/975271	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
221/975271	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 300/597726	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
304/868175	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
380/869839	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
Part of 1000/1153575	Coal & Allied Operations Pty Ltd and Anotero Pty Limited
1/574166	AGL Macquarie Pty Ltd
1/1155775	AGL Macquarie Pty Ltd
2/1167986	AGL Macquarie Pty Ltd
Part of 120/1174907	AGL Macquarie Pty Ltd
Part of 601/1019325	AGL Macquarie Pty Ltd
100/700429	Alpha Distribution Ministerial Holding Corporation
89/752470	Charlotte Augusta Bowman
7/48165	Council Road – Lemington Road
6/48165	Crown/Council Road – Lemington Road
1/776382	Crown/Council Road – Liddell Station Road
2/48165	Crown/Council Road – Old Lemington Road
4/48165	Crown/Council Road – Old Lemington Road
4/776382	Crown Land
Part of 16/848095	Cumnock No 1 Colliery Pty Limited, ICRA Cumnock Pty Limited
300/856881	Cumnock No 1 Colliery Pty Limited, ICRA Cumnock Pty Limited
Part of 3000/1132357	Cumnock No 1 Colliery Pty Limited, ICRA Cumnock Pty Limited
5/48165	Her most gracious majesty Queen Elizabeth the second – Lemington Road
8/48165	Her most gracious majesty Queen Elizabeth the second – Lemington Road
Part of 9/48165	Her most gracious majesty Queen Elizabeth the second – Lemington Road
1/48165	Her most gracious majesty Queen Elizabeth the second – Lemington Road
3/48165	Her most gracious majesty Queen Elizabeth the second – Lemington Road
Part of 102/1103268	Liddell Tenements Pty Limited, Mitsui Matsushima Australia Pty Limited, Enex Liddell Pty Limited
Part of 22/869399	Resource Pacific Ltd, Cumnock No. 1 Colliery Pty Ltd, Muswellbrook Company Ltd, ICRA Cumnock Pty Ltd
2/1113789	Singleton Council – Council Road – Lemington Road
1/135459	State Rail Authority of New South Wales
1481/1129164	The State of New South Wales
7001/93617	The State of New South Wales
	Part Crown (Coal & Allied Operations Pty Limited) Licence 175936
	Crown Land – Closed Road – North side 7001/93617

Lot/DP	Property Owner
	Part Crown land South Bank Hunter River
	Old Highway Road
	Lemington Road
	Liddell Station Road
	NEW ENGLAND HIGHWAY – New England Highway
	Railway – Newdell Rail Spur
	Various Crown and Council Roads
	Hunter River

APPENDIX C

MOP Plans



LEGEND:

- Project Area Boundary (DA-45-10-2003)
- Road
- Railway
- Watercourse
- Water Body
- Local Government Area Boundary
- State Forest
- National Park
- Mining Tenement Boundary

I, _____, the Manager Mining Engineering, certify that the information on this plan is a true indication of the proposed development.


Manager Mining Engineering _____ Date _____

I, _____, Registered Mine Surveyor, certify that to the best of my knowledge and belief this plan conforms to the accuracy and standards required by NSW Trade and Investment and will become Department of Planning and Environment - Resources Registrar.

Registered Mine Surveyor _____ Date _____

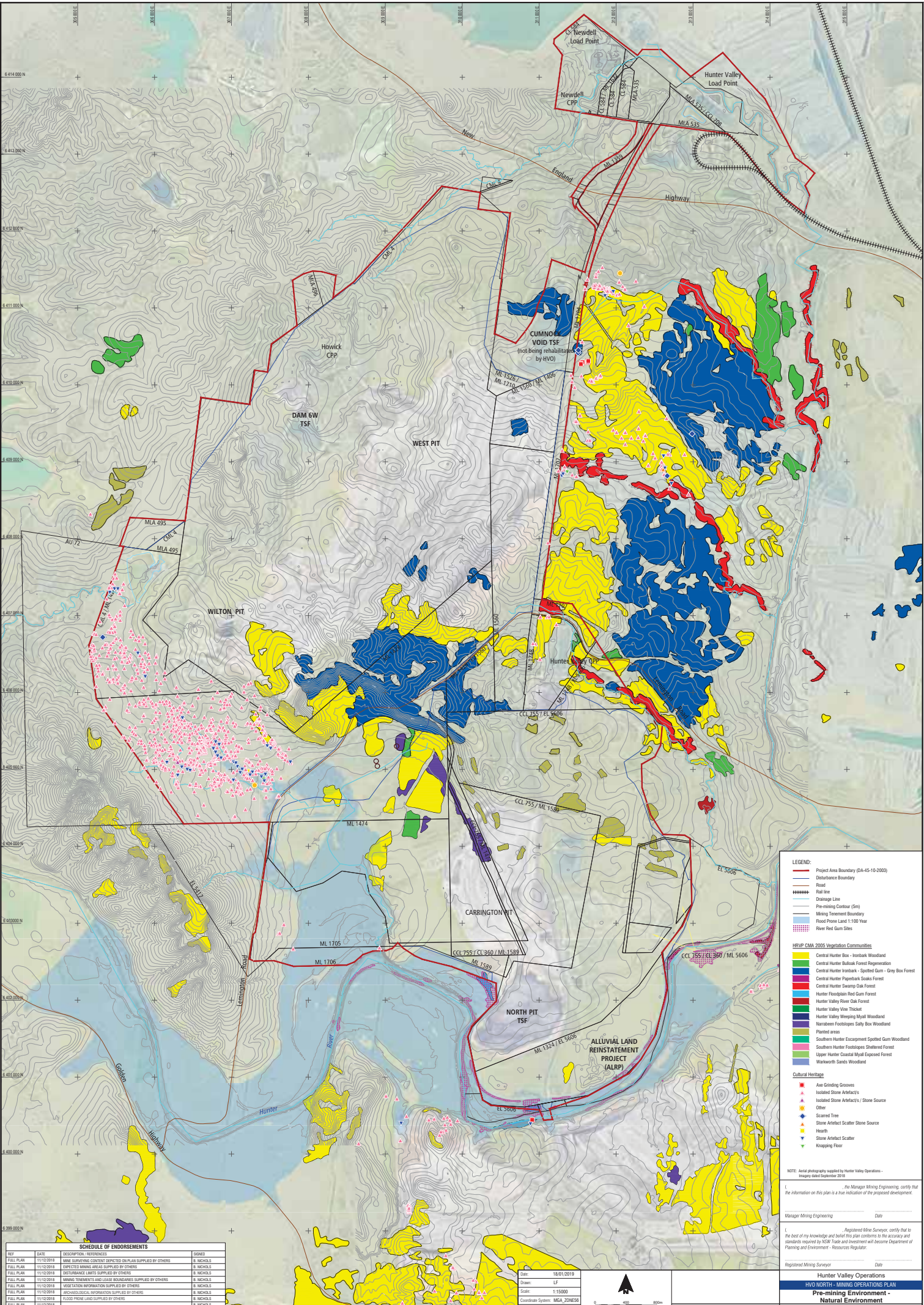
Hunter Valley Operations
HVO NORTH - MINING OPERATIONS PLAN
Pre-Mining Environment - Project Locality
MAP 1A

Date:	18/01/2019
Drawn:	LF
Scale:	1:50000
Coordinate System:	MGA_ZONE98
Sheet Size:	A0



0 1.25 2.5km

Prepared by: SLR Consulting



LEGEND:

- Project Area Boundary (DA-45-10-2003)
- Disturbance Boundary
- Road
- Rail line
- Drainage Line
- Pre-mining Contour (5m)
- Mining Tenement Boundary
- Flood Phone Land 1:100 Year
- River Red Gum Sites

HVMP CMA 2005 Vegetation Communities

- Central Hunter Box - Ironbark Woodland
- Central Hunter Bullock Forest Regeneration
- Central Hunter Ironbark - Spotted Gum - Grey Box Forest
- Central Hunter Paperbark Soaks Forest
- Central Hunter Swampy Oak Forest
- Hunter Floodplain Red Gum Forest
- Hunter Valley River Oak Forest
- Hunter Valley Vine Thicket
- Hunter Valley Weeping Myall Woodland
- Northern Floodplain Salsy Box Woodland
- Planted areas
- Southern Hunter Escarpment Spotted Gum Woodland
- Southern Hunter Floodplains Sheltered Forest
- Upper Hunter Coastal Myall Escaped Forest
- Workworth Sands Woodland

Cultural Heritage

- Art Grinding Cores
- Isolated Stone Artefacts
- Isolated Stone Artefacts / Stone Source
- Other
- Scattered Tree
- Stone Artefact Scatter Stone Source
- Hearts
- Stone Artefact Scatter
- Knapping Floor

NOTE: Aerial photography supplied by Hunter Valley Operations - Imagery dated September 2018

I, _____, the Manager Mining Engineering, certify that the information on this plan is a true indication of the proposed development.

Manager Mining Engineering _____ Date _____

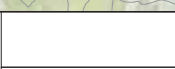
I, _____, Registered Mine Surveyor, certify that to the best of my knowledge and belief this plan conforms to the accuracy and standards required by NSW Trade and Investment and will become Department of Planning and Environment - Resources Register.

Registered Mine Surveyor _____ Date _____

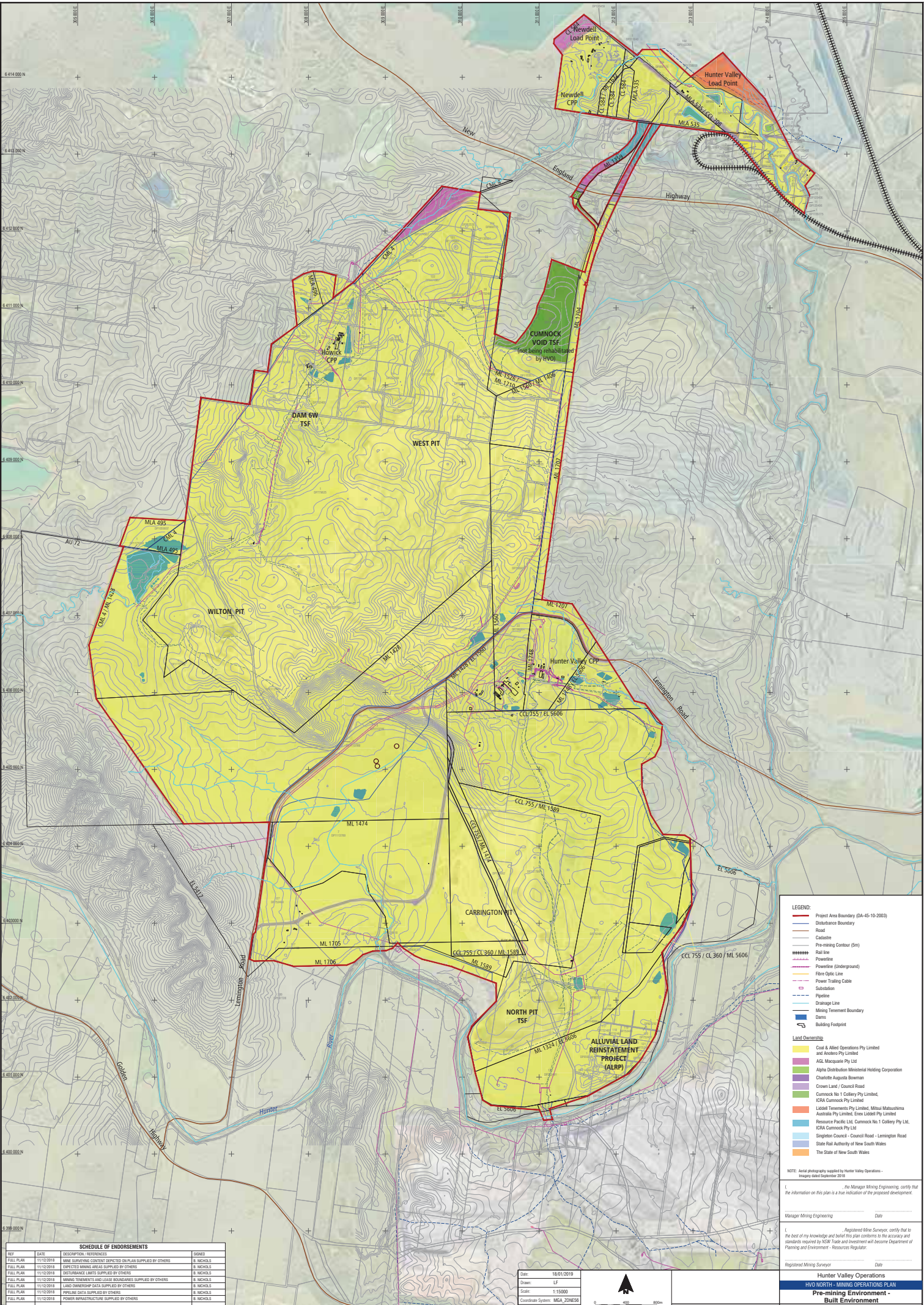
Hunter Valley Operations
HVO NORTH - MINING OPERATIONS PLAN
Pre-mining Environment -
Natural Environment
PLAN 1B

SCHEDULE OF ENDORSEMENTS			
REF	DATE	DESCRIPTION / REFERENCES	SIGNED
FULL PLAN	11/10/2018	FINAL SURVEYING CONTROL SPECIFIC ON PLAN SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2018	EXPECTED MINING AREAS SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2018	DISTURBANCE LIMITS SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2018	MINING TENEMENTS AND LEASE BOUNDARIES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2018	VEGETATION INFORMATION SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2018	ARCHAEOLOGICAL INFORMATION SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2018	GLASS TONNE LAND SUPPLIED BY OTHERS	B. NICHOLS

Date: 18/01/2019
Drawn: LF
Scale: 1:15000
Coordinate System: MGA_ZONE98
Sheet Size: A0



Prepared by: SLR Consulting



LEGEND:

- Project Area Boundary (DA-45-10-2003)
- Disturbance Boundary
- Road
- Pre-mining Contour (5m)
- Rail line
- Powerline (Overhead)
- Powerline (Underground)
- Fibre Optic Line
- Power Trailing Cable
- Substation
- Pipeline
- Drainage Line
- Mining Tenement Boundary
- Dams
- Building Footprint

Land Ownership

- Coal & Allied Operations Pty Limited and Andros Pty Limited
- AGL Macquarie Pty Ltd
- Alpha Distribution Ministerial Holding Corporation
- Charlotte Augusta Bowman
- Crown Land / Council Road
- Cummoock No. 1 Colliery Pty Limited
- ICRA Cummoock Pty Limited
- Liddell Tenements Pty Limited, Minal Malsumina
- Resource Pacific Ltd, Cummoock No. 1 Colliery Pty Ltd, ICRA Cummoock Pty Ltd
- Singtel Council - Council Road - Lemington Road
- State Rail Authority of New South Wales
- The State of New South Wales

NOTE: Aerial photography supplied by Hunter Valley Operations - Imagery dated September 2018

I, the Manager Mining Engineering, certify that the information on this plan is a true indication of the proposed development.

Manager Mining Engineering _____ Date _____

I, the Registered Mine Surveyor, certify that to the best of my knowledge and belief this plan conforms to the accuracy and standards required by NSW Trade and Investment and the Department of Planning and Environment - Resources Regulator.

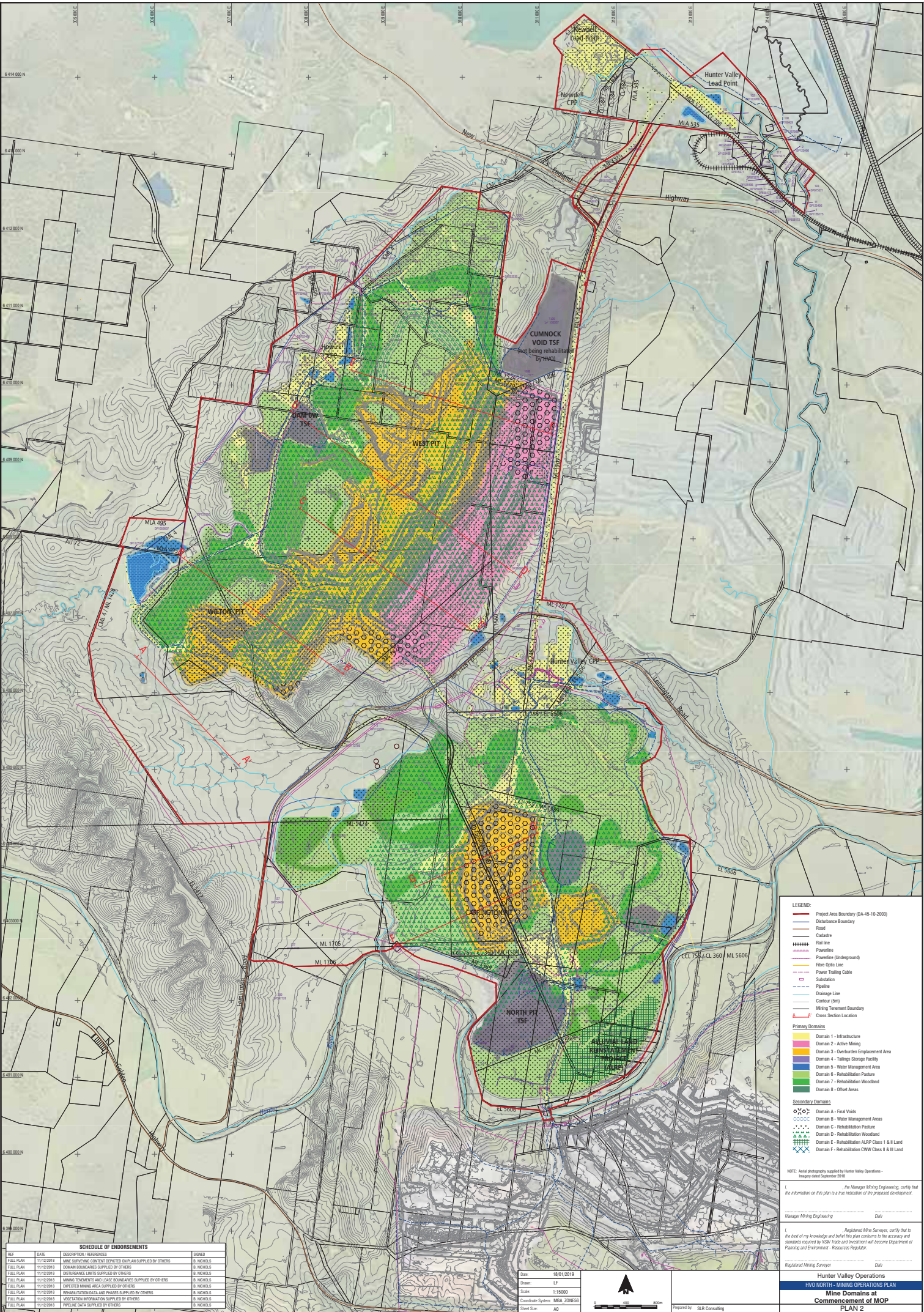
Registered Mine Surveyor _____ Date _____

Hunter Valley Operations
HVO NORTH - MINING OPERATIONS PLAN
Pre-mining Environment - Built Environment
PLAN 1C

SCHEDULE OF ENDORSEMENTS			
REF	DATE	DESCRIPTION / REFERENCES	SIGNED
FULL PLAN	11/12/2018	FINAL SURVEYING CONTRACT SPECIFIED ON PLAN SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/12/2018	EXPECTED MINING AREAS SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/12/2018	DISTURBANCE LIMITS SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/12/2018	MINING TENEMENTS AND LEASE BOUNDARIES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/12/2018	LAND OWNERSHIP DATA SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/12/2018	PIPELINE DATA SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/12/2018	POWER INFRASTRUCTURE SUPPLIED BY OTHERS	B. NICHOLS

Date: 18/01/2019
Drawn: LF
Scale: 1:15000
Coordinate System: MGA_ZONE98
Sheet Size: A0

Prepared by: SLR Consulting



LEGEND:

- Project Area Boundary (DA-45-10-2003)
- Disturbance Boundary
- Road
- Calcrete
- Rail line
- Powerline
- Powerline (Underground)
- Fibre Optic Line
- Power Trailing Cable
- Pipeline
- Substation
- Drainage Line
- Contour (5m)
- Mining Tenement Boundary
- Cross Section Location

Primary Domains

- Domain 1 - Infrastructure
- Domain 2 - Active Mining
- Domain 3 - Overburden Employment Area
- Domain 4 - Tailings Storage Facility
- Domain 5 - Water Management Area
- Domain 6 - Rehabilitation Pasture
- Domain 7 - Rehabilitation Woodland
- Domain 8 - Offset Areas

Secondary Domains

- Domain A - Final Voids
- Domain B - Water Management Areas
- Domain C - Rehabilitation Pasture
- Domain D - Rehabilitation Woodland
- Domain E - Rehabilitation ALSP Class 1 & B Land
- Domain F - Rehabilitation CWW Class 8 & B Land

NOTE: Aerial photography supplied by Hunter Valley Operations - Imagery dated September 2018

I, _____, the Manager Mining Engineering, certify that the information on this plan is a true indication of the proposed development.

Manager Mining Engineering _____ Date _____

I, _____, Registered Mine Surveyor, certify that to the best of my knowledge and belief this plan conforms to the accuracy and standards required by NSW Trade and Investment and will become Department of Planning and Environment - Resources Regulator.

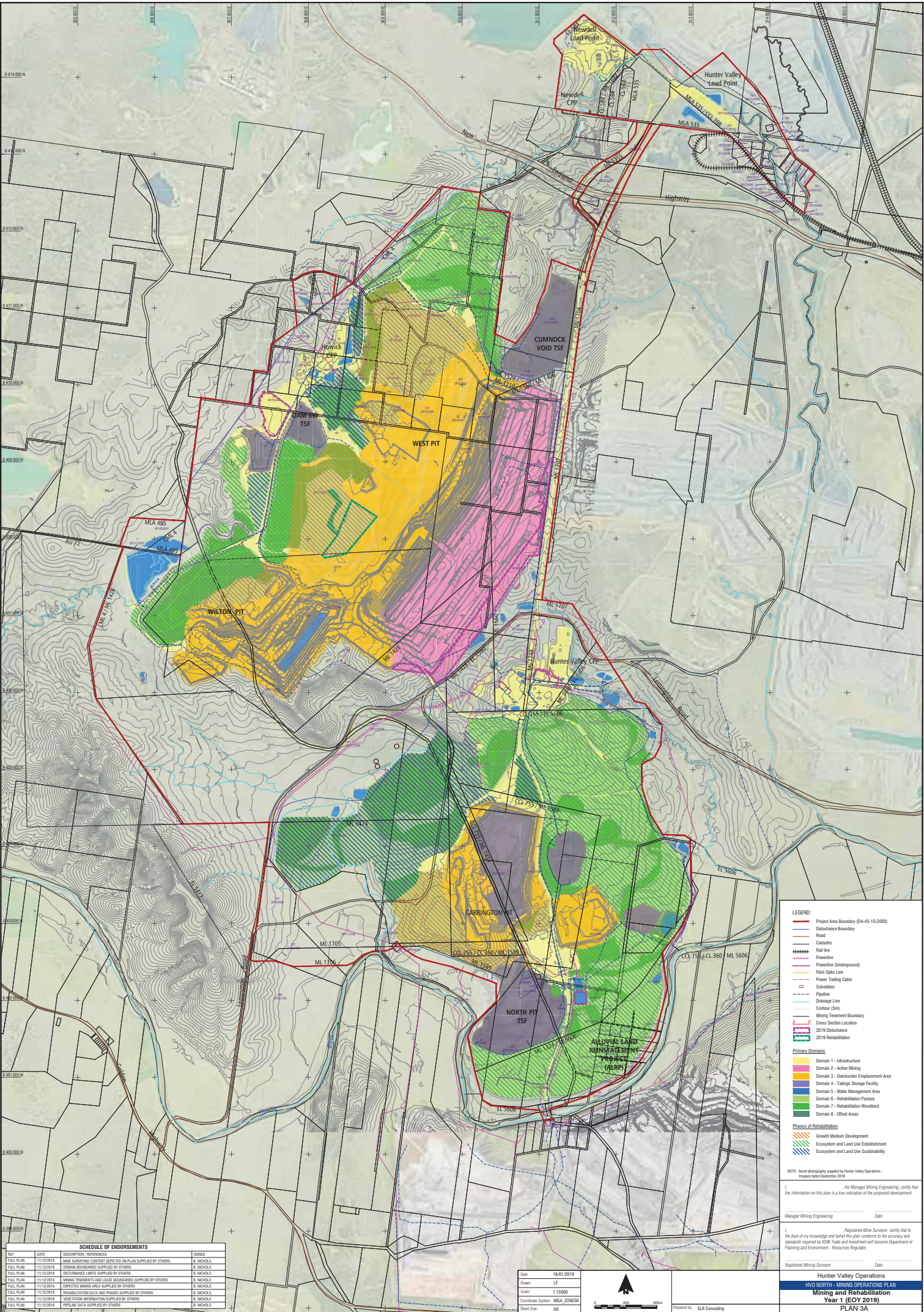
Registered Mining Surveyor _____ Date _____

Hunter Valley Operations
HVO NORTH - MINING OPERATIONS PLAN
Mine Domains at
Commencement of MOP
PLAN 2

SCHEDULE OF ENDORSEMENTS			
REF	DATE	DESCRIPTION / REFERENCES	SIGNED
FULL PLAN	11/10/2018	FINAL SURVEYING CONTROL DEPICTED ON PLAN SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2018	COASTAL BOUNDARIES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2018	OUTSTANDING LIMITS SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2018	MINING TENEMENTS AND LEASE BOUNDARIES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2018	DEPICTED MINING AREA SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2018	REHABILITATION DATA AND PHASES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2018	REGISTRATION INFORMATION SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2018	PIPELINE DATA SUPPLIED BY OTHERS	B. NICHOLS

Date: 18/01/2019
Drawn: LF
Scale: 1:15000
Coordinate System: MGA_ZONE98
Sheet Size: A0

Prepared by: SLR Consulting



LEGEND:

- Project Area Boundary (DA-45-10-2003)
- Disturbance Boundary
- Road
- Cadastre
- Rail line
- Powerline
- Powerline (Underground)
- Fibre Optic Line
- Power Trailing Cable
- Substation
- Pipeline
- Drainage Line
- Contour (5m)
- Mining Tenement Boundary
- Cross Section Location
- 2019 Disturbance
- 2019 Rehabilitation

Primary Domains

- Domain 1 - Infrastructure
- Domain 2 - Active Mining
- Domain 3 - Overburden Employment Area
- Domain 4 - Tailings Storage Facility
- Domain 5 - Water Management Area
- Domain 6 - Rehabilitation Pasture
- Domain 7 - Rehabilitation Woodland
- Domain 8 - Other Areas

Phases of Rehabilitation

- Growth Medium Development
- Ecosystem and Land Use Establishment
- Ecosystem and Land Use Sustainability

NOTE: Aerial photography supplied by Hunter Valley Operations - Imagery dated September 2018

I, _____, the Manager Mining Engineering, certify that the information on this plan is a true indication of the proposed development.

Manager Mining Engineering _____ Date _____

I, _____, Registered Mine Surveyor, certify that to the best of my knowledge and belief this plan conforms to the accuracy and standards required by NSW Trade and Investment and will become Department of Planning and Environment - Resources Registrar.

Registered Mining Engineer _____ Date _____

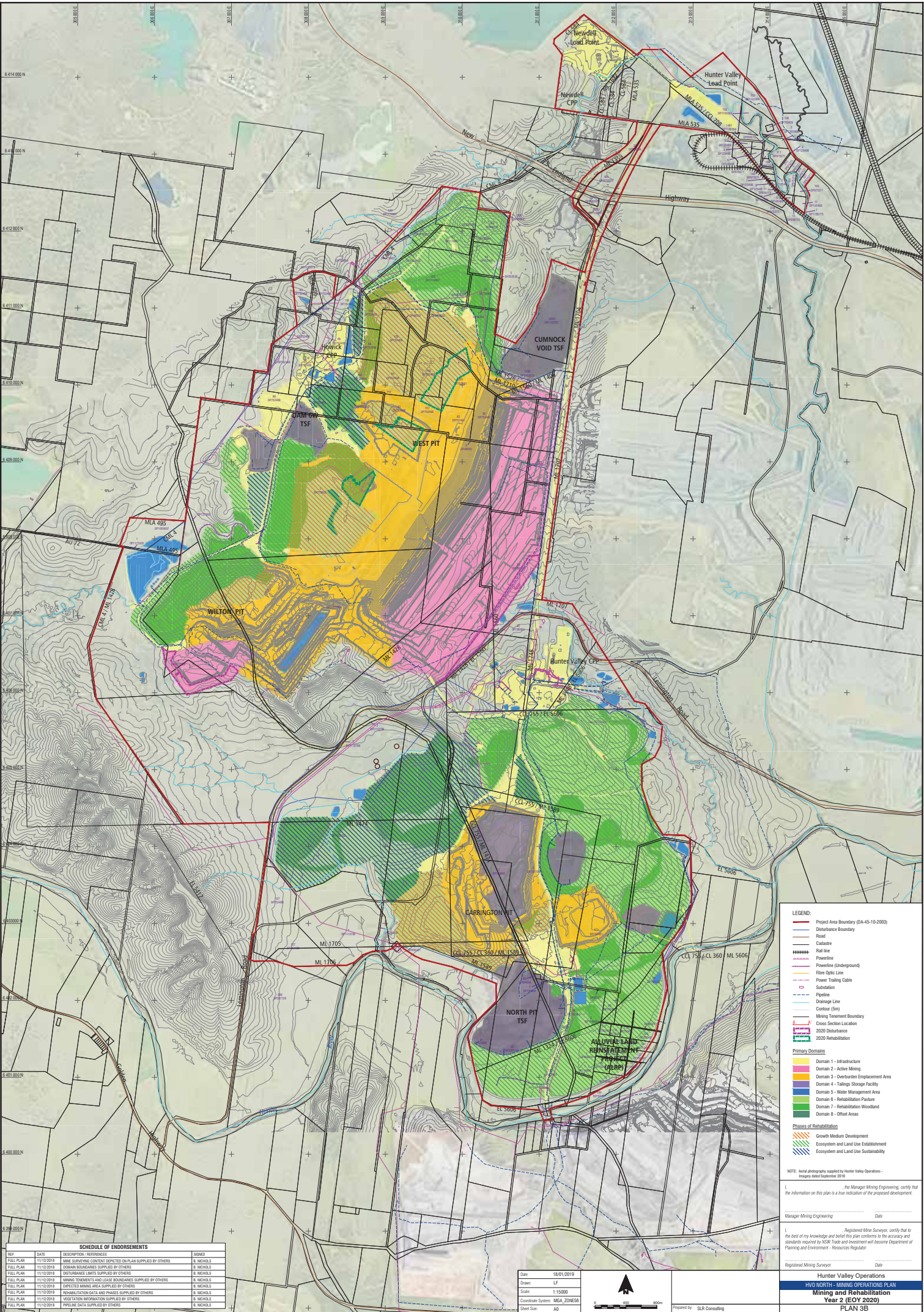
Hunter Valley Operations
HVO NORTH - MINING OPERATIONS PLAN
Mining and Rehabilitation
Year 1 (ECV 2019)
PLAN 3A

SCHEDULE OF ENDORSEMENTS			
REF	DATE	DESCRIPTION / REFERENCES	SIGNED
FULL PLAN	11/10/2019	FINAL SURVEYING CONTROL DEPICTED ON PLAN SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	COMMON BOUNDARIES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	DISTURBANCE LIMITS SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	MINING TENEMENTS AND LEASE BOUNDARIES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	EXPECTED MINING AREA SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	REHABILITATION DATA AND PHASES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	REGISTRATION INFORMATION SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	PIPELINE DATA SUPPLIED BY OTHERS	B. NICHOLS

Date: 18/01/2019
Drawn: LF
Scale: 1:15000
Coordinate System: MGA_ZONE96
Sheet Size: A0



Prepared by: SLR Consulting



LEGEND:

- Project Area Boundary (DA-45-10-2003)
- Disturbance Boundary
- Road
- Cadastre
- Rail line
- Powerline
- Powerline (Underground)
- Fibre Optic Line
- Power Trailing Cable
- Substation
- Pipeline
- Drainage Line
- Contour (5m)
- Mining Tenement Boundary
- Cross Section Location
- 2020 Disturbance
- 2020 Rehabilitation

Primary Domains

- Domain 1 - Infrastructure
- Domain 2 - Active Mining
- Domain 3 - Overburden Employment Area
- Domain 4 - Tailings Storage Facility
- Domain 5 - Water Management Area
- Domain 6 - Rehabilitation Pasture
- Domain 7 - Rehabilitation Woodland
- Domain 8 - Other Areas

Phases of Rehabilitation

- Growth Medium Development
- Ecosystem and Land Use Establishment
- Ecosystem and Land Use Sustainability

NOTE: Aerial photography supplied by Hunter Valley Operations - Imagery dated September 2018

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Registered Mining Engineer _____ Date _____

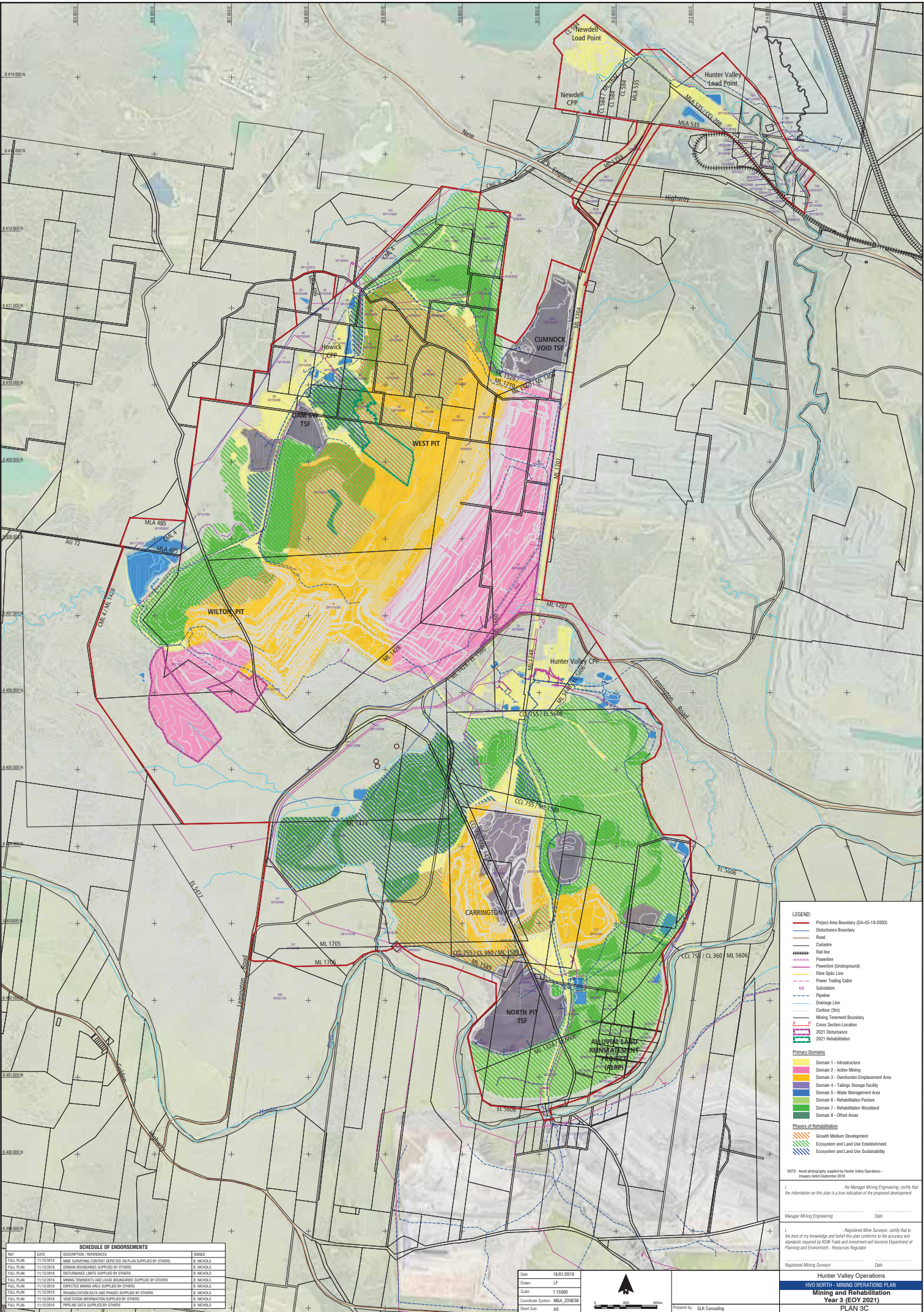
Hunter Valley Operations
HVO NORTH - MINING OPERATIONS PLAN
Mining and Rehabilitation
Year 2 (ECV 2020)
PLAN 3B

SCHEDULE OF ENDORSEMENTS			
REF	DATE	DESCRIPTION / REFERENCES	SIGNED
FULL PLAN	11/10/2019	FINAL SURVEYING CONTROL DEPICTED ON PLAN SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	COMMON BOUNDARIES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	DISTURBANCE LIMITS SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	MINING TENEMENTS AND LEASE BOUNDARIES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	EXPECTED MINING AREA SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	REHABILITATION DATA AND PHASES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	REGISTRATION INFORMATION SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	PIPELINE DATA SUPPLIED BY OTHERS	B. NICHOLS

Date: 18/01/2019
Drawn: LF
Scale: 1:15000
Coordinate System: MGA_ZONE96
Sheet Size: A0



Prepared by: SLR Consulting



LEGEND:

- Project Area Boundary (DA-45-10-2003)
- Disturbance Boundary
- Road
- Castro
- Rail line
- Powerline
- Powerline (Underground)
- Fibre Optic Line
- Power Trailing Cable
- Substation
- Pipeline
- Drainage Line
- Contour (5m)
- Mining Tenement Boundary
- Cross Section Location
- 2021 Disturbance
- 2021 Rehabilitation

Primary Domains

- Domain 1 - Infrastructure
- Domain 2 - Active Mining
- Domain 3 - Overburden Emplacement Area
- Domain 4 - Tailings Storage Facility
- Domain 5 - Water Management Area
- Domain 6 - Rehabilitation Pasture
- Domain 7 - Rehabilitation Woodland
- Domain 8 - Offset Areas

Phases of Rehabilitation

- Growth Medium Development
- Ecosystem and Land Use Establishment
- Ecosystem and Land Use Sustainability

NOTE: Aerial photography supplied by Hunter Valley Operations - Imagery dated September 2018

I, _____, the Manager Mining Engineering, certify that the information on this plan is a true indication of the proposed development.

Manager Mining Engineering _____ Date _____

I, _____, Registered Mine Surveyor, certify that to the best of my knowledge and belief this plan conforms to the accuracy and standards required by NSW Trade and Investment and will become Department of Planning and Environment - Resources Registrar.

Registered Mine Surveyor _____ Date _____

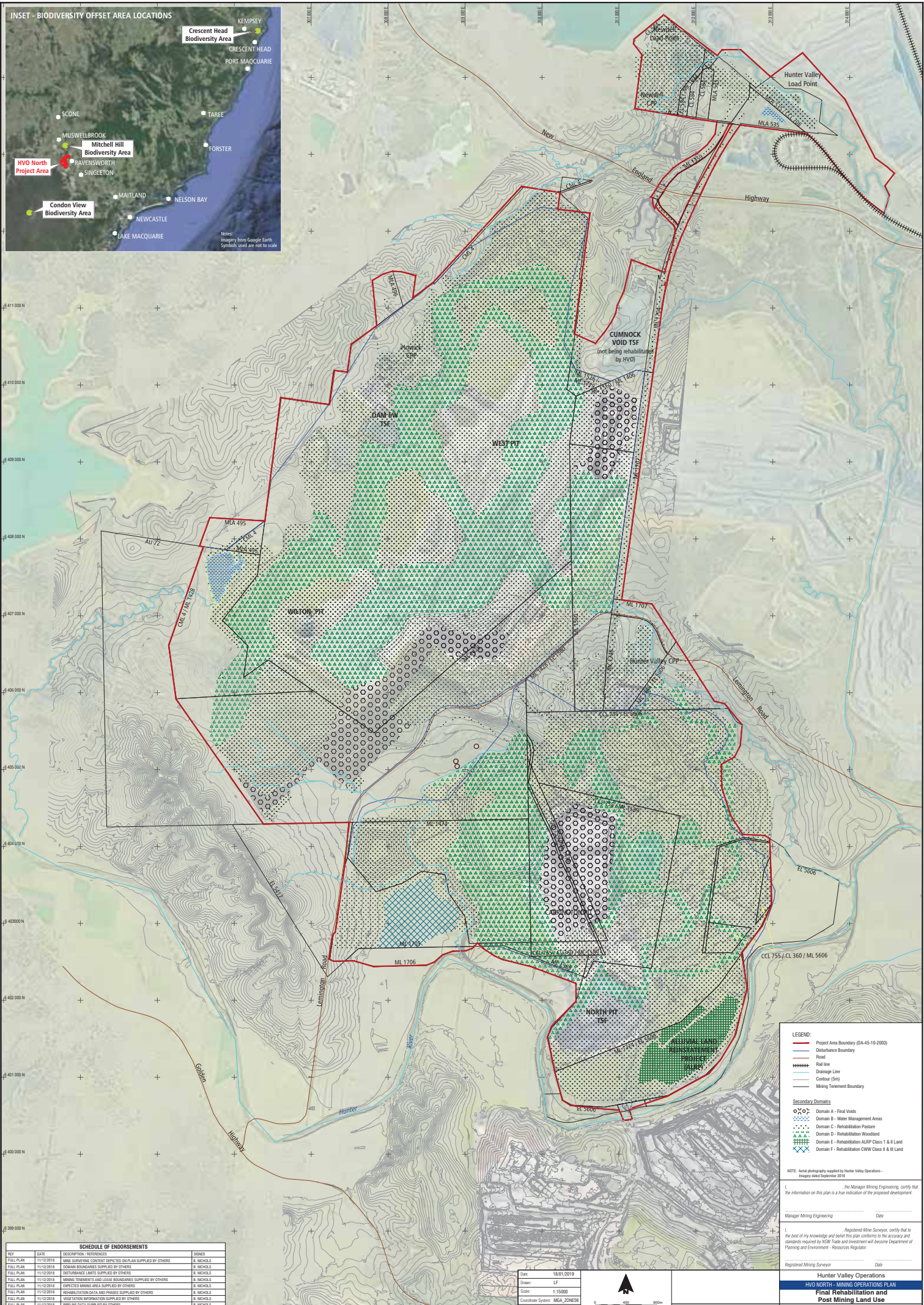
Hunter Valley Operations
HVO NORTH - MINING OPERATIONS PLAN
Mining and Rehabilitation
Year 3 (ECV 2021)
PLAN 3C

SCHEDULE OF ENDORSEMENTS			
REF	DATE	DESCRIPTION / REFERENCES	SIGNED
FULL PLAN	11/10/2019	FINAL SURVEYING CONTROL DEPICTED ON PLAN SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	COASTAL BOUNDARIES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	DISTURBANCE LIMITS SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	MINING TENEMENTS AND LEASE BOUNDARIES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	EXPECTED MINING AREA SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	REHABILITATION DATA AND PHASES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	REGISTRATION INFORMATION SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	PIPELINE DATA SUPPLIED BY OTHERS	B. NICHOLS

Date: 18/01/2019
Drawn: LF
Scale: 1:15000
Coordinate System: MGA_ZONE98
Sheet Size: A0



Prepared by: SLR Consulting



SCHEDULE OF ENDORSEMENTS			
REF	DATE	DESCRIPTION / REFERENCES	SIGNED
FULL PLAN	11/10/2019	FINAL SURVEYING CONTROL DEPICTED ON PLAN SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	DOMAIN BOUNDARIES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	DISTURBANCE LIMITS SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	MINING TOLERANCE AND LEASE BOUNDARIES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	EXPECTED MINING AREA SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	REHABILITATION DATA AND PHASES SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	VEGETATION INFORMATION SUPPLIED BY OTHERS	B. NICHOLS
FULL PLAN	11/10/2019	PIPELINE DATA SUPPLIED BY OTHERS	B. NICHOLS

LEGEND:

- Project Area Boundary (DA-45-10-2003)
- Disturbance Boundary
- Road
- Rail line
- Drainage Line
- Contour (5m)
- Mining Tenement Boundary

Secondary Domains

- Domain A - Final Voids
- Domain B - Water Management Areas
- Domain C - Rehabilitation Pasture
- Domain D - Rehabilitation Woodland
- Domain E - Rehabilitation ALSP Class 1 & 2 Land
- Domain F - Rehabilitation CWW Class 3 & 4 Land

NOTE: Aerial photography supplied by Hunter Valley Operations - Imagery dated September 2019

I, _____, the Manager Mining Engineering, certify that the information on this plan is a true indication of the proposed development.

Manager Mining Engineering _____ Date _____

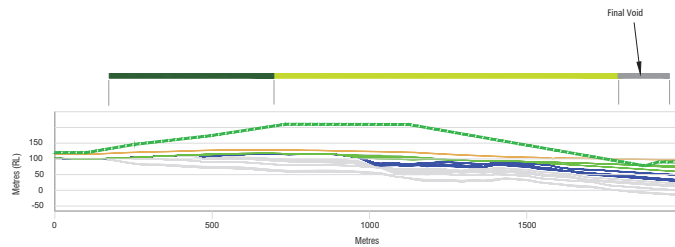
I, _____, Registered Mine Surveyor, certify that to the best of my knowledge and belief this plan conforms to the accuracy and standards required by NSW Trade and Investment and will become Department of Planning and Environment - Resources Registrar.

Registered Mine Surveyor _____ Date _____

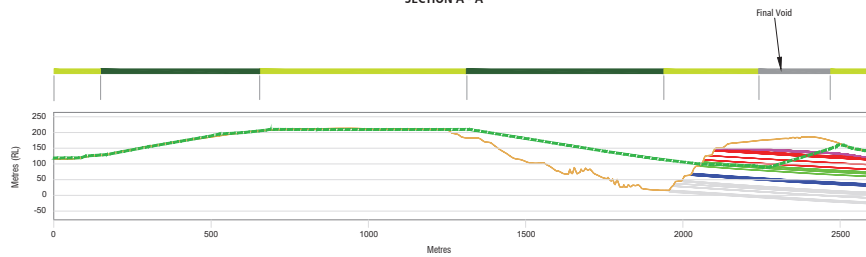
Hunter Valley Operations
HVO NORTH - MINING OPERATIONS PLAN
Final Rehabilitation and Post Mining Land Use
PLAN 4

Date: 18/01/2019
Drawn: LF
Scale: 1:15000
Coordinate System: MGA_ZONE58
Sheet Size: A0

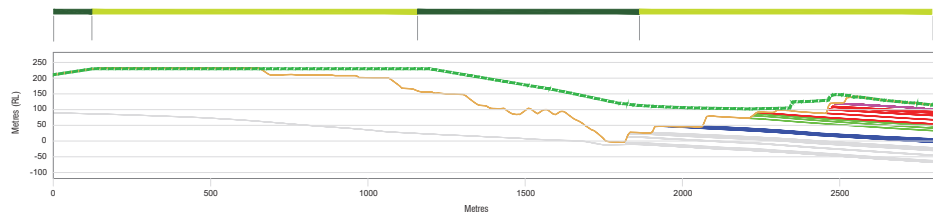
Prepared by: SLR Consulting



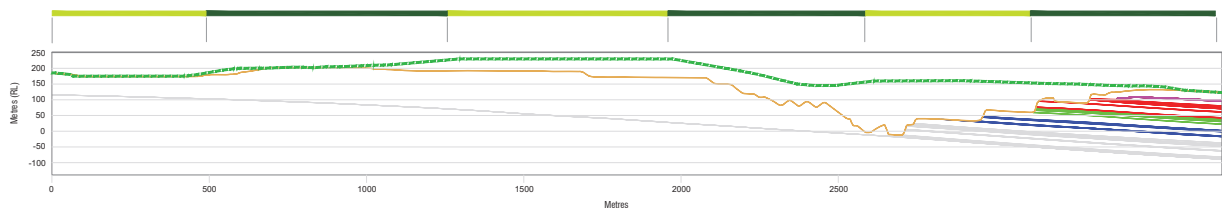
SECTION A - A'



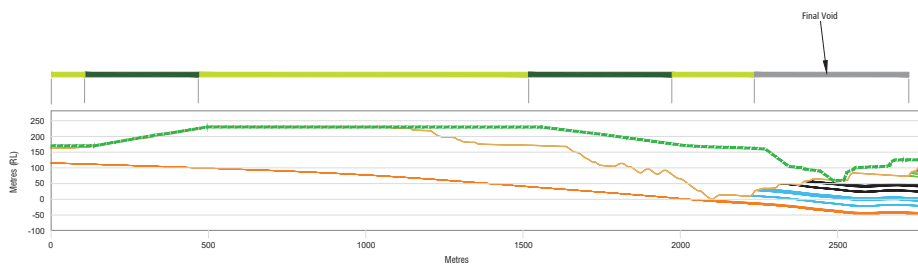
SECTION B - B'



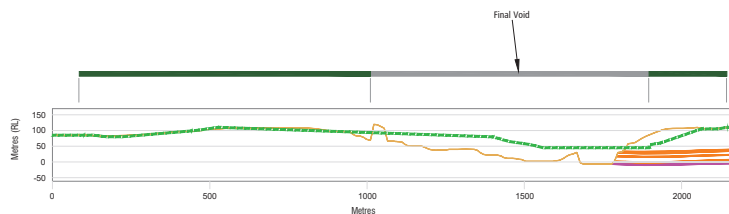
SECTION C - C'



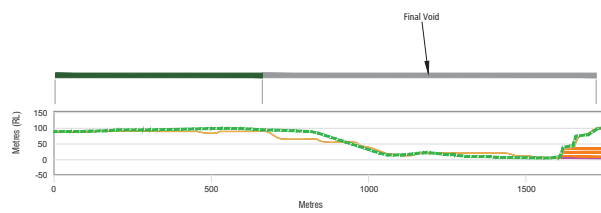
SECTION D - D'



SECTION E - E'



SECTION F - F'



SECTION G - G'

LEGEND:

- Existing Surface
- Final Landform Surface
- Rehabilitation (Open Grassland)
- Rehabilitation (Open Woodland)
- Final Void

SEAMS:

- Artes
- Barrett
- Bayswater
- Broonies
- Lemington
- Liddell
- Pikes Gully
- Ravensworth

I, the Manager Mining Engineering, certify that the information on this plan is a true indication of the proposed development.

Manager Mining Engineering Date

I, the Registered Mine Surveyor, certify that to the best of my knowledge and belief this plan conforms to the accuracy and standards required by NSW Trade and Investment will become Department of Planning and Environment - Resources Regulator.

Registered Mine Surveyor Date

Date: 18/01/2019
 Drawn: LF
 Scale: 1:5000
 Coordinate System: MGA_ZONE98
 Sheet Size: A0



Prepared by: SLR Consulting

Hunter Valley Operations
 HVO NORTH - MINING OPERATIONS PLAN
Final Rehabilitation and Post Mining Land Use Cross Sections
 PLAN 5

APPENDIX D

Environment and Community Risk Assessment

Table 1 Likelihood Ratings

Class	Likelihood	Likelihood Description	Frequency
A	Almost certain	Recurring event during the life – time of the operation / project	Occurs more than twice per year
B	Likely	Event that may occur frequently during the life – time of an operation / project	Typically occurs once or twice per year
C	Possible	Event that may occur during the life – time of an operation / project	Typically occurs in 1-10 years
D	Unlikely	Event that is unlikely to occur during the life – time of an operation / project	Typically occurs in 1-100 years
E	Rare	Event that is very unlikely to occur during the life – time of an operation / project	Greater than 100 year event

Table 2 Maximum Reasonable Consequence Ratings

Class	Consequence	Consequence Description
1	Minor	Near-source confined and promptly reversible impact on-site, with little or no off-site impact expected
2	Medium	Near-source confined and short-term reversible impact on-site, with little and promptly reversible off-site impact
3	Serious	Near-source confined and medium-term recovery impact on-site, with near-source confined and short-term reversible off-site impact
4	Major	Impact that is unconfined and requiring long-term recovery, leaving residual damage on-site with near-source confined and medium-term recovery of off-site impacts
5	Catastrophic	Impact that is widespread (or unconfined) and requiring long-term recovery, leaving major residual damage on-site with off-site impacts that are unconfined and requiring long-term recovery and leaving residual damage

Table 3 Risk Matrix

Likelihood	Consequence				
	1 - Minor	2 - Medium	3 - Serious	4 - Major	5 - Catastrophic
A – Almost Certain	Moderate	High	Critical	Critical	Critical
B – Likely	Moderate	High	High	Critical	Critical
C – Possible	Low	Moderate	High	Critical	Critical
D – Unlikely	Low	Low	Moderate	High	Critical
E – Rare	Low	Low	Moderate	High	High

Table 4 Risk Classification

Risk Class	Risk Management Response
Critical	Risks that significantly exceed the risk acceptance threshold and need urgent and effective attention.
High	Risks that exceed the risk acceptance threshold and require proactive management. While proactive actions are undertaken, further risk reduction is impracticable suggesting a need for compensatory measures
Moderate	Risks that lie on the risk acceptance threshold and require active monitoring. The implementation of specific safeguards could be used to reduce risks further
Low	Risks that are very unlikely and of low consequence, and do not require active management. Nevertheless, some potential for certain risks to occur remains and could require specific monitoring

ISSUE	Exploration	Mine development and mining	Waste rock emplacement	Use/maintenance of roads, tracks and equipment	Mineral processing facilities and infrastructure	Ore/product stockpiling and handling	Construction activities incl. earthworks	Tailings impoundment management	Land preparation, vegetation and topsoil	Water management, incl. storm event	Hazardous material & fuel handling spills management	Sewerage	Rubbish removal	Rehabilitation	Rehabilitated lands and remaining features
Air pollution, dust	H	H	L	H	M	H	M	L	H	H	-	L	H	H	-
Erosion and sedimentation	M	M	M	M	M	-	L	-	M	H	-	-	-	H	H
Surface water	L	H	H	H	-	-	M	M	H	-	-	L	-	H	-
Groundwater	L	H	-	-	-	-	M	M	-	-	-	-	L	-	-
Contaminated land	L	H	-	-	-	-	M	-	L	-	M	L	L	-	-
Hazardous substance contamination	M	M	H	H	L	L	M	-	H	H	H	-	-	H	-
Acid mine drainage	-	L	L	-	-	-	-	-	-	-	-	-	-	-	-
Flora and fauna	M	H	-	-	-	-	H	-	H	-	-	-	-	L	L
Weeds and vertebrate pests	-	M	-	-	-	-	-	-	M	-	-	-	-	H	H
Blasting	-	H	-	-	-	-	-	-	-	-	-	-	-	-	-
Operational noise	L	H	H	H	M	-	H	-	L	-	-	-	-	-	-
Visual amenity and lighting	-	H	-	-	-	-	M	L	-	-	-	-	-	-	-
Aboriginal heritage	H	H	-	-	-	-	H	-	H	-	-	-	-	L	L
European heritage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spontaneous combustion	-	-	L	-	-	L	-	-	-	-	-	-	-	-	L
Bushfire	M	L	-	L	-	-	L	-	M	-	-	-	-	-	M
Landform Settlement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	M
Mine subsidence	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methane drainage / venting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Public safety	L	M	-	-	-	-	-	M	-	L	L	L	-	-	L

APPENDIX E

Common Appendix

To:	Andrew Speechly	At:	Hunter Valley Operations
From:	Adam Williams	At:	SLR Consulting Australia Pty Ltd
Date:	15 January 2018	Ref:	630.12640 Common Appendix Final 20190115.docx
Subject:	HVO Common Appendix		

CONFIDENTIALITY

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1 Introduction

On 3 October 2018, the Department of Planning and Environment – Resources Regulator (RR) issued a Notice under Section 240(1)(c) of the *Mining Act 1992* (Section 240 Notice). The Section 240 Notice related to the unsatisfactory establishment of target vegetation species and the unsatisfactory weed presence at rehabilitation areas across Hunter Valley Operations (HVO) North and HVO South.

The Section 240 Notice stipulated that the following must be addressed:

- Unsatisfactory establishment of target vegetation species at woodland and pasture rehabilitation areas, including (but not necessarily limited to):
 - HVORIV201403 – HVO South;
 - HVORIV201404 – HVO South;
 - HVORIV201405 – HVO South;
 - HVOCHE201201 – HVO South; and
 - HVOWES201601 – HVO North.
- Unsatisfactory weed presence at woodland and pasture rehabilitation areas, including (but not necessarily limited to):
 - HVORIV201402 – HVO South;
 - HVORIV201403 – HVO South;
 - HVORIV201501 – HVO South;
 - HVORIV201503 – HVO South;
 - HVOWES201604 – HVO North;
 - HVOLEM201601 – HVO South;
 - HVOCAR200902 – HVO North;
 - HVORIV201401 – HVO South; and

- HVOWES201601 – HVO North.

Note: the Section 240 Notice incorrectly referenced HVORIV201604 instead of HVOWES201604 and HVORIV201601 instead of HVOLEM201601.

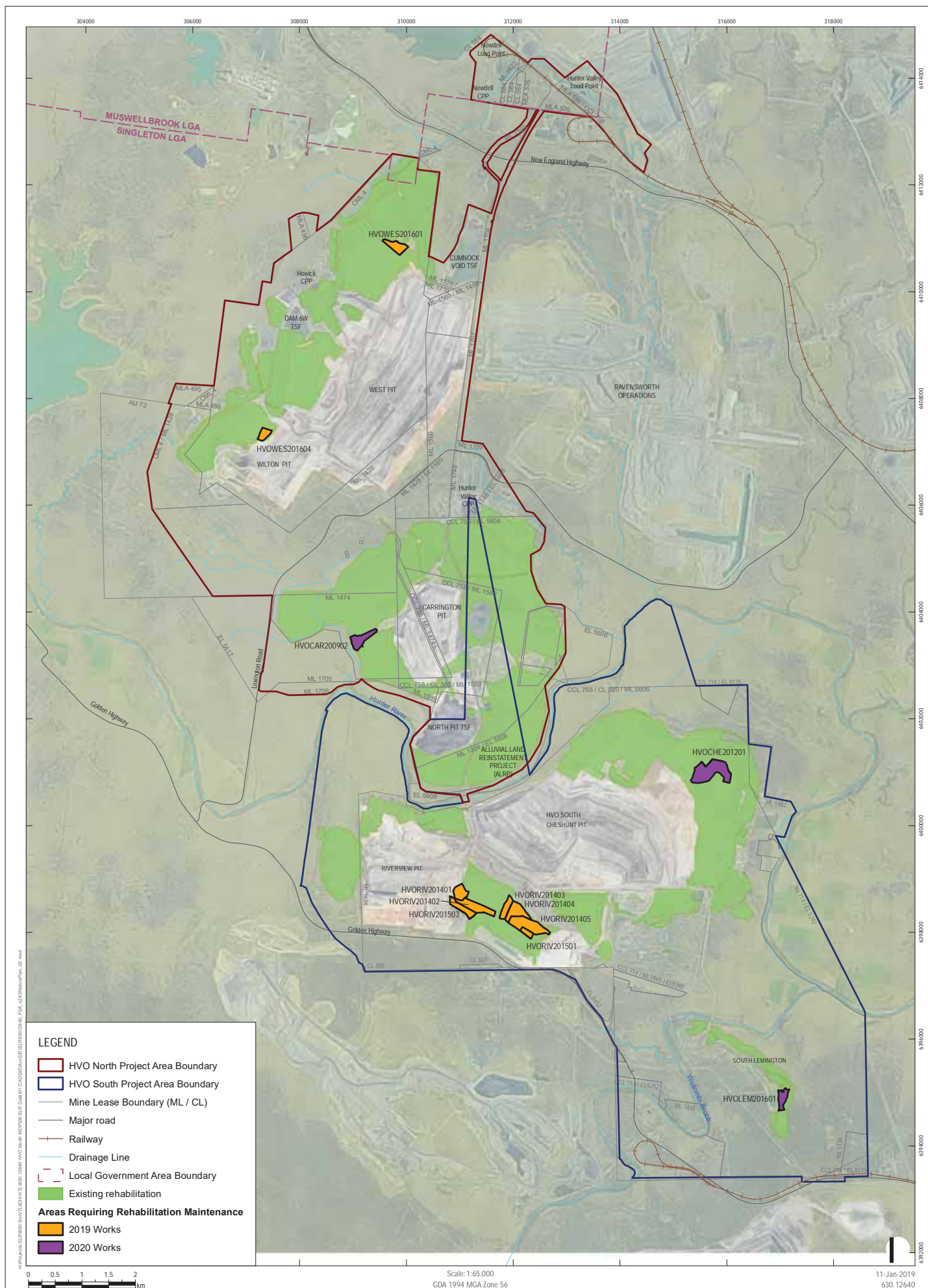
Figure A shows the location of the 12 sites requiring rehabilitation maintenance in relation to all existing rehabilitation.

2 Scope

The Section 240 Notice stipulated a number of actions that need to be addressed by HVO prior 15 January 2019. **Table A** summarises these actions and describes how the requirements have been addressed within this report, the HVO North MOP or the HVO South MOP Amendment.

Table A Section 240 Notice Actions

RR Actions	Where Addressed
Prepare a management plan to address risks to satisfactory rehabilitation progress.	In a meeting with the RR on 24 October 2018, it was confirmed that a specific standalone management plan was not required. It was suggested instead that relevant aspects would be included within the HVO North MOP and HVO South MOP Amendment. Remaining requirements would be addressed within a supporting appendix (this memorandum). The approach was confirmed to be appropriate.
An assessment of the causes of unsatisfactory target species establishment and weed presence in rehabilitation areas. The scope of the assessment must include topsoil handling and management practices, and current weed management practices.	Section 3
A schedule of time bound management actions to address risks of achieving satisfactory rehabilitation progress on all mining authorisations held by HV Operations Pty Ltd.	Figure A and Table B
The location(s) and total area(s) undergoing rehabilitation is generally in accordance with rehabilitation consent conditions and commitments document in any relevant development consents	Section 5



3 Rehabilitation Assessment

Cumberland Plain Seeds (CPS) were engaged to undertake an assessment of rehabilitation areas at HVO North and HVO South. The areas assessed by CPS included, but were not limited to those specified in the Section 240 Notice.

The CPS assessment aims to complement existing rehabilitation monitoring which uses a combination of:

- Landscape Function Analysis (LFA);
- Soil observations and various measures of ecosystem diversity and habitat values;
- Canopy Development;
- Biobanking - Site Value Scores;
- Visual Inspections; and
- Photographic Monitoring.

The BioBanking Assessment Methodology (BAM) is used to assess biodiversity values including composition, structure and function of vegetation. This means that it is a useful method for assessing rehabilitation quality in established vegetation, but it is less suitable for early stage rehabilitation as it assumes vegetation is in a stable condition and most plants in the community are mature. The CPS methodology will focus upon early stages of vegetation establishment (i.e. the first 2 years following sowing). The intention is to produce data that will inform appropriate land management actions and prioritise implementation using a risk based approach.

3.1 Methodology

Inspection of all target areas was undertaken by CPS and HVO representatives during October – November 2019. Targeted inspections were undertaken to achieve:

- Rapid visual survey to identify broad scale patterns in the landscape.
- Demarcation and mapping of management zones based on parameters including: soil characteristics; presence and density of threatening weed species (e.g. Galenia (*Galenia pubescens*), Green Panic (*Panicum maximum* var. *trichoglume*), Rhodes Grass (*Chloris gayana*) and Couch grass (*Cynodon dactylon*); and density and diversity of native species.
- Once different zones have been established within the block a monitoring transect was set up at a random location. Photographs were taken looking at the ground surface at 10 m intervals along the transect.
- Sampling of management zones using 1 m² quadrats established at 10 m intervals along the transect. In each quadrat the following values were measured:
 - Species composition.
 - Native vegetation cover (%).
 - Threatening weed cover (%).
 - Bare ground cover (%).
 - Number of native individuals.
 - Native diversity.

- Sampling of non-typical areas which are not representative of the management zone as a whole but have an effect on the success or failure of the rehabilitation block (e.g. contour bank swales).
- Analysis of data gathered from the assessment.
- Assessment made regarding each rehabilitation block and trajectory towards success or failure.
- Recommendations made based on previous monitoring data, visual assessments, soil observations and current targeted inspection data.
- Development of action plans for each management zone, prioritised using a risk-based approach.

3.2 Results

Following implementation of the monitoring methodology outlined in **Section 3.1**, CPS analysed available data and completed reporting. The results of the assessment have been summarised in **Table B**. The location of rehabilitation sites have been shown on **Figure A**.

Table B Outcomes of Rehabilitation Assessment

Site Name	Trajectory Ranking	Key Issues	Recommendations	Timing
HVOWES201601	Failing	<ul style="list-style-type: none"> • Soil issues. • Poor plant health and growth. • Threatening weeds present in significant density. 	<ul style="list-style-type: none"> • Repeat monitoring and assessment. • Investigate soil issues and ameliorate as necessary. • Control Galenia (spot spraying). Aerate to prepare a seed bed and stimulate germination of natives. • Seeding options include: <ul style="list-style-type: none"> ➤ If significant germination/reshooting of natives, consider: <ol style="list-style-type: none"> 1. Oversow with native seed mix. 2. Sow only chenopods, trees and shrubs to enable treatment of grass weeds with selective herbicide, then following 1-2 seasons of weed control sow grasses. ➤ If there is no evidence of improvement in native cover: <ol style="list-style-type: none"> 3. Spray out entire block, prepare seedbed and resow either entire suite of natives or staged native sowing such as grasses and herbs only, followed by trees and shrubs as required. 	2019
HVOWES201604	Stable but needs work to improve	<ul style="list-style-type: none"> • Stable native vegetation with good grass cover, low shrub and tree diversity and low stem density. • Some threat from weeds. 	<ul style="list-style-type: none"> • Following soil analysis, build on existing native vegetation to increase diversity and cover. • Control weed threats. • Selective seeding, if required. 	2019

Site Name	Trajectory Ranking	Key Issues	Recommendations	Timing
HVOCAR200902	Failing	<ul style="list-style-type: none"> Well established canopy but stem density too high for continued success. Under storey and ground layer have low diversity dominated by threatening weeds (Green Panic). Contour banks and swales without significant native cover. 	<ul style="list-style-type: none"> Thin Eucalypts using mechanical means or fire. Control weed threats. Increase shrub layer diversity (fire would stimulate <i>Acacia</i> germination). Increase shrub and ground layer diversity with soil disturbance and sowing. 	2020
HVOCHE201201	Failing	<ul style="list-style-type: none"> Very poor native cover or diversity apart from some saltbushes. Significant densities of threatening weeds. Evidence of ongoing soil or subsoil problems – poor plant growth and health. Even normally vigorous weeds show signs of drought stress and nutrition problems when compared to other HVO sites. 	<ul style="list-style-type: none"> Investigate soil issues and ameliorate as necessary. Develop and implement a re-establishment plan. 	2020
HVOLEM201601	Stable but needs work to improve	<ul style="list-style-type: none"> Good shrub diversity and density. Ground layer dominated by Couch. Threat from <i>Acacia saligna</i> colonising from adjacent vegetation. Contour banks and swales have low native cover and diversity. Soil appears to be Warkworth Sands Woodland type so species sown may not have been appropriate to this soil type. 	<ul style="list-style-type: none"> Manage weed threats. Investigate initially sown species mix. Sow ground layer species appropriate for this soil type, if required. 	2020

Site Name	Trajectory Ranking	Key Issues	Recommendations	Timing
HVORIV201401	Stable but needs work to improve	<ul style="list-style-type: none"> • Good native species diversity but relatively low native groundcover layer (higher percentage of bare ground). • Heavily infested with threatening weeds, especially Rhodes Grass. • Evidence of soil issues in some areas. 	<ul style="list-style-type: none"> • Manage exotic grasses threat to avoid contamination of adjacent areas. This should involve a combination of targeted slashing/brush cutting, blanket spraying of larger areas of exotic grasses and spot spraying of isolated plants. • Following control of exotic grasses increase native ground cover by re-sowing native grasses and Saltbushes. 	2019
HVORIV201402	Stable but needs work to improve	<ul style="list-style-type: none"> • Generally good native grass diversity and cover, apart from one area which appears to have a different topsoil type. • Good shrub layer cover and some Eucalypts, although stem density is low. • Threat of invasion and spread of Rhodes Grass and Green Panic. 	<ul style="list-style-type: none"> • Treat threatening weeds. • Augment native ground and shrub layer in areas with lower stem density, if required. 	2019
HVORIV201403	Stable but needs work to improve	<ul style="list-style-type: none"> • Good but patchy native diversity and cover in ground layer. • Evidence of soil issues. • Significant weed threats (in particular Rhodes Grass). 	<ul style="list-style-type: none"> • Investigate soil issues and ameliorate as necessary. • Manage weed threats. • Re-sow restricted suite of natives (only sow proven successful species), if required. 	2019
HVORIV201404	Failing	<ul style="list-style-type: none"> • Patchy native vegetation cover. • Majority of the site is dominated by threatening weeds. • Soil issues appear to be causing poor native establishment. 	<ul style="list-style-type: none"> • Investigate soil issues and ameliorate as necessary. • Manage any weeds which pose a threat to adjacent rehab areas (Rhodes Grass and Green Panic pose highest risk of quickly invading areas due to windblown seed). • Consider re-sowing with limited native seed mix (only sow proven successful species). 	2019

Site Name	Trajectory Ranking	Key Issues	Recommendations	Timing
HVORIV201405	Failed	<ul style="list-style-type: none"> Evidence of serious soil problems. Site is almost entirely dominated by annual plants (both native and exotic) suggesting a serious issue with subsoil and/or topsoil. 	<ul style="list-style-type: none"> Investigate soil issues and ameliorate as necessary. Spray out and resow with limited native seed mix (only sow proven successful species). 	2019
HVORIV201501	Tracking towards success but needs work	<ul style="list-style-type: none"> Good native cover and diversity in ground layer. Shrub and canopy layer has low stem density (particularly Eucalypts). 	<ul style="list-style-type: none"> Manage weed threats. Selective seeding, if required. 	2019
HVORIV201503	Tracking towards success but needs work	<ul style="list-style-type: none"> Good native cover and diversity across the majority of the site. Two small zones within the site have lower tree and shrub stem density. 	<ul style="list-style-type: none"> Manage weed threats. Selective seeding, if required. 	2019

3.3 Proposed Changes to Site Management Practices

Existing site topsoil management practices broadly reflect industry standards, typically encompassing:

- Minimal annual disturbance to allow mine advance;
- Ground Disturbance Permit control of topsoil disturbance;
- Topsoil stripping with appropriately sized equipment, and skilled and experienced operators;
- Incorporation of residual mulched native vegetation to bulk topsoils, aiding in preservation of soil biological resources;
- Direct placement to rehabilitation, prompt reuse, and minimal rehandling, where possible;
- When stockpiling, establishment of stockpiles less than 3 metres in height and sown to a desirable cover crop in timely manner;
- Weed control upon stockpiles on as needs basis;
- Program of progressive improvement / re-sowing of historic stockpiles;
- Scalping of stockpiles with unsuitable cover prior to re-use; and
- Maintaining records of topsoil resources encompassing source, storage (where relevant) and reuse.

Despite these established practices there is opportunity to improve the application of the practices.

The following improvements are proposed to ensure that high standards of topsoil management are maintained:

1. Improved integration of topsoil 'mining' and placement into the mine planning process including:
 - Identification of appropriate rehabilitation placement and/or storage locations;
 - Sequencing of topsoil stripping and movement to maximise opportunities for direct placement to rehabilitation or short-term stockpiling (<12-18 months) and prompt reuse within the window of biological activity; and
2. Where feasible, stockpile different soil types separately (including soils with a history of exotic pasture cover which may be unsuitable for use in native rehabilitation areas without additional treatment).
3. Review of site topsoil tracking procedures and associated documentation.
4. Review inspection processes which verify compliance with site topsoil management processes.
5. Review of site training materials, supporting knowledge and understanding of key personnel (site and contractor supervisors and operators) of site procedures and underlying drivers.
6. Development of a Topsoil Management Plan, or review and update of existing site documentation, encompassing:
 - Type and depth of topsoils to be stripped across site;
 - Life of Mine (LOM) topsoil requirements and deficiency mitigations (if any);
 - Topsoil stripping processes in plain English terms;
 - Processes for handling, placement and stockpiling of topsoils; and
 - Processes for maintenance of the site topsoil register.

Site weed management practices also reflect industry standards encompassing inspections to identify weed infestations, targeted control of weed infestations, and maintenance weed control across the site generally. In the context of site rehabilitation key weed management processes include:

- Use of sacrificial cover crops to allow treatment of aggressive weed threats (primarily exotic grasses and *Galenia*) in new rehabilitation;
- Broadacre selective and knockdown control of weed threats in new rehabilitation areas prior to sowing of final seed mixes, and using timely pre-emergent passes following sowing to final seed mixes;
- Focussed spot spraying of key target weed species in the early stage of rehabilitation vegetation establishment;
- Follow-up and periodic targeted spot spraying in rehabilitation areas as required based on inspections and monitoring;
- Management of weeds on topsoil stockpiles; and
- Limited, selective control of key weed species ahead of mining.

Site experience has been that a key threat to successful native vegetation establishment is competition from exotic pasture grasses, in addition to competition from the herbaceous groundcover, *Galenia pubescens*. Due to revisions of the mine plan in association with contemporary approvals, many of the areas of topsoil stripping are historic rehabilitation areas which were initially established with exotic pasture species. Consequently the soil seed bank associated with these re-disturbed topsoils has been a key source of weed infestation.

While site weed management practices are considered broadly appropriate to manage the weed threat in rehabilitation areas, a key additional focus will be on discrete management of topsoils from areas with identified weed infestations compared with soil from previously undisturbed native vegetation areas. Topsoils identified as likely to contain significant exotic grass seed loads will, where possible, be preferentially placed on pasture rehabilitation areas so that the seed load acts in a beneficial manner. Additional improvements to topsoil management procedures which will assist in mitigating weed risk have been detailed above.

It is also noted that weed infestation has been identified in the CPS assessment (refer **Table B**) as the key threat to favourable rehabilitation trajectory and as such the maintenance plan (refer **Table D**) is strongly focussed on weed control as the primary activity needed to re-establish the desired trajectory in impacted blocks. Targeted weed control on a needs basis across all rehabilitation areas will remain a key site focus with site inspections and monitoring continuing to inform of emerging issues, the effectiveness of work undertaken, and work prioritisation.

A further potential issue which has been identified as a risk to successful rehabilitation weed management is the increasing footprint of rehabilitation areas and ensuring resourcing is appropriate to adequately address the areas requiring treatment. While current resourcing is considered appropriate, identification and ongoing planning will ensure resourcing remains at an appropriate level into the future. Significant modifications to existing site weed management procedures are not proposed. Rather, the site reiterates its commitment to ongoing resourcing at an appropriate level to manage known and emerging weed infestations and to the refinement of topsoil management procedures to lessen the weed risk over time.

4 Proposed Maintenance Program

Table C provides an annual summary of the total area of rehabilitation to undergo maintenance at HVO North and HVO South. Progress against these predictions will be reported in the Annual Review.

A detailed maintenance schedule has been provided as **Table D**.

Table C Rehabilitation Maintenance Timing

Year	Area (ha)
2019	61.85
2020	33.55

Table D Rehabilitation Maintenance Schedule

Location	Maintenance	Relative Priority	2019				2020				Section 240 Issue	
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
HVOWES201601 [West North 190, 6.2 ha]												
Priorities	Re-monitoring, investigate soil issues	2									Vegetation, Weeds	
1. Additional monitoring	Soil amelioration (if required)											
2. Weed control	Weed control / spray out											
3. Understanding growth medium	Seeding											
HVOWES201604 [Wilton 210, 3.7 ha]												
Priorities	Weed control	2									Weeds	
1. Weed control	Selective seeding (if required)											
2. Understanding growth medium												
3. Increase diversity												
HVOCAR200902 [Carrington, 7.7 ha]												
Priorities	Stem thinning	5									Weeds	
1. Open canopy	Weed control											
2. Weed control	Selective seeding											
3. Increase diversity												
HVOCHE201201 [Cheshunt Rim, 20.8 ha]												
Priorities	Investigate soil issues	5									Vegetation	
1. Understanding growth medium	Develop re-establishment plan											
2. Addressing medium constraints	Plan execution											
3. Plan development												
HVOLEM201601 [Lemington South, 5 ha]												
Priorities	Weed control	4									Weeds	
1. Weed control	Selective seeding (if required)											
HVORIV201401 [Riverview 145, 5.8 ha]												
Priorities	Weed control	3									Weeds	
1. Weed control	Selective seeding (if required)											
HVORIV201402 [Riverview 145, 10 ha]												
Priorities	Weed control	3									Weeds	
1. Weed control	Selective seeding (if required)											
HVORIV201403 [Riverview 145/155, 4.8 ha]												
Priorities	Investigate soil issues	1									Vegetation, Weeds	
1. Weed control	Soil amelioration (if required)											
2. Soil amelioration	Weed control											
3. Manage for re-disturbance	Selective seeding (if required)											
HVORIV201404 [Riverview 155, 8.4 ha]												
Priorities	Investigate soil issues	1									Vegetation	
1. Weed control	Weed control / spray out											
2. Soil amelioration	Soil amelioration											
3. Manage for re-disturbance	Seeding											
HVORIV201405 [Riverview 155, 14.3 ha]												
Priorities	Investigate soil issues	1									Vegetation	
1. Weed control	Weed control / spray out											
2. Manage for re-disturbance	Soil amelioration											
	Seeding											
HVORIV201501 [Riverview 155, 2.4 ha]												
Priorities	Weed control	2									Weeds	
1. Weed control	Selective seeding (if required)											
HVORIV201503 [Riverview 145, 6.2 ha]												
Priorities	Weed control	2									Weeds	
1. Weed control	Selective seeding (if required)											
Notes:												
1. Work to occur across the periods shown, however may not occur in all periods shown.												
2. Relative priorities balance addressing at-risk areas with maintaining areas demonstrating favourable trajectories.												
3. 2020 work plans are indicative only. Final 2020 plans to be informed by observations and trajectory at 2019 monitoring events, and will be detailed in annual reporting. Work plans beyond 2020 to be informed by future monitoring.												
4. Changes to work plans may occur due to weather events and climatic influences. Where work components are not undertaken details will be provided in annual reporting.												
5. Maintenance of HVORIV201403, HVORIV201404 and HVORIV201405 reflect that blocks are temporary rehabilitation and blocks will be progressively re-disturbed with mine advance.												
Legend - Rehabilitation Trajectory (after CPS monitoring)												
	Tracking towards success but needs work	Legend - Planned work										
	Stable but need work to improve		Primary task timing									
	Failing		Secondary timing (contingency / follow-up as needed)									
	Failed											

5 Rehabilitation Comparison against Predictions

5.1 HVO North

HVO North operates under Development Consent DA 450-10-2003, which was issued under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) on 12 June 2004. Since 2004, DA 450-10-2003 has been modified on seven occasions with the most recent modification (Mod 7) approved on 28 July 2017.

A comparison of the rehabilitation predictions approved under DA 450-10-2003 and the seven modifications has been prepared by HVO North, and is outlined in **Table E** and shown in **Figure B**. **Table E** and **Figure B** show that the rehabilitation predictions are largely on track with the rehabilitation undertaken to date.

Table E HVO North Rehabilitation

Existing Rehabilitation	Predicted Rehabilitation	Difference
1,812.07 ha	1,766.85 ha	45.22 ha

5.2 HVO South

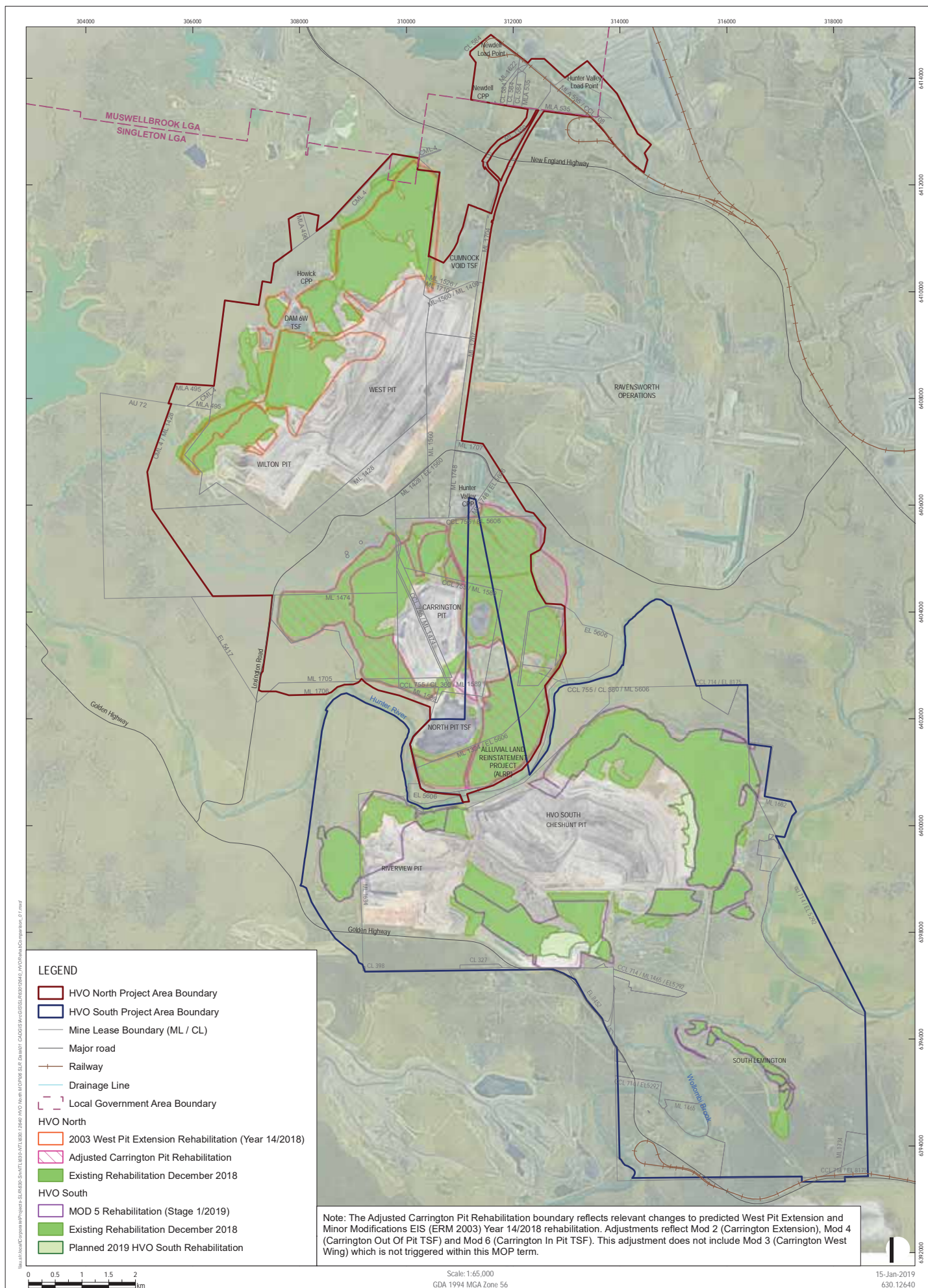
HVO South received Development Consent PA 06_0261 under Part 3A of the EP&A Act from the Minister for Planning for the HVO South Coal Project on 24 March 200. The consent replaced 25 separate development consents and 10 associated modifications granted by both DPE and Singleton Council. PA 06_0261 has been modified on five occasions, with the most recent modification approved in February 2018.

A comparison of the rehabilitation predictions approved under PA 06_0261 has been prepared by HVO South, and is outlined in **Table F** and shown in **Figure B**. **Table F** and **Figure B** show that the rehabilitation predictions are largely on track with the rehabilitation undertaken to date.

Table F HVO South Rehabilitation

Existing Rehabilitation	Planned 2019 Rehabilitation	Total of Existing and Planned 2019 Rehabilitation	Predicted Rehabilitation	Difference
1,043.94 ha	61.69 ha	1,105.63 ha	1,047.55 ha	58.08 ha

Checked/
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