



Rehabilitation Strategy

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1. Project Description

The United Wambo Open Cut Coal Mine (United Wambo) is situated approximately 15 kilometres west of Singleton, near the village of Warkworth, New South Wales (**Figure 1-1**). United Wambo is a 50:50 joint venture between neighbouring mines operated by United Collieries Pty Limited (United) and Wambo Coal Pty Limited (Wambo).

United Collieries Pty Limited (United) is owned 95 per cent by Abelshore Pty Limited, a wholly owned subsidiary of Glencore Coal Pty Limited (Glencore) and 5 per cent by the Construction, Forestry, Mining and Energy Union (CFMEU), which is managed by Glencore. Wambo Coal Pty Limited (Wambo) is a subsidiary of Peabody Energy Australia Pty Limited.

United Wambo combines the existing open cut operations at Wambo with a new open cut coal mine at United. United Wambo has approval to extract up to 10 million tonnes per annum (mtpa) of Run of Mine (ROM) coal from the combined Wambo Open Cut (Wambo Pit) and United Open Cut (United Pit). All coal is transported and processed through the Wambo Coal Handling and Processing Plant (CHPP) and transported by rail from Wambo to the Port of Newcastle for export.

Open cut mining is managed by United on behalf of the joint ventures, whilst Wambo manages the CHPP and train loading facilities as well as Wambo's continued underground operations.

The key features of the Project relevant to the Rehabilitation Strategy are outlined in this section.

1.1 Phase 2

Phase 2 commenced in December of 2020. In Phase 2, Wambo underground operations operates under DA 305-7-2003 MOD 16 and the CHPP operates under 177-8-2004 MOD 3.

Phase 2 includes the following activities:

- Mining within the United Open Cut and Wambo Open Cut areas;
- Hauling of ROM coal to the Wambo CHPP and ROM pad for processing and rail despatch by Wambo;
- Emplacement of tailings within the approved Tailings Storage Facilities and co-disposal of coarse rejects with overburden dumps; and
- Progressive rehabilitation of the site to establish the approved final landform and vegetation types.

Progressive rehabilitation will be completed in Phase 2 with this detail outlined in the RMP.

1.2 Phase 3

The Development Consent defines this phase of the development 'following the cessation of mining operations that includes mine closure'. Rehabilitation will be completed during Phase 2 and 3.



Figure 1-1: Locality Plan

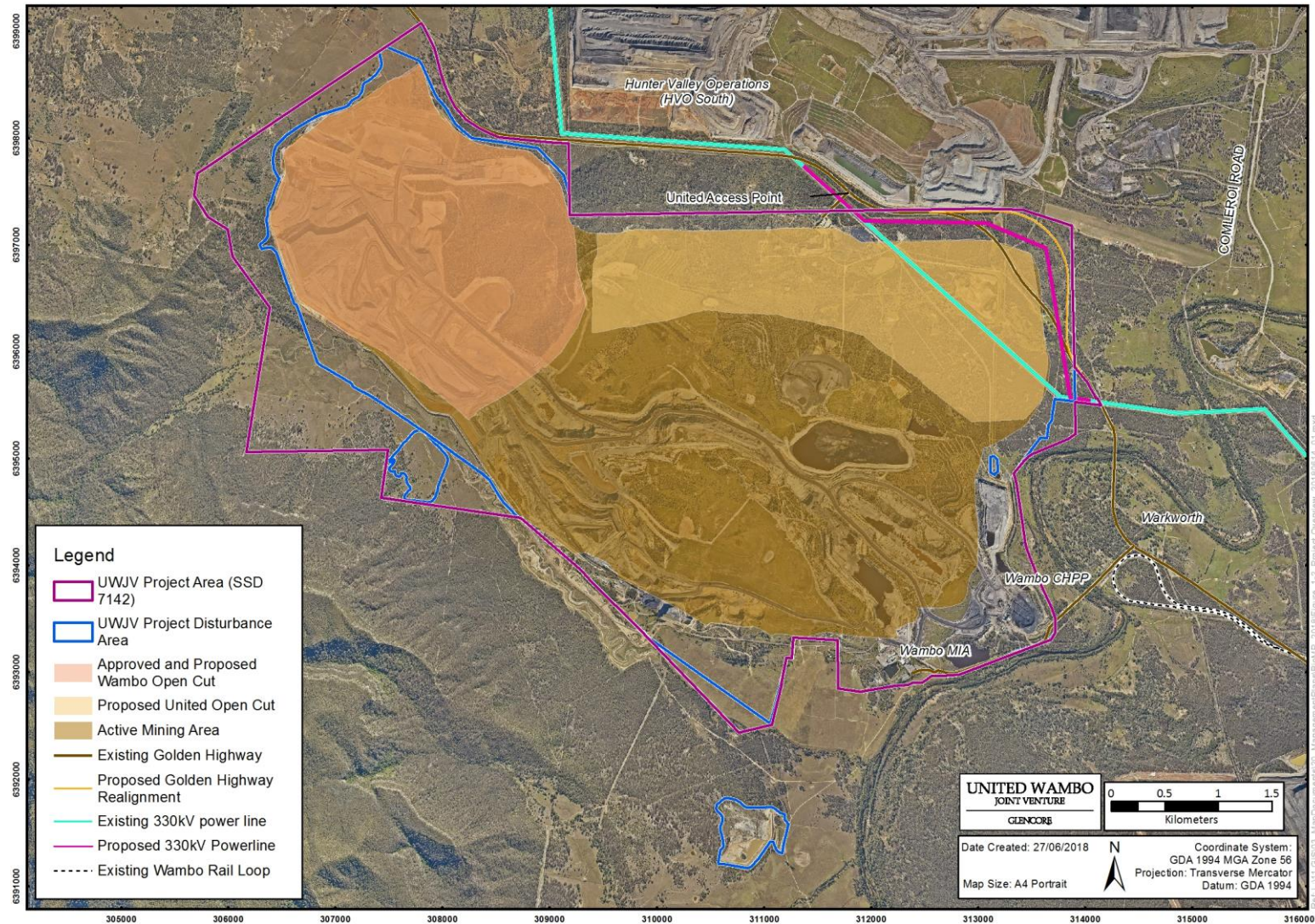


Figure 1-2: Site Layout

1.3 Relationship to the Rehabilitation Management Plan (RMP)

The Rehabilitation Strategy and the RMP both detail the implementation of rehabilitation outcomes in Table 6 of SSD 7142. The intent of the Rehabilitation Strategy is to set the strategic direction and outcomes for rehabilitation of the mine. The Rehabilitation Management Plan defines how the rehabilitation of the site will achieve the objectives required by SSD 7142. While both plans are closely linked, the Rehabilitation Strategy incorporates a longer time period than the RMP with the provision to review and refine the final landform and final void outcomes every five years, in consultation with the Resources Regulator and Council.

1.4 Definitions

The Development Consent SSD 7142 outlines a series of definitions. The relevant definitions have been included in this table.

Table 1-1 – Definitions for this Rehabilitation Strategy

Term	Definition from SSD 7142
Decommissioning	The deconstruction or demolition and removal of works and buildings installed as part of the development.
Demolition	The deconstruction and removal of buildings, sheds and other structures on the site.
Ecological Mine Rehabilitation	Rehabilitation used to satisfy biodiversity credit requirements.
Mine closure	Decommissioning and final rehabilitation of the site following the cessation of mining operations.
Mining operations	The carrying out of mining, including the extraction, processing, stockpiling and transportation of coal on the site and the associated removal, storage and/or emplacement of vegetation, topsoil, overburden and coarse reject material.
Open Woodland	50% woodland within mixed woodland/pasture areas.
Rehabilitation	The restoration of land disturbed by the development to a good condition, to ensure it is safe, stable and non-polluting.

2. Purpose

The purpose of this document is to outline the proposed mine closure and rehabilitation strategy for United Wambo, which has been developed in consideration of a number of factors including site opportunities and constraints, ecological and rural land use values and existing strategic land use objectives, including the integration of rehabilitation with the strategies developed for surrounding operations.

3. Scope

This Rehabilitation Strategy applies to all activities at United Wambo and addresses the relevant conditions of SSD 7142.

The Rehabilitation Strategy applies to all United Wambo employees, and contractors working for, or on behalf of, United Wambo within the project approval boundary. This Strategy forms part of United Wambo's Environmental Management System (EMS) and should be read in conjunction with the United Wambo Environmental Management Strategy (EM Strategy).

This Rehabilitation Strategy applies to all activities conducted under SSD 7142 during Phase 2 and Phase 3 of the Project. Activities undertaken by Wambo under DA 305-7-2003, including the underground mine, CHPP and train loading facility, will continue to be managed by Wambo in accordance with their relevant Wambo Development Consent conditions.

4. Summary of Rehabilitation Management Domains

The RMP under Condition B103 of SSD 7142 outlines the mining domains and final land use domains, with these domains summarised in this section. Mining domains have been defined as the set of discrete areas that have a particular operational or functional purpose.

The current mining domains for the Project include:

- Infrastructure;
- Rejects and Tailings Emplacement;
- Active Pit;
- Overburden Emplacement;
- Water Management;

- Current Rehabilitation;
- Previous Underground Mining Area; and
- Offset areas

Final land use domains are defined as land management units characterised by similar final land use objectives. Each final land use domain will require specific decommissioning and rehabilitation methods. The conceptual final land use domains for the Project are presented in **Table 4-1** and shown in **Figure 4-1**.

Table 4-1 – Final Land Use Domains

Final Land Use Domain	Description
Rehabilitation – Ecological Rehabilitation	Self-sustaining native woodland ecosystems. This includes: • PCT 1691 (HU905) - Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (conforming to Central Hunter Valley Eucalypt Forest and Woodland CEEC under the EPBC Act); • PCT 1602 (HU816) – Spotted Gum - Narrow-leaved Ironbark shrub - grass open forest of the central and lower Hunter (conforming to Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC under the BC Act); and • PCT 1691 (HU905) - Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter.
Rehabilitation – Open Woodland	Restore self-sustaining native woodland ecosystems characteristic of vegetation communities found in the local area and complement the areas proposed for Ecological Mine Rehabilitation.
Rehabilitation – Agriculture	Establish/restore grassland areas to support sustainable agricultural activities (grazing).
Rehabilitation – Riparian	Restore self-sustaining native woodland ecosystems characteristic of vegetation communities found in the local area and complement the areas proposed for Ecological Mine Rehabilitation. Establish areas of self-sustaining: • Riparian vegetation, within any diverted and/or re-established creek lines and retained water features; • Habitat resources for threatened flora and fauna species, particularly the Swift Parrot, Regent Honeyeater, Spotted-tailed Quoll and Koala; and • Vegetation connectivity and wildlife corridors, as far as is reasonable and feasible.
Final Void	• Two final voids will remain as part of the final landform and will become waterbodies. Details of final void management will be developed in subsequent RMP's and a Detailed Closure Plan; and • Voids will be safe, stable and non – polluting.

Final Land Use Domain	Description
Water Management	Covers the long term management of key water management structures, including clean water dams, sediment dams, mine water dams and drainage lines.

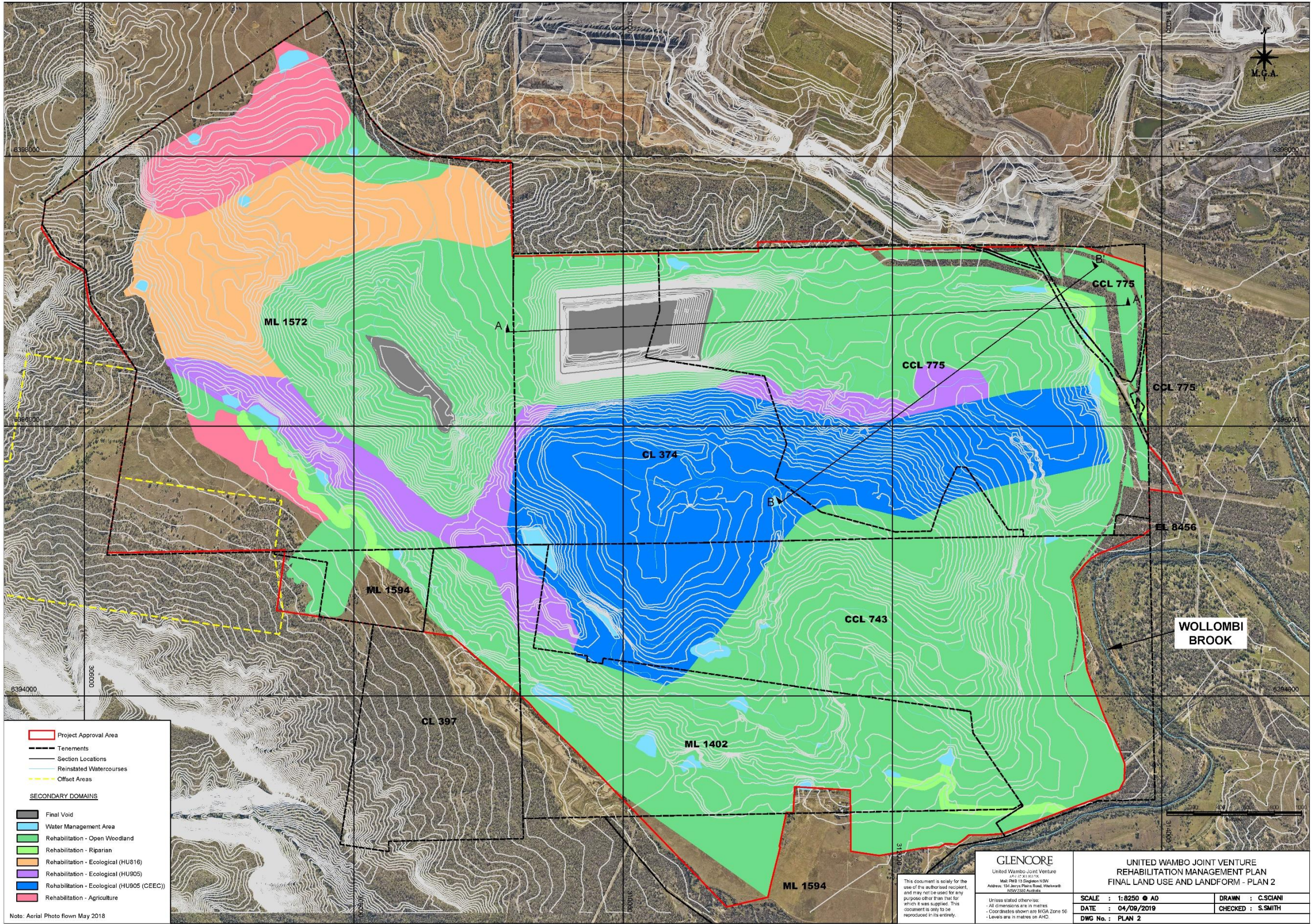


Figure 4-1: Post Mining Landform

5. Objectives of the Rehabilitation Strategy

5.1 Final Land Use Objectives

In accordance with Condition B97 of SSD 7142, United Wambo will rehabilitate the site to the satisfaction of Resources Regulator (Regional NSW) and comply with the final land use objectives provided in Table 6 of SSD 7142 and reproduced in **Table 5-1** Error! Reference source not found. below.

Table 5-1 –SSD 7142 Condition B97 Table 6

Feature	Objective
All areas of the site affected by the development.	- Safe, stable and non-polluting; and - Fit for the intended post-mining land use/s.
Areas proposed for Ecological Mine Rehabilitation under condition B61.	- Restore self-sustaining native woodland ecosystems that: - Align with reference sites in the local area; and - Use State-recognised plant communities to meet the applicable EPBC Act or BC Act listing criteria for the CEEC or EEC in Table 5 of SSD 7142.
Areas proposed for native ecosystem re-establishment.	- Establish a minimum of 1,300 hectares of Open Woodland Revegetation to satisfy condition B69; - Vegetation connectivity and wildlife corridors, as far as is reasonable and feasible; - Restore self-sustaining native woodland ecosystems characteristic of vegetation communities found in the local area and complement the areas proposed for Ecological Mine Rehabilitation; - Establish areas of self-sustaining: - Riparian vegetation, within any diverted and/or re-established creek lines and retained water features. - Habitat resources for threatened flora and fauna species, particularly the Swift Parrot, Regent Honeyeater, Spotted-tailed Quoll and Koala.
Areas proposed for agricultural land	- Establish/restore grassland areas to support sustainable agricultural activities; - Achieve Land and Soil Capability Class IV; and - Locate adjacent to surrounding agriculture land.
Final Landform	- Stable and sustainable for the intended post-mining land use/s; - Integrated with surrounding natural landforms and rehabilitated landforms of surrounding mines, to the greatest extent practicable;

Feature	Objective
	• Incorporate micro-relief and drainage lines that are consistent with surrounding topography, to the greatest extent practicable; • Maximise surface water drainage to the natural environment (excluding final void catchment); and • Minimise visual impacts, to the greatest extent practicable.
Final Voids.	• Designed as long term groundwater sinks to maximise ground water flows across back filled pits to the final void; • Maximise potential for beneficial reuse, to the greatest extent practicable; • Minimise to the greatest extent practicable: - The size and depth of final voids; - The drainage catchment of final voids; - Any highwall instability risk; and - The risk of flood interaction.
Surface infrastructure of the development, including the CHPP and surface infrastructure constructed under DA 410-11-2002-i.	• To be decommissioned and removed, unless the Resources Regulator agrees otherwise.
Rehabilitation materials.	• Materials from areas disturbed under this consent (including topsoils, substrates and seeds) are to be recovered, managed and used as rehabilitation resources, to the greatest extent practicable.
Water Quality	• Water retained on the site is fit for the intended post-mining land use/s; and • Water discharged from the site is suitable for receiving waters and fit for aquatic ecology and riparian vegetation.
Community	• Ensure public safety; and • Minimise adverse socio-economic effects associated with mine closure.

Note: The final land use objectives detailed in this table apply to the entire site, including all landforms constructed under either this consent or previous consents. However, they do not require any additional earthmoving works to be undertaken for landforms that have been approved and constructed under previous consents.

5.1.1 EIS Rehabilitation Requirements

In consideration of the proposed final land use, United Wambo's final land use objectives for the Project Area outlined in the EIS and associated documentation (Umwelt) include the following:

- Provide for the safety of employees and the public during and following the closure of the mining operations;
- Provide a sustainable final landform and uses that can co-exist with surrounding land uses. This includes a commitment to the establishment of “micro-relief” within the final landform for the Project to assist with long term landform stability and to provide a more natural looking and functioning landform;
- Establish similar native vegetation communities to those that will be impacted by the Project;
- Establishment of ecological rehabilitation as part of the biodiversity offset for the Project;
- Develop native vegetation corridors linking surrounding remnant vegetation areas to the southwest of the Project Area to existing remnants in the north east and south east, and the proposed future native rehabilitation areas of Hunter Valley Operations (HVO) mine and Mount Thorley Warkworth (MTW); and
- Inclusion of grassland areas for agricultural land use where appropriate.

In achieving these objectives, United Wambo will also aim to:

- Minimise the potential environmental impacts from closure activities;
- Comply with relevant regulatory requirements and attain regulatory consensus on the successful closure and rehabilitation of the site;
- Reduce the need for long term monitoring and maintenance by achieving effective rehabilitation; and
- Regularly consult with the relevant stakeholders during the closure and rehabilitation planning and implementation process.

5.1.2 Domain Objectives

Final land use domains require specific management objectives due to the distinct geophysical features associated with the current land function. The final land use objectives for the domains are outlined below.

Table 5-2 - Overall Final Land Use Domain Objectives

Domain	Final Land Use Objectives
Rehabilitation: Ecological Rehabilitation	- Restore self-sustaining native woodland ecosystems that meet the listing criteria for the relevant impacted vegetation communities listed in Section 12.9; - Increase in site condition attribute scores are greater than or equal to the increase used to calculate the maximum allowable credit value of the rehabilitation; - The vegetation composition of the rehabilitation is recognisable as the vegetation communities listed in Section 12.9; - The vegetation structure of the rehabilitation is recognisable as, or is trending towards, the vegetation communities listed in Section 12.9; and - Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustainable.
Rehabilitation: Open Woodland	- Restore self-sustaining native woodland ecosystems characteristic of vegetation communities found in the local area and complement the areas proposed for Ecological Mine Rehabilitation; and - Revegetation areas contain flora species assemblages characteristic of the succession pathways expected of local native vegetation communities.
Rehabilitation: Agriculture	- Establish/restore grassland areas to support sustainable agricultural activities (grazing); - Land capability of proposed agricultural areas will be comparable to pre-mining land capability (Land and Soil Capability Class IV); and - Locate adjacent to surrounding infrastructure.
Rehabilitation: Riparian	- Restore self-sustaining native woodland ecosystems characteristic of vegetation communities found in the local area and complement the areas proposed for Ecological Mine Rehabilitation; - Establish areas of self-sustaining: - Riparian vegetation, within any diverted and/or re-established creek lines and retained water features; and - Habitat resources for threatened flora and fauna species, particularly the Swift Parrot, Regent Honeyeater, Spotted-tailed Quoll and Koala. - Vegetation connectivity and wildlife corridors, as far as is reasonable and feasible.
Final Void	- Designed as long term groundwater sinks to maximise groundwater flows across back filled pits to the final void; - Minimise to the greatest extent practicable:

Domain	Final Land Use Objectives
	- The size and depth of final voids; - The drainage catchment of final voids; - Any highwall instability risk; and - The risk of flood interaction. • Safe – associated with safe access and egress into pits by people and animals, and in the case of specific water quality issues, related to safe access and use of that water (in the pit void); • Stable – associated with the risk of geotechnical wall failures, slips and similar mass movement or high erosion rates; • Non-polluting – associated with geochemical risks and water quality impacts on important aquifers, creeks or surrounding ecosystems. The baseline and existing condition of the receiving water is to be considered when determining acceptable water quality standards; and - Sustainable – associated with the ability to remain a stable system that supports some stabilising vegetation cover (where planned) and can satisfy the desired outcomes of safety, stability or that of not polluting in the future.
Water Management	• Water retained on site is fit for the intended post-mining land use/s; and • Water discharged from the site is suitable for receiving waters and fit for aquatic ecology and riparian vegetation.

6. Statutory Requirements

The Rehabilitation Strategy has been prepared to meet the Requirements of Condition B100 of the United Wambo Open Cut Coal Mine Development Consent (SSD – 7142). SSD 7142 was modified in November 2021 to account for changes in the stockpiling of ROM coal. The requirements of the SSD-7142 and where they have been addressed within this document are outlined in **Table 6-1**.

Table 6-1 - SSD 7142 Rehabilitation Objectives and Rehabilitation Strategy Requirements

SSD 7142 Condition	Condition	Section Addressed
B97	Rehabilitation Objectives The Applicant must rehabilitate the site to the satisfaction of the Resources Regulator. This rehabilitation must be generally consistent with the proposed rehabilitation activities described in the document/s listed in SSD 7142 condition A2(c) (and shown conceptually in the figure in Appendix 8) and must comply with the objectives in Table 6.	Section 5
B100	Rehabilitation Strategy B100. The Applicant must prepare a Rehabilitation Strategy for the development to the satisfaction of the Planning Secretary. This strategy must:	This Document
a)	be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Planning Secretary;	Section 8
b)	be prepared in consultation with the Resources Regulator and Council;	Section 8
c)	include a program to review and refine the final landform and final void outcomes every five years, in consultation with the Resources Regulator and Council, to meet the relevant Rehabilitation Objectives in Table 6	Section 12.11
d)	build upon the Rehabilitation Objectives in Table 6 and the Rehabilitation Plans in Appendix 8 including identification of opportunities for increasing the areas of woodland and habitat connectivity within the rehabilitated landscape;	See Section 5

SSD 7142 Condition	Condition	Section Addressed
e)	include details of the canopy, sub-canopy, understorey and ground strata species to be established in the rehabilitation areas, with a particular focus on ensuring the achievement of an appropriate level of diversity and mix of functional groups within each target community;	Section 12.8 and Appendix C
f)	identify opportunities for the incorporation of preferred feed trees, foraging resources and habitat features for threatened fauna species; and	Section 12.8 and Appendix C
g)	include an indicative schedule for the staged rehabilitation of the development.	Section 12.11
B101.	The Applicant must not commence Phase 2 until the Rehabilitation Strategy is approved by the Planning Secretary.	Noted
B102.	The Applicant must implement the Rehabilitation Strategy approved by the Planning Secretary.	Noted

7. Glencore Coal Assets Australia Requirements

Glencore has implemented a proactive approach to rehabilitation and mine closure by developing a range of standards that are to be implemented across its business units which includes United Wambo. These standards require that planning for closure is an integrated part of the life of mine planning process. Specific guidance is provided for developing, implementing and reviewing mine closure plans taking into consideration economic, social and environmental factors so that each of Glencore's operations meet statutory requirements and achieves a sustainable post-closure land use.

The Glencore Closure Standard includes the scope of mine closure activities required at each phase of mining, with closure planning commencing at the exploration phase, continuing through the operational phase and eventually to government sign-off of rehabilitation and successful mining lease relinquishment. The level of detail required in a closure plan increases as the operation proceeds towards the planned closure date. Specifically, Glencore standards require that when a mine is within five years of the planned closure date that a detailed closure planning process is to be initiated. The process involved:

- Confirmation of final land use options;
- Identification of any closure issues and appropriate solutions;
- Budgeting for specific closure costs; and
- Development of a Final Closure Plan.

8. Stakeholder Consultation

Condition B100 b) in SSD 7142 requires stakeholder consultation to be undertaken with the Resources Regulator and Singleton Council. A copy of the consultation and United Wambo response is included in **Appendix A**.

8.1 Ongoing Closure Consultation

Key processes to enable all stakeholders to have their interests considered during the mine closure process will include but not necessarily be limited to the following:

- Ongoing review and update of the United Wambo RMP and Rehabilitation Strategy;
- Submission of Annual Reviews and conducting associated meetings with government regulators to seek feedback in relation to the progress with rehabilitation activities;
- Consultation undertaken in accordance with the *Social Impact Management Plan*;
- United Wambo Community Consultative Committee (CCC);
- Community meetings and information days;
- Community newsletters; and
- One-on-one meetings with stakeholders.

At least five years prior to the planned cessation of mining operations, United Wambo will develop a detailed Mine Closure Plan to address Condition B106 of the Development Consent in consultation with a range of stakeholders including:

- Singleton Council;
- DPE; and
- Resources Regulator.

9. Preparation of the Rehabilitation Strategy

In recognition of the requirements of Condition B100 (a) of SSD 7142, the Strategy has been prepared by a suitably experienced and qualified person, Chris Jones from SLR, who's appointment has been endorsed by the Planning Secretary. A letter of endorsement from the Planning Secretary is provided in **Appendix B**.

10. Planning

10.1 Alignment with Strategic Land Use Objectives

The strategic land use objectives for the area, which have been considered as part of the concept closure planning process for the Project, include those within the Singleton Local Environment Plan (LEP) 2013, NSW Trade and Investment - Division of Resources and Energy's (DRE) Synoptic Plan and the Strategic Regional Land Use Plan for the Upper Hunter (Upper Hunter SRLUP) (Department of Planning and Infrastructure (DP&I) 2012). This Rehabilitation Strategy has also been developed to fulfil the key principles of the Strategic Framework for Mine Closure. Discussion of the alignment of the Rehabilitation Strategy for the Project with these strategies is outlined below.

10.2 Singleton Local Environmental Plans

The Rehabilitation Strategy has been developed in consideration of the objectives of the Singleton LEP (2013). Amendments that may occur to the LEP will be evaluated as part of ongoing revisions to the Project's RMP (Condition B103). Section 4.2.1.1 of the EIS (Umwelt 2016) outlined the land zoning.

Open cut mining is permissible with development consent in RU1 Primary Production but is prohibited within land zoned SP2 Infrastructure.

The land zoned SP2 Infrastructure is associated with the current alignment of the Golden Highway which is proposed to be realigned as part of the Project Clause 7(1)(b)(i) of the State Environmental Planning Policy (Mining, Petroleum and Extractive Industries 2007 (Mining SEPP) provides that mining is permissible with development consent on land where development for the purpose of agriculture is also permissible under the provisions of an environmental planning instrument. Extensive agriculture is a permissible land use within land zoned SP2 Infrastructure. Clause 5(3) of the Mining SEPP provides that the Mining SEPP will prevail where there is any inconsistency between the provisions in the Mining SEPP and the provisions in any other environmental planning instrument (such as the Singleton LEP) (subject to limited exceptions not relevant here). The effect of clause 7(1)(b)(i), in conjunction with the operation of clause 5(3) of the Mining SEPP, is that notwithstanding any prohibition in the Singleton LEP, development for the purpose of open cut mining may be carried out with development consent in the Project Area.

10.3 Singleton Council Local Strategic Planning Statement

Singleton Council has prepared a Local Strategic Planning Statement (LSPS), as required under the provisions of Part 3 of the Environmental Planning and Assessment Act 1979. This LSPS was exhibited in April/May 2020, and adopted by Council at its July 2020 Council Meeting, and supersedes the Singleton Land Use Strategy.. The LSPS has a time frame of 20 years, to 2041. The Development Consent for United Wambo extends to 31 August 2042 which is just beyond the date of the LSPS.

Planning Priority 3.4 of the LSPS is 'Land Rehabilitation Outcomes Meet The Needs Of Current And Future Generations'. The Strategic Policy Positions identified are:

- *Alternative options to returning post-mined land to its pre-mined state should only be considered where comprehensive, detailed and defensible study information demonstrates that the*

alternative option is appropriate in light of environmental impacts, contextual considerations and relevant Council plans.

The approved final land use for United Wambo is native vegetation with areas of agriculture. This is in line with the pre-mining land use for the site.

- *Where they are not intended to be activated, the relinquishment and surrender of mining explorations permits, mineral development licenses and mining leases will be encouraged.*

United Wambo does not hold any mining leases or exploration licences which are not proposed to be mined or are undergoing active exploration activities.

- *Where confidence can be given that non-mined mining buffer land will no longer be impacted by mining activities or associated operations into the foreseeable future, consideration will be given to whether the land use planning provisions that apply to that land remain appropriate, on the basis that it is no longer going to be subject to mining impacts.*

This does not currently apply to United Wambo.

- *Through advocacy and collaboration, we will work with government agencies and industry professionals to achieve rehabilitation outcomes that are sustainable and appropriate for respective sites and locations.*

Singleton Council have been consulted through the assessment phase for the Project and ongoing development of the Rehabilitation Management Plan and Rehabilitation Strategy. United Wambo commits to ongoing consultation throughout the life of the Project.

10.4 Upper Hunter Strategic Regional Land Use Plan (DPIE2012) and Upper Hunter Strategic Assessment

The Upper Hunter SRLUP has been developed to provide a strategic framework for delivering the necessary context for government investment priorities, servicing strategies and local environmental plan making for the Upper Hunter Valley. The stated objective of the Upper Hunter SRLUP is to balance the strong economic growth in Regional NSW with the protection of valuable agricultural land and the sustainable management of natural resources. In particular, the Upper Hunter SRLUP identifies the importance of minimising the land use conflicts arising from the rapid growth of coal mining activities and the recent emergence of the coal seam gas industry.

The Landuse Plan and Strategic Assessment emphasises the importance of the protection of biodiversity through strategic land use planning. It recognises that post mining rehabilitation has the potential to contribute to biodiversity conservation in the longer term and that the location and design of rehabilitation can be used to maximise its landscape value in the future. Importantly, the plan outlines that effective planning will be required to design a post-mining landscape that will allow a number of different land uses including conservation. Other than the Synoptic Plan there is limited strategic planning to guide the development of rehabilitation to improve biodiversity outcomes in the Hunter Valley. The rehabilitation program has been designed to develop native vegetation corridor links. The EIS committed to:

Develop native vegetation corridors linking surrounding remnant vegetation areas to the southwest of the Project Area to existing remnants in the north east and south east, and the proposed future native rehabilitation areas of HVO mine and Mount Thorley Warkworth (MTW).

The final land use within the Development Consent area will be generally consistent with the pre-mining land use and biodiversity, with this discussed further in Section 5.

10.5 Hunter Regional Plan 2036

The Hunter Regional Plan 2036 is the NSW Government's strategic long term plan for guiding land use planning decisions for the Hunter Region until 2036. The Regional Plan sets out four regionally focused goals for the Hunter Region, being:

- The leading regional economy in Australia;
- A biodiversity-rich natural environment;
- Thriving communities; and
- Greater housing choice and jobs.

The regional plan aims to strengthen the region's economic resilience, protect its well established economic and employment bases and build on its existing strengths to foster greater market and industry diversification. In particular, the intent of the Regional Plan 2036 is to transform the productivity of the Upper Hunter, plan for greater land use compatibility, protect and connect natural areas and sustain water quality and security. The Rehabilitation Strategy aligns to the following 'directions' in the Regional Plan:

- Direction 5 Transform the productivity of the Upper Hunter specifically to identify the land and infrastructure requirements to develop the Hunter's Coal and alternative energy resources.
- Direction 11 is aimed at managing the ongoing use of natural resources and notes 'the combination of undeveloped coal resources in the Hunter and Newcastle coalfields and the export capability of the Port of Newcastle provide significant opportunities for growth'.
- Direction 13 is based on managing the compatibility of land uses in particular identifying and protecting important agricultural land, including intensive agricultural clusters.
- Direction 14 is aimed at protecting and connecting natural areas, including developing a holistic approach across both public and private lands will protect and manage natural ecosystems and ensure connectivity between habitats.
- Direction 15 notes the importance of monitoring and managing the impacts of existing land uses, and in the future, those associated with growth will be essential to protect the quality and security of the region's water supplies.
- Directions 5 and 11 are relevant as they relate to the economic benefits of the Project through development of economic coal resources. Direction 13 is related to how the Rehabilitation Strategy aligns with the Upper Hunter SRLUP which is discussed in Section 5.6.
- Direction 14 is addressed through the proposed revegetation of the site to predominately woodland communities which recreates and enhances local and regional habitat connectivity;

- Direction 15 is addressed through the range of management, mitigation and monitoring measures committed to for the Project and those discussed in Section 8. The investigation of alternative, higher economic value and employment generating industries for the site post mining as part of the mine closure planning processes.

10.6 Strategic Framework for Mine Closure

The Strategic Framework for Mine Closure (ANZMEC & MCA 2000) has evolved as a cooperative development between the Australian and New Zealand Minerals and Energy Council (ANZMEC) and the Australian Minerals Industry represented by the Minerals Council of Australia (MCA) that provides a framework of issues to be considered as part of a mine closure plan. The approach to mine closure as outlined in this document has been developed in consideration of the six key objectives as identified by this framework document. Each of these objectives is outlined in **Table 10-1**, along with the relevant section of this document where they are addressed.

Table 10-1 – Key Objectives from the Strategic Framework for Mine Closure

Key Objectives	Relevant Section of Rehabilitation Strategy/Comment
To enable all stakeholders to have their interests considered during the mine closure process.	Section 8
To ensure the process of closure occurs in an orderly, cost-effective and timely manner.	This document
To ensure that the cost of closure is adequately represented in company accounts and that the community is not left with a liability.	Rehabilitation Cost Estimate process.
To ensure there is clear accountability and adequate resources for the implementation of the closure plan.	Section 14
To establish a set of indicators which will demonstrate the successful completion of the closure process.	Section 5 Objectives and see RMP.
To reach a point where the company has met agreed completion criteria to the satisfaction of the responsible authority.	Section 5 Objectives and see RMP.

10.7 Land Ownership and Land Use

10.7.1 Historic

The Project Area is situated in a landscape that is characterised by mining land, grazing land, more intensive agriculture on the Hunter River alluvial zone (cropping and dairying) and some private and

public woodland. The land to the north and north-east of the Project Area is occupied by Hunter Valley Operations (HVO) coal mine (HVO South), and further to the north by agricultural land.

10.7.2 Current

The area south of the Project Area is Wambo-owned grazing land. Land to the east of the Project Area is privately owned by the Hunter Valley Gliding Club, surrounded by HVO-owned mining buffer land. To the immediate west of the Project Area is land owned by Wambo which is also utilised for grazing. Wollemi National Park is located approximately 0.5 kilometres west of the Project Area at its closest point to the western boundary of the Project Area. Wollemi National Park is also part of the Greater Blue Mountains World Heritage Area.

United and Wambo own the majority of freehold land within the Project Area other than road reserves and an area of Crown land. United's land interests in the area are held by the CFMEU on behalf of United.

A large proportion of the Project Area has been impacted by a combination of past mining operations, associated mining infrastructure, existing rehabilitation, infrastructure corridors and past agricultural clearing. Substantial areas of regenerating remnant vegetation are also present within the Project Area. The Project Area contains large areas of cleared and disturbed land, and native vegetation communities providing woodland, riparian, shrubland and grassland habitat and rehabilitated communities. Farm dams and ephemeral watercourses, which are typically dry, provide drinking water for fauna species.

10.7.3 Final Land Use

The proposed final land use is discussed in detail in *Section 12.1*.

11. Decommissioning Activities

At the end of the proposed operational life of the Project, with the exception of that which is required for the final land use, United Wambo proposes to decommission all on site infrastructure and associated facilities not required for any post-mining land uses as part of the mine closure process. Rehabilitation and closure monitoring and maintenance works would continue after mine closure activities are complete, until it can be demonstrated that the relevant completion criteria have been met (refer to RMP for Completion Criteria)

Further details of decommissioning activities will be outlined in the Mine Closure Plan. Condition B106 outlines that *"At least 5 years prior to the planned cessation of mining operations, the Applicant must prepare a Mine Closure Plan for the development to the satisfaction of the Planning Secretary"*. The Mine Closure Plan will address the specific GCAA Requirements for Mine Closure.

A summary of the general decommissioning activities that will be undertaken as part of the closure and decommissioning is outlined in **Table 11-1**.

Table 11-1 – General Approach to Decommissioning Activities

Mine Closure Aspect	General Approach
Site Services	Where not required for approved future land uses, the following activities will occur: • Electricity services to any remaining infrastructure will be removed prior to the commencement of building demolition works; • Telecommunications, water supply and other services will also be disconnected and removed where practical; and • 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 site plan and a suitable caveat developed to provide that they are readily identifiable for future land holders.
Buildings and Fixed Plant	• All buildings, fixed plant and other infrastructure which are not required as part of the post-closure land use will be demolished and removed. Where appropriate the materials recovered during demolition will be sold for re- use or recycled; • Concrete footings and pads along with other potential inert building waste will be broken up and buried with overburden in the pit area or used in rehabilitation where appropriate; and • Where it does not pose a constraint to the proposed final land use, structures such as footings, underground water pipelines and disconnected power cables may be left in situ. This may include where it is not practical to retrieve the structures or where their removal may lead to environmental damage. These remaining structures will be surveyed and recorded on a plan.
Removal of Carbonaceous/ Contaminated Material	• Excess coal material remaining at closure will be scraped up and either reprocessed or disposed of within the tailings/coarse reject emplacement areas; • Any remaining carbonaceous material (e.g. coal reject) on the base of the coal stockpile area will be either capped with inert material in accordance with relevant guidelines or scraped up and removed to the tailings/coarse reject emplacement area; and • Where there is potential that contamination may have occurred as a result of operational activities (e.g. re-fuelling areas, workshops, etc.), investigations will be undertaken to determine the presence and extent of any contamination. Where identified, contaminated material will be bio-remediated on site or managed in accordance with the appropriate waste guidelines.

Mine Closure Aspect	General Approach
Equipment Storage Areas	- Any redundant plant or equipment will either be sold for reuse, recycled (i.e. scrap metal) or disposed of at an appropriate landfill facility; and - Storage areas will be assessed for potential contamination (e.g. hydrocarbons) and remediation undertaken as required.
Hardstand Areas, Roadways and Car Parks	Hardstand areas, roadways and car parks will be removed with the waste material (e.g. bitumen, concrete) being placed and capped in the tailings/overburden emplacement areas or incorporated into the final voids.
Hazardous Materials Management	- All remaining hydrocarbons such as diesel and lubricants and other hazardous materials will be either utilised or disposed of via an authorised waste contractor; and - Storage tanks will be removed and depending on their condition either sold or disposed of at an authorised facility.
Dangerous Goods	It is envisaged that the majority of dangerous goods remaining on-site will include gas bottles and cleaning agents, which will be utilised during decommissioning activities or disposed of off-site in accordance with the regulatory arrangements applicable at the time.
Water Management Infrastructure	Depending on the chosen final land use, issues that will be addressed as part of the post-mining water management system will likely include: - Removal of excess sediment (i.e. saline sediment) from the surface dams for future use by the subsequent land owner or alternatively filling or removing the dams if they are no longer required; - Re-shaping dams (where required) in accordance with their intended use. This may involve re-sizing, facilitating stock access (if required) or reshaping to enhance habitat functionality for specific fauna species; - Where dams are to be retained, design drainage structures to capture runoff from sufficient catchment area so that the dam can be utilised for its intended use; - The installation of appropriate sediment and erosion control measures; and - Sediment material extracted from surface dams will be analysed to determine the potential for contamination and, if present, will be appropriately disposed.
Final Void Management	- High and Low walls of final voids rehabilitated as per geotechnical recommendations to provide wall stability; - Voids will be safe, stable and non-polluting; - Drainage structures constructed to divert water away from final voids; - Drainage structures constructed as required within final void areas to prevent instability from erosion; - Rehabilitation of high and low walls as defined in the Closure Plan; and

Mine Closure Aspect	General Approach
	Designed as long-term groundwater sinks to maximise ground water flows across back filled pits to the final void.

12. Implementation of the Rehabilitation Strategy

12.1 Final Land Use

The approved final land use for the Project Area is native woodland areas with areas of agricultural use (included in response to community feedback). A key consideration is the existing requirements for revegetation of the Wambo mining area imposed by the Wambo mine development consent and EPBC Controlled Action Approval 2003/1138 (1570 ha) that need to be met. These existing requirements have been incorporated into the Project final land use plan as well as utilising mine rehabilitation for offsetting requirements (up to 878 ha). The substantial existing Wambo approval requirements when combined with the proposed biodiversity offsetting outcomes for the Project limit the area available for alternative future land uses. The remaining areas are proposed for agricultural land (125 ha) and were included in response to community input which requested prioritisation of agricultural land where practical, possible and sustainable.

The indicative final voids, final landform and land use were consulted on during the assessment phase and were the subject of a community workshop. The feedback from these stakeholder engagement processes influenced the final landform considerations and the closure commitments. This included feedback on aspects such as:

- The balance between biodiversity offset requirements, woodland areas and land for agricultural purposes as part of the final land use and revegetation plan;
- The desire to minimise the number and size of the final voids, where practicable;
- The desire for the incorporation of natural landform design principles into the design of the final landform for the Project.

The rehabilitated area will provide native vegetation corridors linking surrounding remnant vegetation areas, including future vegetation areas planned on rehabilitated mining land to the north and east.

Key linkages will include:

- From the Wollemi National Park through the Project Area to the proposed native rehabilitation areas of HVO South mine to the north; and
- To the northeast of the Project Area, through to the proposed native rehabilitation area of the Warkworth mine to the southeast of the Project Area.

Several ancillary land use options that are complimentary to the proposed native vegetation/conservation and agricultural land uses have been identified. The potentially viable land use options that have been previously identified include:

- Industrial uses, particularly in consideration of the availability of the rail loop, as well as the suitability of infrastructure associated with the workshop, office complex and other surface facilities including water management structures;
- Adventure tourism and recreation;
- Aquaculture; and

- Pumped-storage hydroelectricity.

The options above have been identified as potentially suitable ancillary land uses but are not currently proposed.

In addition, the Project Area may have some value in terms of future mining operations. The Project Area is located in an area dominated by existing mining operations and with surrounding exploration licence areas that may have potential for future mining operations. The Project Area includes the following key values that could be beneficial for any nearby future mining operation:

- Coal processing infrastructure;
- Established water/storage and management;
- Tailings storage facilities;
- Access to road and rail transport;
- Electricity and communication infrastructure; and
- Accessibility to skilled mining/heavy engineering workforce.

While not proposed, it is recognised that the Project Area may provide an opportunity to support other future mining operations within the local area.

Discussion of the feasibility of delivering the ancillary land options and potential future mining opportunities is provided in the Response to the IPC Review Report which can be downloaded from the NSW Major Project website: <https://www.planningportal.nsw.gov.au/major-projects/project/25271>.

It is noted that economic feasibility cannot be assessed at this time as it will depend on the economic environment post mining, which is up to 23 years from now. The discussion therefore focusses on the physical and other attributes that would be required to support the identified ancillary land use.

12.2 Management of Biological Resources for Utilisation in Rehabilitation

12.2.1 Seed Collection and Propagation

Native revegetation activities in rehabilitation areas will preferentially use local provenance seed for direct seeding or tubestock propagation. United Wambo has developed a seed collection program to maximise the amount of viable seed of local provenance from clearing activities for use in rehabilitation and revegetation activities. The program includes:

- Species considered suitable for seed collection should have high seed production and high levels of viability. Seed collection activities will be managed in accordance with the *Flora Bank Guidelines* (Florabank 2013);
- Developing a seed calendar that contains information relating to fruiting and seed collection times for key native species;
- Recording data on seed collection including species, collection location and date of collection;

- Seed assessment of native vegetation within the United Wambo disturbance footprint in order to allow for seed collection prior to or immediately following clearing;
- The required volumes of seed are to be collected in order to enable the adequate supply of native seed for reuse;
- The utilisation of record sheets and a GIS database to track collection, storage and utilisation of the seed resource; and
- The seed collection program adopts innovations to industry best practice techniques, where relevant.

Seed propagation activities will be undertaken by an external contractor who is suitably trained, licenced and experienced in propagation of the species required for revegetation. Ideally, all seed collected as part of the seed collection program will be used for tree propagation or direct seeding activities.

Trials of propagation methods may be undertaken throughout the revegetation program.

Whilst local provenance seed will be targeted for collection it is unlikely to provide sufficient diversity and quantities of seed required for rehabilitation or revegetation activities. Therefore, native seed will also be purchased from suitable seed suppliers as required.

Mitigation measures relating to clearing are outlined in the *United Wambo Biodiversity Management Plan*.

12.2.2 Salvage of Tree Hollows, Stags and Timber

Further details on the salvaging of hollow logs, stags and timber is outlined in the *Biodiversity Management Plan*. The United Wambo Habitat Pre-Clearing Survey and Habitat Tree Felling Procedure (part of the *Biodiversity Management Plan*) will be implemented to minimise the potential for impacts on native fauna species (including threatened species) as a result of the clearing of hollow-bearing trees.

The salvage of hollow bearing trees, hollow logs, fallen timber and boulders will be undertaken, where practical, during the clearing process. The relocation of such habitat resources into post-mining rehabilitation areas and offset and conservation areas (where deemed to be appropriate) is aimed at increasing habitat complexity in these areas, in order to make them more habitable for native species, particularly key threatened species.

12.2.3 Soil Characterisation and Topsoil Management

The soil landscape was mapped as part of the EIS (see Section 6.2.2 of EIS Umwelt 2016). The soils of the Project Area are generally texture contrast profiles of varying depths, and have low fertility. They are subject to a number of hazards that affect their suitability for agricultural uses, including salinity, structural decline, susceptible to sheet erosion and potential for poor drainage and waterlogging (EIS 2016).

As discussed in the EIS (Umwelt 2016), materials management and monitoring techniques to be adopted for the Project include:

- Material characterisation of topsoil and subsoil at an appropriate scale across the site. Representative samples will be taken to characterise the nature of the soil material (e.g. sodicity, acid-generating potential, etc.) to determine the potential limitations to rehabilitation and sustainable plant growth. The results will be used to determine specific ameliorant techniques that may be applied to the soil material in order to overcome potential limitations and enhance vegetation establishment;
- Topsoil and subsoil stripping activities are to be restricted during adverse weather conditions to minimise the potential for dust generation;
- Topsoil and stripping depths will be identified for each stripping area and will be undertaken using appropriate equipment (e.g. dozer or scraper);
- Topsoil and subsoil layers will be assessed and managed so that they can be appropriately re-applied in areas to be rehabilitated;
- Topsoil will not be compacted;
- Wherever practicable, topsoil will be transferred directly from stripping location to areas that have been reshaped for rehabilitation, eliminating the need for storage and re-handling;
- Topsoil stockpiles will be located away from traffic areas and at an appropriate distance from watercourses;
- Appropriate sediment controls will be installed around topsoil stockpiles;
- Stockpiles will be generally less than 3 metres high to retain biological activity within the topsoil;
- Stockpiles to be kept longer than six months will be sown with a suitable cover crop to minimise soil erosion and invasion of weed species;
- Where required, machinery used to handle and transport topsoil will be washed down prior to and at the completion of works to minimise the transfer of weeds;
- Weed growth on topsoil stockpiles will be monitored and subsequently controlled if necessary;
- Prior to re-spreading, any weed growth will be scalped from the top of the stockpiles to minimise the transport of weeds into rehabilitated areas; and
- Stockpiles will be appropriately identified to minimise the potential for inadvertent use or disturbance.

A *Topsoil Management Plan* has been developed for the United Wambo Project. The Plan will contain information on stripping and handling practices. The Plan will outline the location and availability of topsoil.

12.3 Overburden and Interburden Handling

The overburden emplacement areas resulting from the two open cut mining areas will be combined to provide an integrated final landform across the Project mining area.

Trucks will be utilised to haul overburden excavated by the shovels/excavators to emplacement areas.

Key design considerations associated with the overburden emplacement areas include:

- All final overburden landform slopes will be battered to minimise erosion risk. Concave profiles may be implemented to further enhance stability and provide consistency with surrounding natural landforms;
- Overburden emplacement areas will include variation in vertical relief in order to prevent ponding of surface water as well as to create a variable profile that is commensurate with the natural local topography; and
- The footprint of the overburden emplacement areas have been designed to be irregular in shape in order to provide a more natural landscape.

12.4 Management of Spontaneous Combustion

During preparation of the EIS (Umwelt 2016), geological investigations were undertaken by United Wambo which concluded that the propensity for spontaneous combustion in the strata to be mined is low.

With appropriate management measures in place the risk of adverse air quality impacts and negative impacts to rehabilitation associated with spontaneous combustion is low. Specific management measures will also be put in place for open cut mining through the former United underground workings, to minimise the risk of spontaneous combustion in these areas.

United Wambo is committed to the management of potential air quality issues associated with spontaneous combustion. This commitment will be demonstrated by the application of a hierarchy of management controls. United Wambo hierarchy of controls applied to spontaneous combustion will be as follows:

- Elimination – processing and shipping of coal for its end use before the oxidation reaction that leads to spontaneous combustion occurs.
- Separation – Where material has or is showing signs of spontaneous combustion it is stockpiled separately from other inert coals to avoid spreading the heating. Carbonaceous material is buried in a short space of time that prevents heating with a minimum depth of inert cover of 5 metres.
- Engineering – Controls that minimise the impact of hot material such as establishing sprinklers/bench flooding to cool material prior to mining and selective digging and/or burying. Control overburden lift heights where spontaneous combustion is predicted to increase compaction of the emplacement area that reduces air and heat flow.
- Procedures – Including early identification of spontaneous combustion; dealing with heated materials; provision of protective or first response capacity; and preparing for / cleaning up after spontaneous combustion.
- Personnel skills and training – Personnel training and education on the effects of spontaneous combustion, how to manage actual and potential for spontaneous combustion in overburden emplacement areas and coal stockpiles and how to prevent incident to all people who work in affected areas.

PPE – Including gas monitors, masks, respirators and eye protection are required when potentially exposed to spontaneous combustion.

12.5 Management of Acid Mine Drainage

Analysis was undertaken by Geoterra Pty Ltd (Geoterra) as part of the EIS (Umwelt 2016) to assess the acid rock drainage (ARD) potential of the materials to be mined. The study indicated that the vast bulk of overburden, interburden and floor materials represented by the samples tested are unlikely to be acid producing or release significant salinity and will be acid consuming. The Geoterra laboratory results did however identify some small areas of potential acid forming (PAF) material present within the Project Area (1 out of 87 samples collected).

The general buffering nature of most of the overburden and interburden material and the likely small proportion (if any) of PAF material potentially present in the mining area provides considerable flexibility in mine materials management. Operational mixing of any PAF and high acid neutralising capacity (ANC) materials is expected to be sufficient to control any potential for acid generation.

Should PAF material be identified, the following management strategies listed in the EIS (Umwelt 2016) will be considered for PAF material where operational blending is not sufficiently effective:

- Placement of PAF material in thin layers of no more than 5 metres with traffic compaction and immediate over-dumping with non-acid forming (NAF) spoil;
- Avoid placing PAF material within 5 metres of the natural ground level in out-of-pit emplacement areas to isolate it from any water flow along the interface between the overburden and natural ground;
- Mixing of acid neutralising materials (limestone and/or high ANC NAF overburden and interburden) with PAF material to increase lag times before onset of acid conditions ;
- Selective placement of PAF material at least 100 metres back from the outer perimeter of the emplacement area with a thick (not less than 20 metre) outer zone of NAF materials (preferably high ANC material) and incorporate strategies to limit oxygen transfer to and fluctuating moisture conditions in PAF materials; and
- Selective placement of PAF materials in-pit below the long term recovery water table to allow inundation at closure and prevent long term exposure to atmospheric oxidation.

A program of routine sampling and testing of the overburden/interburden material identified in the Geoterra study as being PAF will be carried out during operations to better define the ARD potential and variability of rejects. A program of routine sampling and testing of seepage and runoff from pit walls and floors, overburden emplacements, ROM stockpiles and washery waste disposal areas where the testing has identified a risk of ARD will also be carried out to check for ARD generation, assess the performance of management strategies, and determine and/or refine non-acid forming/potentially acid forming blending ratios and limestone treatment requirements (if required). The need for ongoing monitoring will be reviewed periodically should the testing and monitoring indicate negligible risk of ARD with the management practices above being implemented.

12.6 Coarse Reject and Tailings Dam Decommissioning

12.6.1 Coarse Reject

Coarse reject material will be co-disposed with overburden material and incorporated into the final landform. The coarse reject material will be placed with a minimum depth of inert cover of 5 metres within the final landform to minimise any potential interference to rehabilitation establishment as well as minimise the potential for spontaneous combustion or ignition of carbonaceous material in the event of bushfire occurring within the revegetated landscape.

12.6.2 Tailings Dam Decommissioning

The tailings storage facilities on site will be filled, capped and shaped to the conceptual final landform plan (Plan 2). The primary objective of the capping design will be to minimise the potential for exposure of potentially environmentally sensitive tailings material in the rehabilitated landform and prevent the occurrence of spontaneous combustion. Following capping, these areas will be revegetated.

Key design considerations associated with the overburden emplacement areas include:

- All final overburden landform slopes will be battered to minimise erosion risk. Concave profiles may be implemented to further enhance stability and provide consistency with surrounding natural landforms;
- Overburden emplacement areas will include variation in vertical relief in order to prevent ponding of surface water as well as to create a variable profile that is commensurate with the natural local topography; and
- The footprint of the overburden emplacement areas have been designed to be irregular in shape in order to provide a more natural landscape.

12.7 Final Landform Design

During the assessment phase of the Project, detailed concept and pre-feasibility mine design studies were completed to optimise the Project's final design. These studies identified potential mine design options and then evaluated each option to identify the preferred mine design. During these studies environmental and community impacts were key considerations that informed the Project design.

The key issues considered in assessing the viability and feasibility of various alternatives and developing the final Project design were:

- Minimising noise, dust and visual impacts on the surrounding community over the life of the Project;
- Maximising resource recovery;
- Financial viability;
- Mining efficiency;
- Optimisation of product coal quality from the various seams within the resource;

- Minimising impacts on biodiversity and water resources;
- Minimising social impacts; and
- Establishing the future final landform.

The outcome of these studies was the development of a preliminary Project mine plan which was then further refined over time by a detailed iterative design and impact assessment process to determine the preferred mine plan for the Project. United Wambo has taken an approach to the design and development of the final landform to achieve a more natural looking and functioning landform.

United Wambo has committed that the final landform will:

- Be safe, stable and non-polluting;
- Incorporate micro relief;
- Incorporate drainage lines consistent with topography and natural drainage where reasonable and feasible;
- Sustain the intended land use for the post-mining domains;
- Minimise the visual impacts of the development;
- Be in keeping with the natural terrain features of the area; and
- Be integrated with the rehabilitated landforms of surrounding mines where practicable.

The process for the implementation of the conceptual final landform will utilise a natural landform design incorporating micro-relief principles. The key objectives for the shaping of the landform are provided in **Section 12.8**.

Over the several years of Project mine planning and development of the preferred mine plan, several different final void options were investigated. More options were also considered after the preferred mine plan was determined including void treatment options and the option of backfilling the voids.

Based on these considerations, it was determined by United Wambo that the Project could be designed to extract 176 Mt of ROM coal without an additional void, maintaining the number of voids at two, as was already approved for Wambo, and designing the final landform to be sympathetic with the surrounds. The approved final landform seeks to strike a balance between mine planning, economic, environmental and social outcomes. Further details on the final voids are provided in **Section 12.10**.

In accordance with Condition B100 (c) of SSD 7142 , the Rehabilitation Strategy is to be reviewed every five years or earlier if required in consultation with the Resources Regulator and Council.

The final landform will remain unchanged in the United Wambo RMP, unless United seek and are approved for a modification to the Development Consent.

12.8 Landform Shaping

The process for the implementation of the conceptual final landform will utilise a natural landform design incorporating micro-relief principles. The key objectives include:

- The drainage density of the final landform is to reflect the nature of the drainage patterns in surrounding landforms;
- Steeper slopes are to be located higher in the catchment (that is, where water flows are smallest), with slope gradients flattening out downstream;
- Drainage lines will have both channel and floodplain components to provide stability during frequent flood events;
- Gentle flow transitions which emulate natural transitions and maintain a balance between scour risk and sediment load; and
- The micro-relief design process also results in a more natural looking landform, which reduces the visual impact of the final landform.

12.9 Revegetation Program

A seed collection and handling program aimed at maximising the viability and diversity of local seed in the revegetation mix will be implemented as part of the rehabilitation program, however, endemic species may also be sourced from other sources, where required. As rehabilitation progresses, additional species can be planted to mimic succession processes where necessary to achieve the target woodland community.

Open woodland will be seeded with a native species mix from the list of species typically found to occur within the Central Hunter Valley Eucalypt Forest and Woodland CEEC and other native woodland communities currently occurring within the Project Area.

During the rehabilitation process, the ecological structure of the rehabilitated land will be consistent with what would be expected in a typical disturbed landscape transitioning back to woodland. Succession patterns are likely to be similar to those that are observable in forest areas heavily impacted by bushfire and cleared land (such as agricultural land) regenerating to bushland. Most or all of the vegetation to be disturbed has been previously cleared, and is comprised now of regenerated vegetation that has developed through various successional stages.

During the early stages of rehabilitation, grasses and fast growing pioneer species will initially dominate with pioneer species such as acacias dominating the mid strata and canopy. As the pioneer species thin out, other canopy species such as the eucalypt species grow, increase in dominance and occupy a greater percentage of canopy. In rehabilitated areas (and heavily disturbed environments), until pioneer species have started to die back, there is little light available in the lower storeys and typically a consequential low species richness in ground and shrub layers. As the pioneer species die out and canopy height increases, increased species richness can be expected to develop in the understorey.

Aggressive exotic grasses, such as kikuyu (*Cenchrus clandestinus*), African lovegrass (*Eragrostis curvula*), Rhodes grass (*Chloris gayana*) and coolatai grass (*Hypertheca hirta*), are not to be used within 50 metres of the interface of agricultural rehabilitation areas with remnant native vegetation or woodland rehabilitation areas to prevent their spread into those areas.

The rehabilitation will be undertaken through the creation of corridors of rehabilitated woodland which will link to remnant stands of native vegetation within the Development Consent area, from

remnants adjoining the Development Consent Area and to proposed future woodland areas of rehabilitated HVO and MTW Mine.

Rehabilitated woodland areas will contain flora species assemblages characteristic of the dominant vegetation communities impacted by the Project. A summary of the different seed mixes for vegetation communities are outlined below and in **Appendix C**.

12.10 Final Voids and Highwall

Following United Wambo's determination that final voids are necessary to allow the Project to be economically feasible, United Wambo focussed on the design of the voids, committing to designing them to be safe, stable, non-polluting and sustainable. United Wambo has established several design principles which will be applied to the final voids developed as part of the Project. The design principles include:

- Slopes within zones of weathered strata and final slopes of emplaced materials will be battered to achieve final slopes of 9 to 18 degrees;
- Highwalls will have slopes between 63.5 and 80 degrees;
- Regardless of the above slope criteria, all final void rock slope angles will be determined by geotechnical investigations to ensure they are safe and stable;
- Highwall bench widths of generally 10 to 20 metres;
- Within the void, overburden will be placed against all exposed coal seams including those that will ultimately be covered by water within the void;
- A safety berm will be established along the top of each highwall;
- Safety berm and associated drainage will be designed to prevent runoff flowing over face of the highwall;
- The void slopes and highwall benches will be revegetated;
- Final internal corners of the mine highwalls are proposed to be rounded in areas above the final predicted water level to provide a more natural, less geometric form to the void sides; and
- The highwall benches will be revegetated with a suitable native vegetative mix using local species, where appropriate, above the predicted final void water level.

United Wambo proposes to maintain the final voids as long-term salinity sinks with the smaller void catchment areas to maximise the return of water to the surrounding natural catchments. United Wambo will further investigate the potentially feasible water management options, along with any other viable options that are identified during the life of the Project.

The void associated with the Wambo Open Cut will be partly filled with overburden and the sides of the void will be shaped with micro-relief features incorporated. Based on the conceptual final mine layout and final landform design there will be no highwalls associated with the Wambo Open Cut final void due to the design as shown in the EIS, which mines back into previously backfilled areas resulting in the removal of the final highwall. If mining in the Wambo Open Cut does not reach the full extent shown in the EIS due to future economic or technical mining constraints, there may be sections of the

highwall that remain *in situ* at the conclusion of mining. These will be treated with the same design principles outlined above. A pit lake will establish in the base of the Wambo Open Cut final void over time.

As part of the closure process, additional battering of the upper benches of the United Wambo Open Cut will also be implemented to improve the visual amenity of the void and reduce highwall heights. This will also improve long term geotechnical stability of the top weathered sections of the highwall. It is not feasible to completely remove the highwall from this final void due to mining lease and land ownership constraints to the north and interaction with the emplacement areas to the west and south. A large portion of the retained highwalls will be below the predicted final water level in the pit lake and there will be minimal vantage points from which the remnant highwall will be visible (particularly once vegetation has been established on adjacent areas) prior to inundation.

In addition, as identified above, the final internal corners of the mine highwalls are proposed to be rounded in areas above the final predicted water level to provide a more natural, less geometric form to the void sides. The widths of the benches formed in the final highwall are proposed to generally be between 10 and 20 metres wide to provide for long term stability, and opportunities for the establishment of low height vegetation on the benches over time. This will further improve the visual aspects of the void.

The final voids, lowwalls and ramps cannot be rehabilitated progressively over the life of the mine as they are active until the end of production and final landform establishment. The final voids will be designed to minimise its size and depth by infilling some components where mine planning allows.

Although for the Project backfilling voids is uneconomic, United Wambo is committed to minimising risks to the community from any residual voids through effective mine planning and through the development of effective final void designs. The Project has committed to design final voids that are safe, stable and non-polluting.

In achieving its overall aim of minimising voids, United Wambo will consider the following factors throughout the life of the Project:

- The ongoing refinement of the life of mine plan will consider final void implications at each stage of planning;
- There needs to be recognition that due to the dynamic nature of mining, mine plans will change through time in response to economic, geotechnical and environmental factors. As such, void positions/size/characteristics may change from that initially envisaged in concept mine plans, however, the design of the final voids in each mine plan iteration will meet acceptable outcomes; and
- Final voids and rehabilitated mine sites need to consider opportunities for the economic diversification of an area following the cessation of mining. United has committed to consider such options as a part of the detailed mine closure planning process.

In summary, United Wambo is committed to minimising the scale and potential impacts represented by the final voids where practicable, through integrated mine planning and environmental analysis, with a target of leaving all pit voids post-mining in a condition that is safe, stable, non-polluting and sustainable.

These overarching commitments are further described as:

- Safe – associated with safe access and egress into pits by people and animals, and in the case of specific water quality issues, related to safe access and use of that water (in the pit void);
- Stable – associated with the risk of geotechnical wall failures, slips and similar mass movement or high erosion rates;
- Non-polluting – associated with geochemical risks and water quality impacts on important aquifers, creeks or surrounding ecosystems. The baseline and existing condition of the receiving waters is to be considered when determining acceptable water quality standards; and
- Sustainable – associated with the ability to remain a stable system that supports some stabilising vegetation cover (where planned) and can satisfy the desired outcomes of safety, stability or that of not polluting into the future.

The design of the voids will be continually reviewed over the life of the mine as mining progresses in consideration of the above listed void design principles.

Further detail on the final voids will also be included in the detailed Mine Closure Plan as required by Condition B106 of SSD 7142.

12.11 Staged Rehabilitation Program

The indicative schedule for the staged rehabilitation of the development is in accordance with the mine stage plans that have been provided in the EIS and approval documentation. These plans are provided in **Appendix D**.

The rehabilitation proposed in the stage plans is indicative and will be further refined during the life of the Project. Detailed rehabilitation and mine plans are provided in the United Wambo RMP. The RMP is updated every three years, or earlier if triggered under the RMP Guidelines.

United Wambo will provide annual updates on rehabilitation and disturbance in the Annual Review. It is understood the Resources Regulator are in the process of undertaking a rehabilitation reform, with reporting requirements likely to change in the coming years.

12.12 Revegetation Care and Maintenance

Based on the outcomes of the rehabilitation monitoring program as outlined in **Section 13**, a care and maintenance program will be implemented to facilitate that rehabilitation is sustainable for the long term. The scope of this program will include as a minimum the following:

- Weed and feral animal control of rehabilitation;
- Erosion and drainage control works;
- Re-seeding/planting of rehabilitation areas that may have failed (e.g. lack of germination, high plant mortality rate etc.) or require the establishment of later phase successional species;
- Maintenance fertilising; and
- Repair of fence lines, access tracks and other general related land management activities.

It is envisaged that this program will be continued as required until it can be demonstrated that the rehabilitation of the United Wambo has satisfied the closure criteria.

Where areas have been identified as being capable of being returned to sustainable agricultural use, it will be the intention to manage these areas in accordance with their intended use as soon as practical after rehabilitation has become established. For example, following the incorporation of infrastructure such as farm dams and fencing into the rehabilitated landform, cattle grazing at low stocking rates may be introduced intermittently until the soil profile and species diversity has developed sufficiently to support more intensive sustainable grazing.

12.13 Proposed Rehabilitation Sign-Off Process

Based on the outcomes of the rehabilitation monitoring programs and in consultation with the relevant government agencies, United Wambo intend to seek progressive sign-off of rehabilitated areas once the agreed closure and rehabilitation criteria have been satisfied. The aim will be to achieve consensus on the quality of rehabilitation required as a benchmark for sign-off. With the United Wambo Project only recently commencing, it is not expected that sign-off of rehabilitation to occur until later in the project life cycle.

Where ongoing monitoring indicates a high degree of confidence that revegetated areas meeting certain benchmarks will continue to transition towards fully functioning communities (based on experience at other areas of rehabilitation at other Glencore mine sites), rehabilitation sign-off criteria may be revised to enable sign-off at an earlier stage in the succession process. Any such application of revised criteria would be based on the monitoring of early successional phases and evidence to provide a high degree of confidence that appropriate ecosystem function processes were occurring in the areas to be signed-off.

13. Measurement and Evaluation

United Wambo will continue to undertake a rehabilitation monitoring program in accordance with Glencore standards. The objectives of the program will be to:

- Assess the long term stability and functioning of re-established ecosystems on mine affected land;
- Assess rehabilitation performance against the closure criteria; and
- Facilitate continuous improvement in rehabilitation practices.

The monitoring program will be continued within rehabilitated as well as non-mined areas until it can be demonstrated that rehabilitation has satisfied the closure criteria or is there is a high degree of confidence that the vegetation in the rehabilitated area is on a successional pathway that will achieve closure criteria. Information from the monitoring program will also be used to refine closure and sign-off criteria as required. Further details on the proposed rehabilitation monitoring are outlined below.

13.1 Active Mining Records

During active mining operations, United Wambo will maintain active records as to mining activities and processes that may impact upon the rehabilitation and closure of the site. These records will provide the basis for developing rehabilitation strategies and interpretation of later rehabilitation monitoring outcomes. The types of records to be maintained are provided in the Rehabilitation Management Plan.

13.2 Rehabilitation Monitoring

United Wambo will undertake rehabilitation monitoring in accordance with the Rehabilitation Management Plan. Section 6 of the *Biodiversity Management Plan* outlines the proposed rehabilitation inspections and monitoring. The *Biodiversity Management Plan* also provides details of ecological monitoring.

13.3 Review and Improvement

In accordance with Condition E7 of SSD 7142, the Rehabilitation Strategy will be reviewed within 3 months of:

- The submission of an incident report under condition E9;
- The submission of an annual review under condition E11;
- The submission of an Independent Environmental Audit under condition E12; and
- The approval of any modification of the conditions of this consent.

United Wambo shall review, and if necessary, revise, the strategies, plans, and programs required under this approval to the satisfaction of the Secretary.

As required by Condition B100 (c), the final landform and final void outcomes will be reviewed and refined every five years in consultation with the Resources Regulator and Council. The outcomes of the review will be included in a revised Rehabilitation Strategy that will be submitted to DPE for approval.

An internal review of the Rehabilitation Strategy will also be undertaken every three years, or as required, to refine and make improvements to the management strategies and to assess performance against preliminary performance indicators and completion criteria. The three year review will seek opportunities to improve the management strategies. As per Condition E7 of SSD 7142, to improve environmental performance of the development, cater for a modification or comply with a direction, this Rehabilitation Strategy must be revised to the satisfaction of the Planning Secretary. Where revisions are required, the revised document must be submitted for approval within 6 weeks of the review.

14. Accountabilities

Accountabilities for this management plan are outlined in **Table 14-1**.

Table 14-1 - Accountabilities for this Plan

Role	Accountabilities for this Document
Operations Manager	Ensure that sufficient resources are allocated for the implementation of this Rehabilitation Strategy.
Environment and Community Manager	• Ensure that sufficient time and resources are allocated to allow for the implementation of the Rehabilitation Strategy; • Allocate sufficient resources and time for the implementation of the rehabilitation monitoring program; • Ensure all internal and external reporting requirements are met, including necessary revisions of the Rehabilitation Strategy; and • Ensure that all relevant records are effectively maintained on site.
Environment and Community Coordinator/ Officer	• Coordinate the implementation of this Rehabilitation Strategy; • Coordinate monitoring requirements as per the Rehabilitation Strategy and Glencore standards; • Coordinate reporting requirements relating to rehabilitation in the Annual Review.
All Persons	Undertake activities directly in accordance with the requirements of the Rehabilitation Strategy

15. Document Information

Relevant legislation, standards and other reference information must be regularly reviewed and monitored for updates and should be included in the site management system. Related documents and reference information in this section provides the linkage and source to develop and maintain site compliance information.

15.1 Related Documents

Related documents, listed in **Table 15-1** below, are *documents* directly related to or referenced from within this document.

Table 15-1 – Related documents

Number	Title
UWOC-1689771511-348	<i>United Wambo Rehabilitation Management Plan</i>
UWOC-1689771511-368	<i>United Wambo Biodiversity Management Plan</i>

15.2 Reference Information

Reference information, listed in **Table 15-2** below, is *information* that is directly referred to for the development of this document.

Table 15-2 – Reference information

Reference	Title
Umwelt (2016)	Umwelt (2016) <i>United Wambo Open Cut Coal Mine Project Environmental Impact Statement</i>
Umwelt (2017a)	Umwelt (2017a) <i>United Wambo Open Cut Coal Mine Project Response to Submissions Part A and Part B</i>
Umwelt (2017b)	Umwelt (2017b) <i>United Wambo Open Cut Coal Mine Project Response to Submissions Part A and Part B</i>
SLR Consulting (2019)	<i>United Wambo Rehabilitation Management Plan Phase 1</i>
SLR Consulting (2020)	<i>United Wambo Rehabilitation Management Plan Phase 1 Amendment A</i>

15.3 Change Information

Full details of the document history are recorded in the document control register, by version. A summary of the current change is provided in **Table 15-3** below.

Table 15-3 – Change information

Version	Date	Change Details
1.0	July 2020	Initial document
1.1	August 2020	Updated to address comments from Singleton Council and Resources Regulator
1.2	November 2020	Update to address comments from DPIE
2.0	April 2022	Reviewed and updated in accordance with Condition E7 – Modification 1

Appendix A - Consultation with Stakeholders

Resources Regulator Comment	United Wambo Response
Information contained in Section 1.4 "relation to the Rehabilitation Management Plan (RMP) is confusing and does not reflect the requirements for each of these plans and there relationship to the Rehabilitation Objectives Table 6 of SSD 7142 stipulated in the conditions of the Development Consent. This section should be updated to be consistent with Condition B100 (c) which requires the Rehabilitation Strategy to "build upon the Rehabilitation Objectives in Table 6", whilst Condition B103(d) requires the Rehabilitation Management Plan to "describe how the rehabilitation of the site would achieve the objectives identified in Table 6".	Section 1.4 has been updated to reflect the purpose of each plan.
Noting that the intent of the Rehabilitation Strategy is to set the strategic direction and outcomes for rehabilitation of the mine, it is the Regulator's view that Section 12 (implementation of the Rehabilitation Strategy) and Section 13 (Measurement and Evaluation) is too prescriptive and duplicative of the requirements for the content of a Mining Operations Plan (MOP) required under the conditions of the mining lease. Approval of the Rehabilitation Strategy may cause unnecessary regulatory burden where subsequent modifications to both the Rehabilitation Strategy and MOP may be required to accommodate for changes to rehabilitation procedures or the adoption of new and innovative practices. As such, it is the Regulator's preference that this detail is captured as per requirements under the Mining Act 1992 (e.g. currently the MOP process).	Details in Section 13 have been removed and referenced to the RMP. However, Section 12 provides details on the strategy and outcomes proposed for the final landform and land use and is therefore required to be included in the Strategy.
In relation to conceptual mines plans provided as Figures 3.11-3.15 in Appendix D, which provide an indicative 5 yearly progressive rehabilitation schedule, the Regulator's expectation will be that rehabilitation is undertaken as soon as reasonably practical after the disturbance occurs.	United Wambo commit to undertake rehabilitation as soon as practical following disturbance. The plans shown are conceptual for the life of mine operations.
In addition to the above, it should be noted that under the conditions of the mining authority granted under the Mining Act 1992, the Regulator requires an authority holder to adopt a risk-based approach to achieving the required rehabilitation outcomes. The applicability of the controls to achieve effective and sustainable rehabilitation is to be determined based on site specific risk assessments conducted by the authority holder. An authority holder may also be directed by the Regulator to implement further risk control measures that may be required to achieve effective rehabilitation outcomes.	Noted. United Wambo has undertaken a Rehabilitation Risk Assessment that underpins the Rehabilitation Management Plan.

Singleton Council Comment	United Wambo Response
In general, the Rehabilitation Strategy lacks clarity on the relationship between this Strategy and other	See below

Singleton Council Comment	United Wambo Response
plans/strategies/outcomes required as conditions of approval. Specifically, further clarity is required on:	
The relationship between the Phase 1 Rehabilitation Management Plan, any subsequent rehabilitation management plan for future phases of operations and the overarching Rehabilitation Strategy required under condition B100;	The intent of the Rehabilitation Strategy is to set the strategic direction and outcomes for rehabilitation of the mine. The Rehabilitation Management Plan defines how the rehabilitation of the site will achieve the objectives required by SSD 7142. Section 1.4 of the Rehab Strategy has been updated to state this.
The relationship between the Rehabilitation Strategy required under SSD 7142 and those approved under DA 305-7-2003 MOD 16 and DA 17782004 MOD 3, in particular how the final landforms and final land uses will integrate;	There are no requirements for a Rehabilitation Strategy under either DA 305-7-2003 MOD 16 or DA 177-8-2004 MOD 3. The approved final landform and land use is uniform across all consents.
There is a general lack of clarity around the established (or existing approved) final land use, the rehabilitation outcomes (open woodland, riparian, ecological and agricultural) and the yet to be determined post closure land use(s); and	The existing approved landform has been modified by SSD 7142 and the associated modifications of the Wambo consents. The approved post closure land use is native woodland areas, for biodiversity offsetting purposes, with areas of agricultural use. Other ancillary land uses will be reviewed over the life of the Project but are not currently proposed.
The relationship between this Strategy and The Mine closure Plan required under condition B106.	The Mine Closure Plan required under B106 is not required until 5 years prior to closure. The principles in the Rehabilitation Strategy will be incorporated into the Mine Closure Plan during its development.
The Rehabilitation Strategy does not provide detail on how these relationships will be achieved, nor does it establish how, as per the EIS rehabilitation requirements, a sustainable final landform and uses that co-exist with surrounding land uses would be achieved. The Strategy lacks discussion on the existing surrounding land uses, or the future proposed land uses of surrounding operations and surrounding landowners, and how the final landform proposed in the Strategy will accommodate and/or synergise with those uses, including co-existence of uses. The Strategy provides a lot of generic information that overlaps with information included in the Phase 1 Rehabilitation Management Plan.	Section 10.7 has been added which discusses surrounding land ownership and land use.
Council acknowledges that several final land uses were proposed in the EIS supporting the development application, and that these uses are conceptual at best and will be further defined and refined when the Mine Closure Plan is developed. However, section 7 of the Strategy describes the Glencore approach to proactive rehabilitation and mine closure planning, through the development of a range of	Whilst the EIS and supporting documentation identified potential future ancillary land uses, as discussed in Section 12.1, the approved final land use is native woodland areas for biodiversity offsetting purposes, with areas of agricultural use. This final land use has

Singleton Council Comment	United Wambo Response
standards. These standards require planning for closure at all stages of mine life, taking into consideration, amongst other things, social, economic and environmental factors to achieve a sustainable post-closure land use. As described in Section 7, closure planning commences at the exploration phase, continuing through to lease relinquishment with the level of detail for closure planning increasing the closer to closure. The process described in section 7 implies that conceptual final land uses are defined at exploration stage and are presumably refined as mining progresses. As such, landform design, stability, safety and sustainability, as documented through this process, should cater for the suite of proposed final land uses described in the EIS. It is not clear in the Strategy what relationship there is between the internal mine closure planning process and outcomes and those described in the Strategy.	been identified via extensive mine planning, community consultation and social and environmental assessment. The outcomes described in the Rehab Strategy are the outcomes from this planning process and are approved as part of SSD 7142.
Section 5.1.1 identifies the EIS rehabilitation requirements, including the provision of a sustainable final landform and uses that can co-exist with surrounding land uses. The Strategy does not define the criteria that would be used to determine a sustainable final landform, nor is sustainable final landform a defined term.	The Rehabilitation Strategy provides and overview of the strategic direction and proposed outcomes of the rehabilitation. Detailed completion criteria are incorporated into the Rehabilitation Management Plan.
Section 8.3 identifies ongoing review of the Strategy however does not describe how this will take place, the frequency of review, what aspects of the Strategy would be reviewed or how adaptive management practices would be identified and implemented should the review identify departure from adopted outcomes.	The review process for the Rehabilitation Strategy is described in Section 13.3.
Section 10.3 refers to the Singleton Land Use Strategy. Singleton Council has prepared a Local Strategic Planning Statement (LSPS), as required under the provisions of Part 3 of the Environmental Planning and Assessment Act 1979. This LSPS was exhibited in April/May 2020, and adopted by Council at its July 2020 Council Meeting, and supersedes the Singleton Land Use Strategy. This Strategy should be updated to reflect the contemporary strategic land use planning context identified in the LSPS.	Section 10.3 has been updated to reflect the LSPS.
Table 11-1 identifies the general approach to be adopted during decommissioning activities. Under Hardstand Areas, Roadways and Car Parks reference is made to the disposal of these materials in either tailings/overburden emplacements or incorporated into the final voids. The Strategy does not discuss the impact of this on various environmental factors, including water quality.	Disposal of the materials described have considered environmental impacts, including water quality, as part of the assessment phase. This detail is not provided as part of the general decommissioning management measures. Disposal of waste onsite will be undertaken in accordance with relevant legislation and guidelines.
In addition, in Table 11-1 under Final Void Management the general approach refers to voids being safe, stable and non polluting yet the Strategy provides no information on how this will be measured and monitored, and, in the event stability fails, the strategies that would be adopted to address. This section also refers to a Mine Closure Plan that	The Rehabilitation Strategy provides an overview of the approach to rehabilitation. This level of detail is contained in the Rehabilitation Management Plan.

Singleton Council Comment	United Wambo Response
has not been prepared, so it is difficult to determine the effectiveness or intended outcome of the approaches identified.	
Table 11-1 does not include any generalised approaches to the management of water quality, community safety, or prevention of adverse socio-economic effects on the community as required by Table 6 of the approval.	Table 11-1 provides details on the decommissioning management measures to be implemented during the closure phase. The measures have been developed in consideration of the management of water quality, community safety, or prevention of adverse socio-economic effects on the community during the assessment phases and further details are provided in the Rehabilitation Management Plan.
Section 12 discusses how the Strategy will be implemented. As described above, under general comments, it is difficult to identify the relationships between existing approved final uses, the final uses proposed at adjacent operations and the final land uses approved for this Project. The section discusses linkages, but not how these will be effected or sustainable, potential ancillary final land uses (which at the end of mine life, will not be ancillary uses – as new or additional approvals would be required, which are not related to mining), but not how the progressive landform design would support these uses, discusses potential future mining operations (which are not discussed elsewhere) and refers to a feasibility assessment that was completed as part of the development assessment process. Further clarification is required regarding the relationship between rehabilitation and mine closure, the timing of both, how the rehabilitated landform will achieve the approved final land uses and the details that would be provided in subsequent Rehabilitation Management Plans to implement the Strategy.	The approved final land use is native woodland areas for biodiversity offsetting purposes, with areas of agricultural use. None of the potential future ancillary land uses or potential future mining operations identified are currently proposed. Details of these potential land uses and potential feasibility of these land uses are provided in the Response to the IPC Review Report. Details on the timing of rehabilitation and how the rehabilitation will meet the final land uses are provided in the Rehabilitation Management Plan.
Additionally, further clarification is required on the adaptive management strategies that will be implemented if, during operations and/or review of the Strategy, the Rehabilitation Objectives in Table 6 of the approval are not being met.	This detail is provided in the Rehabilitation Management Plan.



Resources Regulator

FORM EAMS generic v1.3
Our ref: MAAG0007838
LETT0004805

United Collieries Pty Ltd t/a United Wambo JV Project
134 Jerrys Plains road
WARKWORTH NSW 2330
Attn: Aislinn Farnon

Dear Aislinn Farnon

Via email: Aislinn.Farnon@glencore.com.au

RE: United Wambo Open Cut Coal Mine Rehabilitation Strategy

In accordance with Condition B100 of SSD 7142, United Collieries Pty Limited (United Wambo Joint Venture) has submitted the Rehabilitation Strategy for consultation with the Resources Regulator (Regulator). Based on its review of the Rehabilitation Strategy, the Regulator provides the advice as outlined below.

- Information contained in Section 1.4 "relation to the Rehabilitation Management Plan (RMP) is confusing and does not reflect the requirements for each of these plans and there relationship to the Rehabilitation Objectives Table 6 of SSD 7142 stipulated in the conditions of the Development Consent. This section should be updated to be consistent with Condition B100 (c) which requires the Rehabilitation Strategy to "build upon the Rehabilitation Objectives in Table 6", whilst Condition B103(d) requires the Rehabilitation Management Plan to "describe how the rehabilitation of the site would achieve the objectives identified in Table 6".
- Noting that the intent of the Rehabilitation Strategy is to set the strategic direction and outcomes for rehabilitation of the mine, it is the Regulator's view that Section 12 (implementation of the Rehabilitation Strategy) and Section 13 (Measurement and Evaluation) is too prescriptive and duplicative of the requirements for the content of a Mining Operations Plan (MOP) required under the conditions of the mining lease. Approval of the Rehabilitation Strategy may cause unnecessary regulatory burden where subsequent modifications to both the Rehabilitation Strategy and MOP may be required to accommodate for changes to rehabilitation procedures or the adoption of new and innovative practices. As such, it is the Regulator's preference that this detail is captured as per requirements under the Mining Act 1992 (e.g. currently the MOP process).
- In relation to conceptual mines plans provided as Figures 3.11-3.15 in Appendix D, which provide an indicative 5 yearly progressive rehabilitation schedule, the Regulator's expectation will be that rehabilitation is undertaken as soon as reasonably practical after the disturbance occurs.

In addition to the above, it should be noted that under the conditions of the mining authority granted under the Mining Act 1992, the Regulator requires an authority holder to adopt a risk-based approach to achieving the required rehabilitation outcomes. The applicability of the controls to achieve effective and sustainable rehabilitation is to be determined based on site specific risk assessments conducted by the authority holder. An authority holder may also be directed by the Regulator to implement further risk control measures that may be required to achieve effective rehabilitation outcomes.

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If you require additional information, please contact the Resources Regulator on 1300 814 609 or via email at nswresourcesregulator@service-now.com.

Yours sincerely,

Matthew Newton
Principal Inspector Environment & Rehab
Resources Regulator

17 August 2020



13 August 2020

Aislinn Farnon
Approvals Manager
United Wambo JV Project
134 Jerrys Plains Road
WARKWORTH NSW 2330

Dear Ms Farnon

RE: Request for comment: Rehabilitation Strategy

I refer to your request via the Major Projects Planning Portal to Singleton Council requesting comment from Council on the Rehabilitation Strategy for the United Wambo Joint Venture Project. This letter forms Council's comments in relation to that request.

The Rehabilitation Strategy (**Strategy**) prepared by the Joint Venture details the proposed mine closure and rehabilitation strategy that would be applied during Phase 1A, Phase 2 and Phase 3 of the Project. As described in Section 2, the Strategy takes into consideration *site opportunities and constraints, ecological and rural land use values and existing strategic land use objectives, including the integration of rehabilitation with the strategies developed for surrounding operations.*

Conditions B97, B98, B100, B103 and B106 outline the rehabilitation requirements, including this Strategy, for the approved operations. Council has reviewed the Strategy in the context of the relevant conditions of approval, and council's input into the development of those conditions. Condition B100 of the approved development requires the Strategy to, amongst other things, *include a program to review and refine the final landform and final void outcomes every five years, in consultation with the Resource Regulator and Council, to meet the relevant Rehabilitation Objectives in Table 6.*

Table 6 of the approved development includes a list of Rehabilitation Objectives, which must be met, presumably at mine closure. These include objectives related to rehabilitation areas used as offsets, native woodland areas, areas proposed for agricultural use, final landform, final voids, surface infrastructure, water quality and community.

General Comments

Council provided comments in September 2019 on the draft Phase 1 Rehabilitation Management Plan and has drawn on those comments when reviewing this Strategy. As such, in general, the Rehabilitation Strategy lacks clarity on the relationship between this Strategy and other plans/strategies/outcomes required as conditions of approval. Specifically, further clarity is required on:

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- The relationship between the Phase 1 Rehabilitation Management Plan, any subsequent rehabilitation management plan for future phases of operations and the overarching Rehabilitation Strategy required under condition B100;
- The relationship between the Rehabilitation Strategy required under SSD 7142 and those approved under DA 305-7-2003 MOD 16 and DA 17782004 MOD 3, in particular how the final landforms and final land uses will integrate;
- There is a general lack of clarity around the established (or existing approved) final land use, the rehabilitation outcomes (open woodland, riparian, ecological and agricultural) and the yet to be determined post closure land use(s); and
- The relationship between this Strategy and the Mine Closure Plan required under condition B106.

The Rehabilitation Strategy does not provide detail on how these relationships will be achieved, nor does it establish how, as per the EIS rehabilitation requirements, a sustainable final landform and uses that co-exist with surrounding land uses would be achieved. The Strategy lacks discussion on the existing surrounding land uses, or the future proposed land uses of surrounding operations and surrounding landowners, and how the final landform proposed in the Strategy will accommodate and/or synergise with those uses, including co-existence of uses. The Strategy provides a lot of generic information that overlaps with information included in the Phase 1 Rehabilitation Management Plan.

Council acknowledges that several final land uses were proposed in the EIS supporting the development application, and that these uses are conceptual at best and will be further defined and refined when the Mine Closure Plan is developed. However, section 7 of the Strategy describes the Glencore approach to proactive rehabilitation and mine closure planning, through the development of a range of standards. These standards require planning for closure at all stages of mine life, taking into consideration, amongst other things, social, economic and environmental factors to achieve a sustainable post-closure land use. As described in Section 7, closure planning commences at the exploration phase, continuing through to lease relinquishment with the level of detail for closure planning increasing the closer to closure. The process described in section 7 implies that conceptual final land uses are defined at exploration stage and are presumably refined as mining progresses. As such, landform design, stability, safety and sustainability, as documented through this process, should cater for the suite of proposed final land uses described in the EIS. It is not clear in the Strategy what relationship there is between the internal mine closure planning process and outcomes and those described in the Strategy.

Specific Comments

Section 5.1.1 identifies the EIS rehabilitation requirements, including the provision of a sustainable final landform and uses that can co-exist with surrounding land uses. The Strategy does not define the criteria that would be used to determine a sustainable final landform, nor is sustainable final landform a defined term.

Section 8.3 identifies ongoing review of the Strategy however does not describe how this will take place, the frequency of review, what aspects of the Strategy would be reviewed or how adaptive management practices would be identified and implemented should the review identify departure from adopted outcomes.

Section 10.3 refers to the Singleton Land Use Strategy. Singleton Council has prepared a Local Strategic Planning Statement (LSPS), as required under the provisions of Part 3 of the *Environmental Planning and Assessment Act 1979*. This LSPS was exhibited in April/May 2020, and adopted by Council at its July 2020 Council Meeting, and supersedes the Singleton Land Use Strategy. This Strategy should be updated to reflect the contemporary strategic land use planning context identified in the LSPS.

Table 11-1 identifies the general approach to be adopted during decommissioning activities. Under *Hardstand Areas, Roadways and Car Parks* reference is made to the disposal of these materials in either tailings/overburden emplacements or incorporated into the final voids. The Strategy does not discuss the impact of this on various environmental factors, including water quality.

In addition, in Table 11-1 under *Final Void Management* the general approach refers to voids being safe, stable and non polluting yet the Strategy provides no information on how this will be measured and monitored, and, in the event stability fails, the strategies that would be adopted to address. This section also refers to a Mine Closure Plan that has not been prepared, so it is difficult to determine the effectiveness or intended outcome of the approaches identified.

Table 11-1 does not include any generalised approaches to the management of water quality, community safety, or prevention of adverse socio-economic effects on the community as required by Table 6 of the approval.

Section 12 discusses how the Strategy will be implemented. As described above, under general comments, it is difficult to identify the relationships between existing approved final uses, the final uses proposed at adjacent operations and the final land uses approved for this Project. The section discusses linkages, but not how these will be effected or sustainable, potential ancillary final land uses (which at the end of mine life, will not be ancillary uses – as new or additional approvals would be required, which are not related to mining), but not how the progressive landform design would support these uses, discusses potential future mining operations (which are not discussed elsewhere) and refers to a feasibility assessment that was completed as part of the development assessment process. Further clarification is required regarding the relationship between rehabilitation and mine closure, the timing of both, how the rehabilitated landform will achieve the approved final land uses and the details that would be provided in subsequent Rehabilitation Management Plans to implement the Strategy.

Additionally, further clarification is required on the adaptive management strategies that will be implemented if, during operations and/or review of the Strategy, the Rehabilitation Objectives in Table 6 of the approval are not being met.

Closing Comments

Overall, whilst the Strategy aligns with satisfying the conditions of approval, and provides a foundation for the rehabilitation of the project post-closure, the lack of clarity around the post-closure land uses, adaptive management and relationship between

various documents, makes it difficult to establish whether the criteria set out in Table 6 of the approval can be met.

I would like to thank the Project for the opportunity to provide comment on the Rehabilitation Strategy. Should you have any questions or comments, please contact Mary-Anne Crawford, Manager Development and Environmental Services on 02 6578 7290.

Yours faithfully



Mary-Anne Crawford
Manager Development and Environmental Services

Appendix B - Endorsement of Specialist



Planning,
Industry &
Environment

Aislinn Farnon
Environment & Community Manager
United Wambo Joint Venture
134 Jerrys Plains Road
Warkworth, NSW, 2330

13/07/2020

Dear Ms Farnon

United Wambo Open Cut Coal Project (SSD 7142) Endorsement of Expert – Rehabilitation Strategy

I refer to your letter dated 22 June 2020, requesting the Planning Secretary's approval of a suitably qualified person to prepare the Rehabilitation Strategy in accordance with condition B100 of the United Wambo Open Cut Coal Project (SSD 7142).

The Department has reviewed the nomination and information you have provided and is satisfied that Mr Chris Jones of SLR Consulting is suitably qualified and experienced. Consequently, I can advise that the Planning Secretary approves the appointment of Mr Chris Jones to prepare the Rehabilitation Strategy.

If you wish to discuss the matter further, please contact Melanie Hollis on 8217 2043.

Yours sincerely

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

Matthew Sprott
Director
Resource Assessments (Coal & Quarries)

as nominee of the Planning Secretary

Appendix C - Proposed Seed Mix

The seed lists included in the sections below have been prepared by Umwelt based on the following references:

- Department of the Environment (DoE) (2015). Approved Conservation Advice for the Central Hunter Valley eucalypt forest and woodland ecological community. <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/130-conservation-advice.pdf>
- Huxtable, C. (2003). *Rehabilitation of open cut coal mines using native grasses: Management guidelines*. Centre for Natural Resources, Department of Sustainable Natural Resources.

C.1 Ecological Rehabilitation

Based on the outcomes of the ACARP project investigating ecological mine rehabilitation in the Hunter Valley (Umwelt in prep), a high number of appropriate species are included in the rehabilitation seed mix where specific PCTs are to be established. Research by Umwelt demonstrates that for a site to have a reasonable chance of being regarded as 'recognisable' as the target PCT, at least 18 species listed in the PCT profile need to be recorded within a 20 m x 20 m plot. The research also indicates that the species composition of rehabilitation is mostly determined at establishment and does not change substantially over time. The lists provided below have been informed by draft versions of the PCT profiles which are yet to be publicly released, in consideration of the vegetation types that occur at United Wambo.

The suggested proportions to be included in the seed mix are indicative and may be revised based on findings from other Hunter Valley mining operations regarding the results obtained from their seed mixes, in addition to consultation with seed suppliers to determine what is available.

C.1.1 HU905/PC1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (consistent with Central Hunter Eucalypt Forest and Woodland CEEC)

The recommended list of species for HU905 CEEC Rehabilitation was developed with reference to the list of characteristic species listed in the Approved Conservation Advice for the community (DoE 2015) and includes species known to occur at United Wambo and which have also been recorded in rehabilitation in the Hunter Valley.

Stratum/growth form	Scientific Name	Common Name	Indicative proportion
Canopy / Tree	<i>Eucalyptus crebra</i>	narrow-leaved ironbark	50
	<i>Eucalyptus moluccana</i>	grey box	40
	<i>Allocasuarina luehmanni</i>	bulloak	1
	<i>Angophora floribunda</i>	rough barked apple	4
	<i>Eucalyptus tereticornis</i>	forest red gum	4
	<i>Brachychiton populneus</i>	kurrajong	1
Total Canopy Species			100
Mid-storey / Trees and Shrubs	<i>Acacia amblygona</i>	fan wattle	5
	<i>Acacia cultriformis</i>	knife-leaf wattle	5
	<i>Acacia decora</i>	western silver wattle	20
	<i>Acacia falcata</i>	sickle wattle	10
	<i>Acacia implexa</i>	hickory wattle	10
	<i>Acacia salicina</i>	cooba	10
	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	native blackthorn	10
	<i>Daviesia ulicifolia</i>	gorse bitter pea	5
	<i>Dodonaea viscosa</i>	sticky hop-bush	10
	<i>Notelaea microcarpa</i>	native olive	5
	<i>Maireana microphylla</i>	small leaf blue bush	5
	<i>Myoporum montanum</i>	water bush	5
Total Mid-storey species			100
Ground / Grass and grass-like	<i>Aristida ramosa</i>	purple wiregrass	2
	<i>Aristida vagans</i>	threeawn speargrass	3
	<i>Austrostipa scabra</i>	speargrass	3
	<i>Austrostipa verticillata</i>	slender bamboo grass	2
	<i>Bothriochloa decipiens</i>	red grass	4
	<i>Cymbopogon refractus</i>	barbed wire grass	3
	<i>Chloris ventricosa</i>	tall chloris	3
	<i>Dichanthium sericeum</i>	Queensland bluegrass	2
	<i>Digitaria diffusa</i>	open summer-grass	2
	<i>Eragrostis leptostachya</i>	paddock lovegrass	3
	<i>Lomandra confertifolia</i>	mat-rush	1
	<i>Lomandra filiformis</i>	wattle mat-rush	3

Stratum/growth form	Scientific Name	Common Name	Indicative proportion
	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>	many-flowered mat-rush	3
	<i>Panicum effusum</i>	hairy panic	2
	<i>Paspalidium distans</i>		4
	<i>Microlaena stipoides</i>	weeping grass	1
	<i>Rytidosperma bipartitum</i>	wallaby grass	1
	<i>Rytidosperma fulvum</i>	wallaby grass	3
	<i>Sporobolus creber</i>	slender rats tail grass	3
Ground / Forbs	<i>Brunoniella australis</i>	blue trumpet	4
	<i>Calotis lappulacea</i>	yellow burr-daisy	4
	<i>Chrysocephalum apiculatum</i>	common everlasting	4
	<i>Desmodium brachypodum</i>	large tick-trefoil	4
	<i>Dichondra repens</i>	kidney weed	2
	<i>Einadia nutans</i>	climbing saltbush	2
	<i>Eremophila debilis</i>	winter apple	4
	<i>Enchylaena tomentosa</i>	ruby saltbush	4
	<i>Phyllanthus virgatus</i>		2
	<i>Sida corrugata</i>	corrugated sida	4
	<i>Stackhousia viminea</i>	slender stackhousia	2
	<i>Veronica plebeia</i>	trailing speedwell	2
	<i>Vittadinia cuneata</i>	fuzzweed	2
	<i>Vittadinia pustulata</i>	fuzzweed	2
	<i>Sida hackettiana</i>	golden rod	4
Ground / Other	<i>Desmodium varians</i>	slender tick-trefoil	2
	<i>Glycine tabacina</i>		2
	<i>Glycine clandestina</i>		2
Total Ground Species			100

C.1.2 HU905/PC1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter

This ecological rehabilitation is not required to be consistent with the Central Hunter Eucalypt Forest and Woodland CEEC, the same seed mix be used as that stated above for the HU905 CEEC rehabilitation to ensure that the required area of the CEEC rehabilitation is established on site.

C.1.3 HU816/PCT1602 Spotted Gum - Narrow-leaved Ironbark shrub - grass
open forest of the central and lower Hunter

Stratum/growth form	Scientific Name	Common Name	Indicative proportion
Canopy / Tree	<i>Corymbia maculata</i>	spotted gum	30
	<i>Eucalyptus crebra</i>	narrow-leaved ironbark	40
	<i>Eucalyptus moluccana</i>	grey box	20
	<i>Eucalyptus fibrosa</i>	red ironbark	6
	<i>Eucalyptus punctata</i>	grey gum	2
	<i>Brachychiton populneus</i>	kurrajong	2
Total Canopy Species			100
Mid-storey / Trees and Shrubs	<i>Acacia amblygona</i>	fan wattle	10
	<i>Acacia implexa</i>	hickory wattle	10
	<i>Acacia decurrens</i>	black wattle	5
	<i>Acacia doratoxylon</i>	currawang	5
	<i>Acacia falcata</i>	sickle wattle	10
	<i>Allocasuarina torulosa</i>	forest oak	10
	<i>Breynia oblongifolia</i>	coffee bush	5
	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	native blackthorn	10
	<i>Daviesia ulicifolia</i>	gorse bitter pea	10
	<i>Denhamia silvestris</i>	orange bush	5
	<i>Dodonaea viscosa</i>	hopbush	10
	<i>Notelaea longifolia</i>	large mock-olive	5
	<i>Persoonia linearis</i>	narrow-leaved geebung	5
Total Mid-storey Species			100
Ground / Grass and Grass-like	<i>Aristida ramosa</i>	purple wiregrass	2
	<i>Aristida vagans</i>	threeawn speargrass	3
	<i>Cymbopogon refractus</i>	barbed wire-grass	4
	<i>Chloris truncata</i>	windmill grass	4
	<i>Echinopogon caespitosus</i>	bushy hedgehog-grass	3
	<i>Entolasia stricta</i>	wiry panic	4
	<i>Dichanthium sericeum</i>	Queensland bluegrass	3
	<i>Lepidosperma laterale</i>		2
	<i>Lomandra confertifolia</i>	mat-rush	3
	<i>Lomandra filiformis</i>	wattle mat-rush	2

Stratum/growth form	Scientific Name	Common Name	Indicative proportion
	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>	many-flowered mat-rush	3
	<i>Microlaena stipoides</i>	weeping grass	4
	<i>Oplismenus aemulus</i>	Australian basket grass	3
	<i>Paspalidium distans</i>		4
	<i>Panicum effusum</i>	hairy panic	3
	<i>Themeda triandra</i>	kangaroo grass	4
Ground / Forbs	<i>Brunoniella australis</i>	blue trumpet	4
	<i>Calotis cuneifolia</i>	purple burr-daisy	4
	<i>Chrysocephalum apiculatum</i>	common everlasting	4
	<i>Dianella revoluta</i>	blue flax-lily	4
	<i>Dichondra repens</i>	kidney weed	3
	<i>Einadia hastata</i>	berry saltbush	3
	<i>Enchylaena tomentosa</i>	ruby saltbush	3
	<i>Eremophila debilis</i>	winter apple	3
	<i>Lobelia purpurascens</i> (syn. <i>Pratia purpurascens</i>)	whiteroot	3
	<i>Phyllanthus virgatus</i>		3
	<i>Pomax umbellata</i>		3
Ground / Other	<i>Glycine clandestina</i>		3
	<i>Glycine tabacina</i>		3
	<i>Pandorea pandorana</i>	wonga wonga vine	3
	<i>Hardenbergia violacea</i>	native sarsaparilla	3
Total Ground Species			100

C.2 Open Woodland Rehabilitation

It is understood that the open woodland rehabilitation is intended to be floristically similar to HU905, however the need to establish rehabilitation that is 'recognisable' as this community is not required. Whilst there is a reduced requirement to obtain high species diversity, we recommend that the seed mix be based on that provided for the HU905 CEEC rehabilitation. Additionally, we recommend that the amount of seed of canopy tree species, and potentially shrub species, be reduced from that used for the HU905 CEEC rehabilitation to achieve an 'open woodland' structure.

C.3 Riparian Rehabilitation

The seed mix for the riparian rehabilitation contains species which are known to occur in riparian areas. This list is not representative of a specific riparian PCT.

We recommend the inclusion of as many species on this list in the seed mix as possible. The suggested proportions to be included in the seed mix are indicative and we recommend seeking advice from personnel at other Hunter Valley mining operations regarding the results obtained from their seed mixes, in addition to consultation with seed suppliers to determine what is available.

Stratum/growth form	Scientific Name	Common Name	Indicative proportion
Canopy / Tree	<i>Eucalyptus tereticornis</i>	forest red gum	40
	<i>Angophora floribunda</i>	rough barked apple	30
	<i>Eucalyptus punctata</i>	grey gum	5
	<i>Eucalyptus crebra</i>	narrow-leaved ironbark	20
	<i>Corymbia maculata</i>	spotted gum	5
Total Canopy Species			100
Mid-storey / Trees and Shrubs	<i>Acacia parvipinnula</i>	silver-stemmed wattle	15
	<i>Acacia salicina</i>	cooba	15
	<i>Breynia oblongifolia</i>	coffee bush	15
	<i>Daviesia ulicifolia</i>	gorse bitter pea	15
	<i>Notelaea microcarpa</i> var. <i>microcarpa</i>	native olive	10
	<i>Spartothamnella juncea</i>	bead bush	20
	<i>Maireana microphylla</i>	small-leaf bluebush	10
Total Mid-storey Species			100
Ground / Grass and Grass-like	<i>Austrostipa verticillata</i>	slender bamboo grass	4
	<i>Bothriochloa decipiens/macra</i>	red grass	2
	<i>Chloris ventricosa</i>	tall chloris	3
	<i>Cymbopogon refractus</i>	barbed wire-grass	4
	<i>Dichelachne micrantha</i>	shorthair plumegrass	4
	<i>Echinopogon caespitosus</i>	bushy hedgehog-grass	4
	<i>Entolasia stricta</i>	wiry panic	4
	<i>Eragrostis leptostachya</i>	paddock lovegrass	4
	<i>Lomandra longifolia</i>	spiny-headed mat-rush	3
	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>	many-flowered mat-rush	4
	<i>Microlaena stipoides</i>	weeping grass	5
	<i>Panicum effusum/simile</i>	panic grass	3
	<i>Rytidosperma bipartitum</i>	wallaby grass	3
Ground / Forbs	<i>Brunoniella australis</i>	blue trumpet	4
	<i>Calotis cuneifolia</i>	purple burr daisy	4
	<i>Commelina cyanea</i>	native wandering Jew	4

Stratum/growth form	Scientific Name	Common Name	Indicative proportion
	<i>Dichondra repens</i>	kidney weed	4
	<i>Einadia hastata</i>	berry saltbush	4
	<i>Einadia nutans</i>	climbing saltbush	4
	<i>Enchylaena tomentosa</i>	ruby saltbush	4
	<i>Eremophila debilis</i>	winter apple	4
	<i>Lobelia purpurascens</i> (syn. <i>Pratia purpurascens</i>)	whiteroot	4
	<i>Mentha satureioides</i>	creeping mint	4
	<i>Oxalis perennans</i>		3
	<i>Sida corrugata</i>	corrugated sida	4
Ground / Other	<i>Desmodium varians</i>	slender tick-trefoil	3
	<i>Glycine tabacina</i>		3
Total Ground Species			100

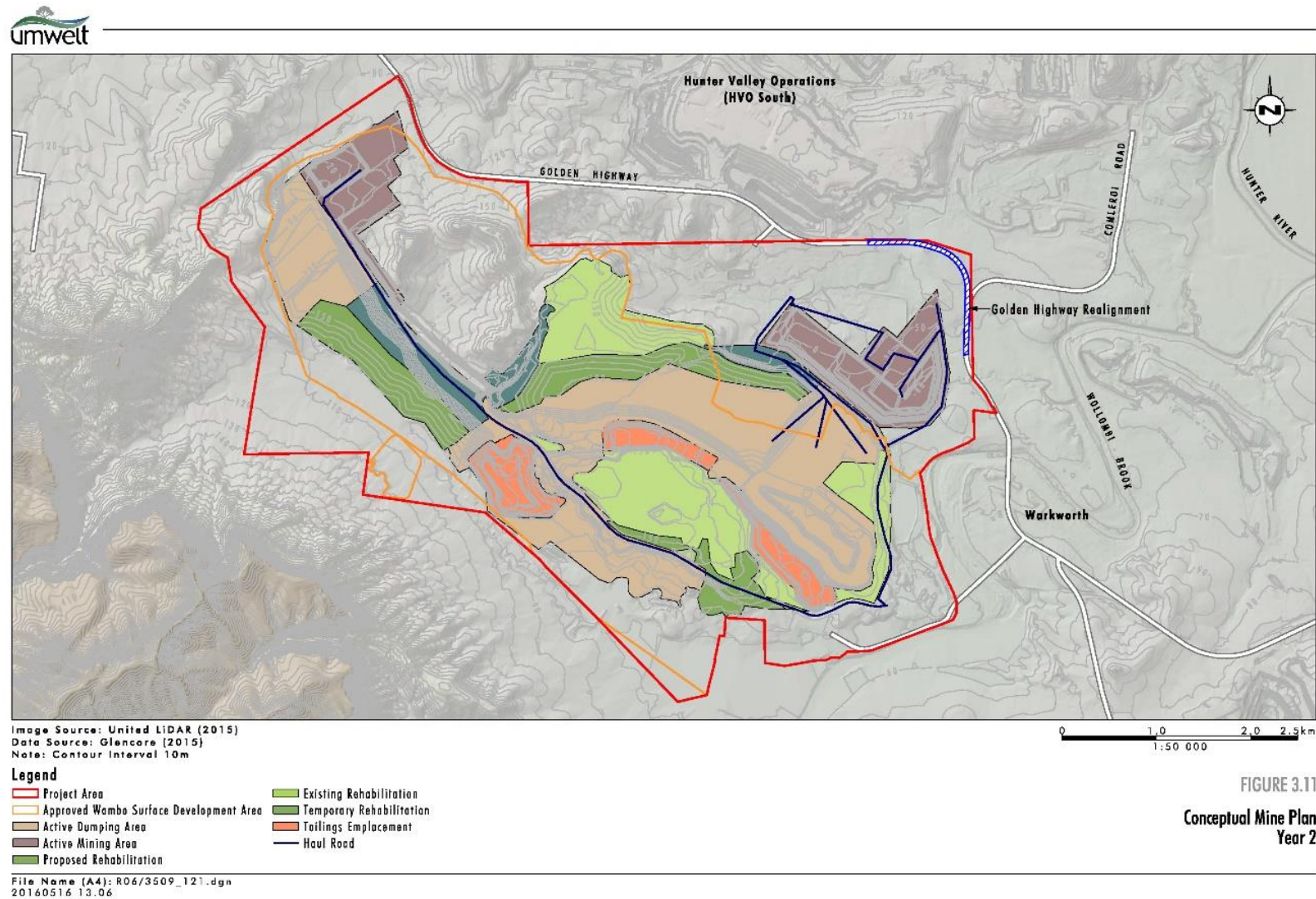
C.4 Agricultural Rehabilitation

We recommend the use of native grass species in rehabilitation intended for an agricultural land use. The list of recommended species below is consistent with the list of native grasses for use on mine rehabilitation developed by Huxtable (2003), with low forage value species removed. We recommend that Huxtable (2003) be reviewed, with particular attention given to the species that grow most successfully on each type of topsoil, so that the seed mix can be tailored to what is available at United. If the inclusion of native species is not desirable for agricultural rehabilitation, we recommend consultation with an agronomist be undertaken for advice regarding the most appropriate species to use.

Indicative proportions of each species have not been provided. We recommend consultation with seed suppliers to determine the optimal proportions to use once the topsoil quality has been assessed.

Stratum/growth form	Scientific Name	Common Name
Ground / Grass	<i>Anthosachne scraba</i> (syn. <i>Elymus scaber</i>)	wheatgrass
	<i>Austrostipa aristiglumis</i> or <i>bigeniculata</i>	plains grass
	<i>Austrostipa scabra</i>	speargrass
	<i>Austrostipa verticillata</i>	slender bamboo grass
	<i>Bothriochloa macra/decipiens</i>	red grass
	<i>Chloris truncata</i>	windmill grass
	<i>Chloris ventricosa</i>	tall chloris
	<i>Dichanthium sericeum</i>	Queensland bluegrass
	<i>Dichelachne micrantha</i>	shorthair plumegrass
	<i>Digitaria brownii</i>	cotton panic grass
	<i>Digitaria divericatissima</i>	umbrella grass
	<i>Eriochloa pseudoacrotricha</i>	early spring grass
	<i>Lachnagrostis filiformis</i>	
	<i>Panicum decompositum</i>	native millet
	<i>Panicum effusum</i>	hairy panic
	<i>Rytidosperma caespitosum</i>	ringed wallaby grass
	<i>Rytidosperma richardsonii</i>	straw wallaby grass
	<i>Rytidosperma setaceum</i>	smallflower wallaby grass

Appendix D - Indicative Mine Stage Plans



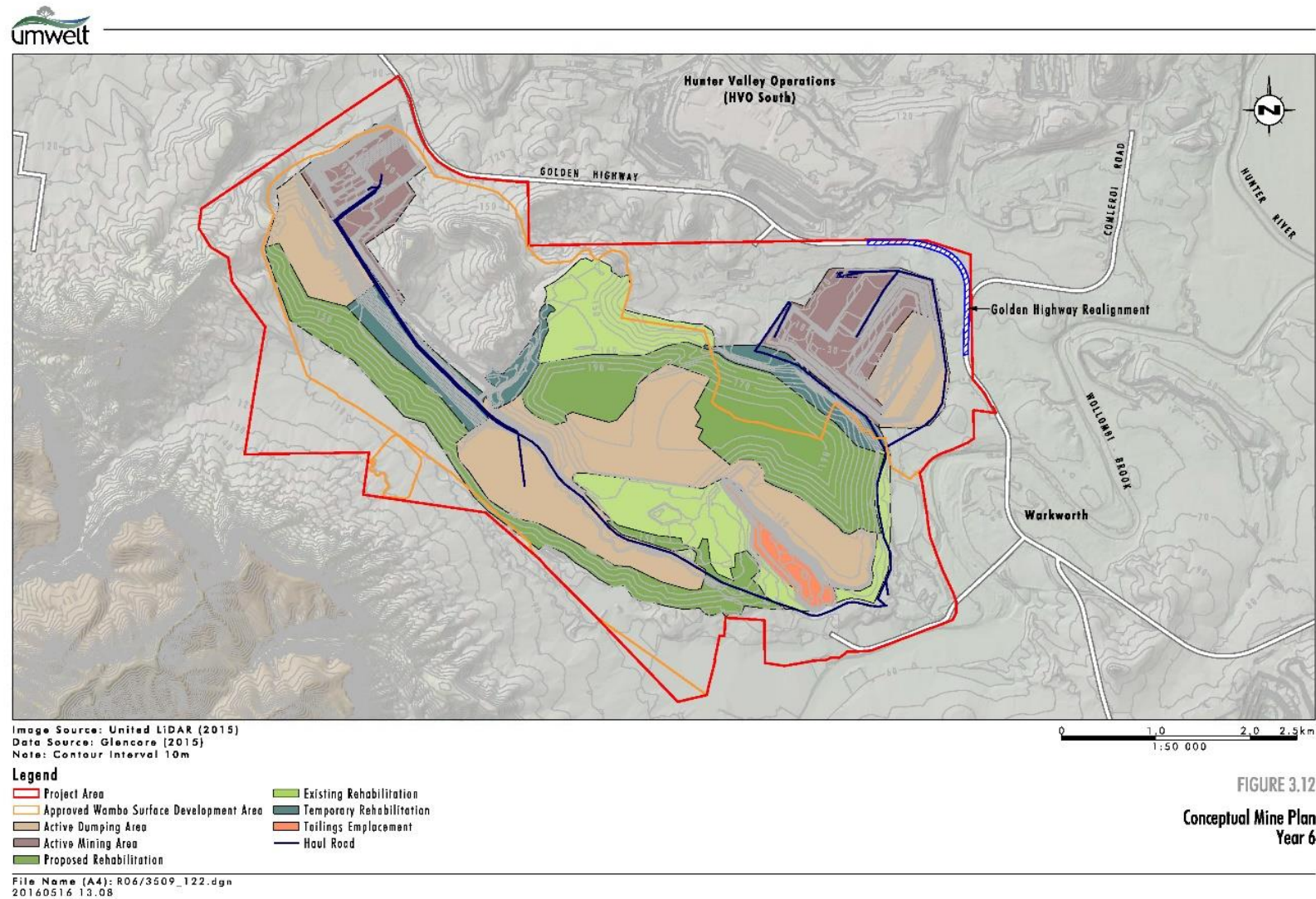


FIGURE 3.12
Conceptual Mine Plan
Year 6

