

# HUNTER VALLEY OPERATIONS

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## Hunter Valley Operations

Integrated Biodiversity Management Plan

25 June 2018

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### Document Control

Version	Date	Prepared by	Reviewed by
V0.1	22/05/2018	Berlinda Ezzy	Nathan Garvey
V1.0	25/06/2018	Berlinda Ezzy Casandra Kottaras	Nathan Garvey
V1.2	25/06/2018	Berlinda Ezzy Casandra Kottaras	Michael Lloyd Andrew Speechly

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## Hunter Valley Operations – Integrated Biodiversity Management Plan

Final

Report J180133RP1 | Prepared for Hunter Valley Operations | 22 May 2018

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Prepared by **Berlinda Ezzy**

Approved by **Nathan Garvey**

Position Associate Ecologist

Position Associate Ecologist

Signature



Signature



Date 25/06/2018

Date 25/06/2018

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# 1 Introduction

Hunter Valley Operations (HVO) is an open cut coal mine complex located 24 km north-west of Singleton in the Hunter Valley region of New South Wales (NSW). It consists of two separate mining projects being; HVO North and HVO South (Figure 1.1). HVO commenced operations in 1949 and has been through a process of extending existing mines and acquiring additional mines in the area over time and amending approvals as required. HVO North and HVO South have received separate State approvals, but are managed as an integrated operation. HVO is located in an area where mining is already a feature of the landscape in the Hunter Valley coalfields. Surrounding mines and infrastructure include Mount Thorley Warkworth (MTW), Wambo and Ravensworth.

As of 4 May 2018, HVO is owned by Hunter Valley Operations (HV Operations) and operates as a joint venture arrangement with Glencore becoming the operator of HVO.

HVO South comprises a number of open cut pits including the Cheshunt Pit, Riverview Pit and South Lemington Pits 1 and 2. Approvals granted under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) have been modified to include expansions to these pit areas and, most recently on 28 February 2018, to enable mining of deeper seams and an increased rate of extraction (Project Approval 06\_0261 - Modification 5). This recent approval modification introduced a new condition (Condition 33A) requiring the preparation of a Biodiversity Management Plan (BMP) for the project. The condition requirements and how they have been addressed in this BMP is summarised in Table 1.2.

The majority of State approvals for the HVO complex were in place prior to the commencement of the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act), including commencement of the water trigger on 22 June 2013. The HVO complex was referred under the EPBC Act in 2016 for the continuation of mining in areas approved by the State after commencement of the EPBC Act and not previously cleared, referred to as 'extension areas'. The proposed extension activities were declared a 'controlled action' and an approval granted on 10 October 2016 (EPBC2016/7640). The EPBC approval permits disturbance to one threatened ecological community (TEC) and three listed fauna species habitats, and requires the provision of direct offset sites to compensate for these impacts. These conditions of approval are being implemented and have been referenced where appropriate in this BMP.

## 1.1 Purpose

This Integrated BMP has been prepared to meet the requirements of Condition 33A of NSW Project Approval (06\_0261) under the EP&A Act. The BMP is required to be implemented as approved by the Secretary.

The scope of the BMP includes the identification of biodiversity values within the approved HVO mine boundaries, including those approved to be impacted and those which are being retained and managed for their conservation value. The scope of this BMP has been expanded to include the biodiversity areas that are within the HVO North and HVO South approved project boundaries as the mines are located adjacent to each other and being managed as an integrated operation.

This BMP aims to ensure that the mine operates in compliance with all avoidance, minimisation and rehabilitation measures detailed in the HVO South Environmental Impact Statement (EIS), and the recognised biodiversity values that occur on-site are protected and managed in compliance with Condition 33A. This BMP will also act as an overarching framework for biodiversity related matters that shows how the various commitments and documents that have been prepared will work together.

It also includes a summary of the biodiversity monitoring and reporting framework that evaluates the outcomes being achieved and how they are meeting set performance and completion criteria.

## 1.2 Structure

Condition 33A covers activities across operational and non-operational land, Biodiversity Areas (BAs) and projects to compensate for HVO South Mine's impacts on biodiversity values including offset sites and ensure appropriate management of retained remnant vegetation and fauna habitat.

To address the requirements of Condition 33A, the BMP is structured into the following sections:

- Section 2 – Biodiversity Values: Description of biodiversity values impacted by mine operations, approved Biodiversity Offset Strategy (for HVO North and HVO South) and applicable details regarding performance and monitoring of offset sites;
- Section 3 – Operational Land: Description of management and rehabilitation measures to be undertaken on operational lands, within the approved disturbance boundaries, that are contained within the HVO North and HVO South operational areas;
- Section 4 – Biodiversity Areas on Non-Operational Land: Description of those biodiversity values which occur on non-operational land within the approved mine development boundaries, which have been identified for protection and management actions to be undertaken to ensure their biodiversity values are maintained;
- Section 5 – GDE and riparian vegetation monitoring: Description of monitoring to be implemented for groundwater dependent ecosystems and riparian vegetation; and
- Section 6 – Monitoring and Reporting: Summary of main monitoring activities that are being implemented and a reporting program that outlines how the effectiveness of activities being undertaken will be evaluated and measured, and progressive improvements made over time.

The below diagram has been developed to outline the applicable documents and actions that relate to the management of biodiversity values across HVO and form part of this HVO South BMP.



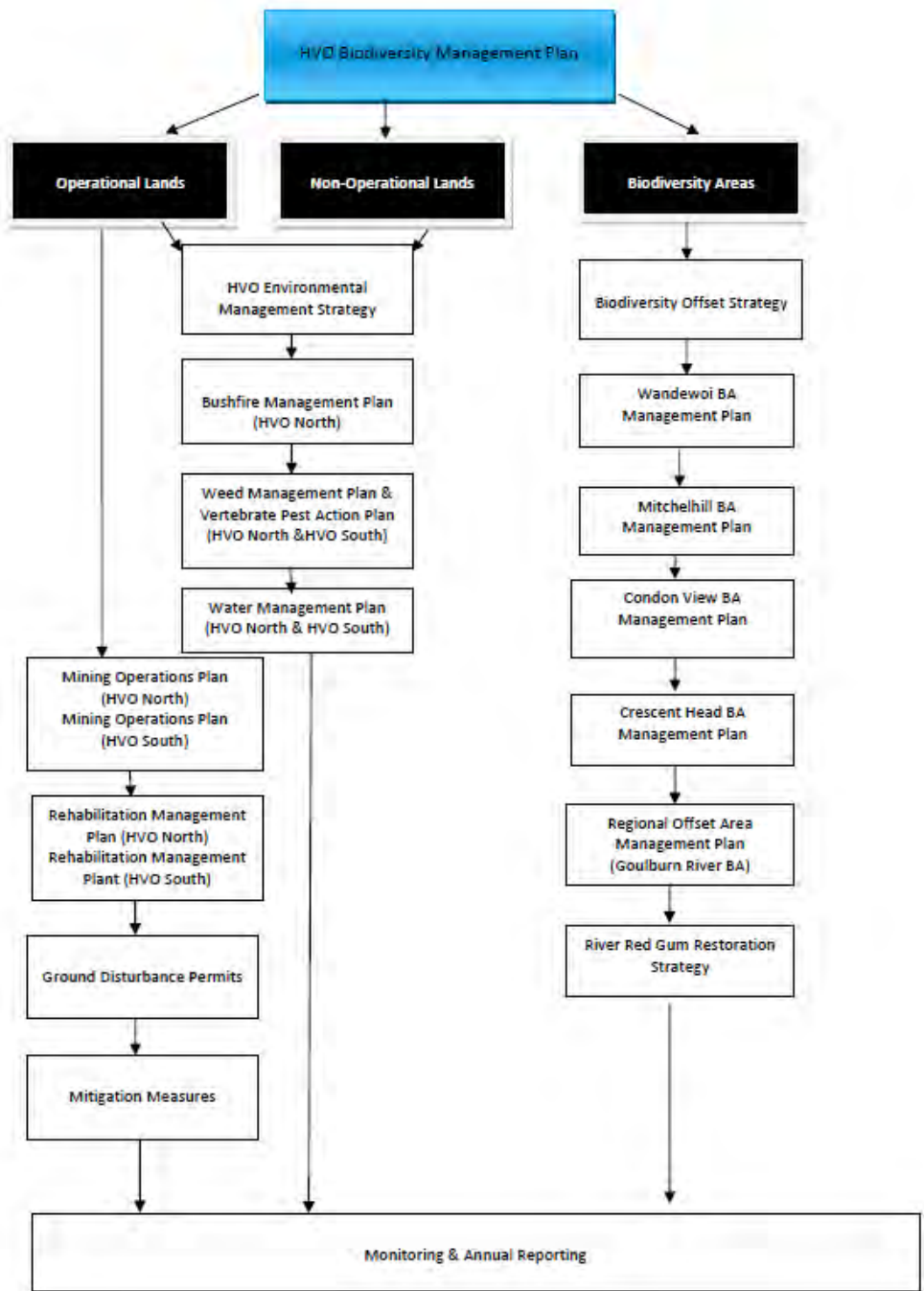


Plate 1.1 HVO Integrated Biodiversity Management Plan - Related Documents

### 1.3 Compliance

An overview of project approval conditions relating to this BMP in the NSW HVO South Project Approval (06\_0261) and EPBC Approval (2016/7640) with the associated timeframes and delivery mechanism is provided in Table 1.1.

**Table 1.1 HVO South Project Approvals– Biodiversity Activities**

Biodiversity Activity	Timeframe	Delivery Mechanism
<b>NSW Project Approval 06_0261 - Modification 5</b>		
<b>Biodiversity Offset Strategy (BOS) (Condition 29)</b>		
The proponent must implement the Biodiversity Offset Strategy as described in the Warkworth Mine EIS to the satisfaction of the Secretary. This relates to a 140ha offset area in the Goulburn River Biodiversity Area enhancing Narrow leaved ironbark woodland.	–	The 140ha offset area will be delivered as part of the Goulburn River Biodiversity Area and in accordance with the approved Regional Offset Management Plan – Warkworth Mine and HVO.
<b>Long Term Security of Offset (Condition 29A)</b>		
By end of June 2019, unless the Secretary agrees otherwise, the Proponent must secure the offset area identified in condition 29 under an in perpetuity conservation mechanism to the satisfaction of the Secretary. This conservation mechanism may be combined with any similar mechanism required for Warkworth Mine.	30 June 2019	HVO are currently in discussions with OEH regarding an appropriate legally binding mechanism.
<b>Offsets for Warkworth Mine (Condition 29B)</b>		
The proponent must not undertake any mining operations or development within the Southern Biodiversity Area or Northern Biodiversity Area (as indicated on the plan in Appendix 10), other than any conservation related activity under an approved Biodiversity Management Plan under this approval or similar plan for Warkworth Mine.	Ongoing	Sections 3 and 4 of this BMP identifies mechanisms to ensure the Southern and Northern Biodiversity Areas will be protected from mining activities and managed to maintain their conservation values.
<b>River Red Gum Restoration Strategy (Condition 30)</b>		
Within 12 months from date of approval, or otherwise agreed by Secretary, the Proponent must review, revise and provide a timetable for implementation of the HVO River Red Gum Strategy for Hunter River and Wollombi Brook River Red Gum populations in consultation with CLWD and OEH, and to satisfaction of Secretary. This strategy must be prepared by suitably qualified experts.	28 February 2019	The current River Red Gum Strategy is being implemented and is summarised in Section 5 of this BMP. A revised River Red Gum Strategy will be submitted for approval prior to 28 February 2019.
<b>Hunter Lowland Red Gum Forest (Condition 31)</b>		
The proponent must protect all stands of the Hunter Lowland Red Gum Forest endangered ecological community within the site, and adjacent lands under control of the proponent, to the satisfaction of the Secretary	Ongoing	The current River Red Gum Strategy outlines mechanisms for protection of Hunter Lowland Red Gum Forest. This strategy is being implemented and is summarised in Section 5 of this BMP. This BMP also identifies the location of the Hunter Lowland Red Gum Forests and summarises key management actions.

**Table 1.1 HVO South Project Approvals– Biodiversity Activities**

<b>Biodiversity Activity</b>	<b>Timeframe</b>	<b>Delivery Mechanism</b>
<b>Strategic Study Contribution (Condition 33)</b>		
If during the project the Department or OEH commissions a strategic study into the regional vegetation corridor from Wollemi National Park to Barrington Tops National Park, then the proponent must contribute up to \$10,000, towards completion of this study.	–	Funding will be provided if required.
<b>Biodiversity Management Plan (BMP) (Condition 33A)</b>		
Condition 33A – Prepare BMP to satisfaction of the Secretary. The plan must be submitted to Secretary for approval within 3 months of determination of Modification 5. Unless otherwise approved by Secretary.	27 July 2018	This report forms the BMP.
<b>Progressive Rehabilitation (Condition 34)</b>		
The proponent must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated.	As required	Proposed rehabilitation is summarised in Section 3 of this BMP. Full details are provided in the HVO North and HVO South Mining Operations Plans.
<b>Rehabilitation Objectives (Condition 35)</b>		
The Proponent must rehabilitate the site to the satisfaction of the Secretary responsible for DRG. This rehabilitation must be generally consistent with the proposed rehabilitation activities described in the documents listed in condition 2 of Schedule 2 (and shown conceptually in the figure in Appendix 6), and comply with the objectives in Table 16.	As required	Proposed rehabilitation is summarised in Section 3 of this BMP. Full details are provided in the HVO North and HVO South Mining Operations Plans.
<b>Rehabilitation Management Plan (Condition 36)</b>		
The proponent must prepare a Rehabilitation Management Plan for the project to the satisfaction of the DRG. It must be submitted for approval within 3 months of determination of Modification 5. Unless otherwise approved by Secretary.	27 July 2018	Proposed rehabilitation is summarised in Section 3 of this BMP. A Rehabilitation Management Plan for HVO South is currently being finalised.
<b>EPBC Approval (EPBC2016/7640)</b>		
1. Person taking the action must not clear more than 54.4ha of Central Hunter Valley Eucalypt Forest and woodland (CHVEF) from the Riverview Pit and 6.6ha of CHVEF from the West Pit and must limit all vegetation clearing to project disturbance boundaries.	Approved on 24 October 2016	Progressive clearance is outlined in the Mining Operational Plans (HVO North and HVO South) and approved under the Ground Disturbance Permit process. This is outlined in Section 3. Clearing is outlined in the Vegetation Clearance Plan.

**Table 1.1 HVO South Project Approvals– Biodiversity Activities**

<b>Biodiversity Activity</b>	<b>Timeframe</b>	<b>Delivery Mechanism</b>
2. The person taking the action must prepare and submit a Vegetation Clearance Plan for Minister's approval to mitigate impacts of the action on CHVEF, Regent Honeyeater, Swift Parrot and Green and Golden Bell Frog. Action must not commence until the Vegetation Clearance Plan is approved by the Commonwealth Minister.	Approved on 24 October 2016	Clearing is outlined in the Vegetation Clearance Plan. Summary is provided in Section 3.
4. To compensate for residual impacts to protected matters the person taking the action must, under a legally binding agreement, secure 405.8ha at the Wandewoi Biodiversity Area within 3 years from date of approval. The offset must include 405.8ha of CHVEF, 175.8ha of foraging habitat for Swift Parrot and 40ha of regenerating foraging habitat for Swift Parrot.	10 October 2019	Delivered via the Wandewoi Biodiversity Area Management Plan. HVO are currently in discussions with OEH regarding an appropriate legally binding mechanism.
5. To compensate for 22.7ha of Class A CHVEF from the Riverview Pit extension area the person taking the action must identify a direct offset that meets the EPBC Act Offset Policy and secures the offset in perpetuity under a legally binding agreement within 12 months from date of the approval of the Offset Strategy in Condition 10.	23 October 2018	Delivered via the Mitchelhill Biodiversity Area Management Plan. HVO are currently in discussions with OEH regarding an appropriate legally binding mechanism.
6. To compensate for residual impacts to 68.4ha of breeding and foraging habitat for Regent Honeyeater the person taking the action must identify a direct offset that meets the EPBC Act Offset Policy and secures the offset in perpetuity under a legally binding agreement within 12 months from date of approval of the Offset Strategy in Condition 10.	23 October 2018	Delivered via the Mitchelhill Biodiversity Area Management Plan and Condon View Biodiversity Area Management Plan. HVO are currently in discussions with OEH regarding an appropriate legally binding mechanism.
7. To compensate for residual impacts to 2.6ha of breeding habitat and 102.7ha of foraging habitat for Green and Golden Bell Frog the person taking the action must identify an offset package that meets the EPBC Act Offset Policy and secures the offset in perpetuity under a legally binding agreement within 12 months from date of approval of Offset Strategy in Condition 10.	23 October 2018	Delivered via the Crescent Head Biodiversity Area Management Plan. HVO are currently in discussions with OEH regarding an appropriate legally binding mechanism.
9. The action cannot continue for more than 12 months from date of approval of Offset Strategy unless the direct offset sites have been secured in perpetuity under a legally binding agreement.	23 October 2018	HVO are currently in discussions with OEH regarding an appropriate legally binding mechanism.
10. Within 6 months from commencement of the action the person taking the action must prepare and submit an Offset Strategy for Minister's approval.	The Offset Strategy was approved on 23 October 2017	A Biodiversity Offset Strategy has been prepared and approved by DoEE.
11. For protection of CHVEF and habitat for Regent Honeyeater, Swift Parrot and Green and Golden Bell Frog the person taking the action must prepare and submit a Biodiversity Offset Management Plan for Minister's approval within 12 months from date of this approval.	Draft Biodiversity Offset Management Plans have been submitted to DOEE (Oct 2017)	Delivered via the Wandewoi Biodiversity Area Management Plan, Crescent Head Biodiversity Area Management Plan, Mitchelhill Biodiversity Area Management Plan and Condon View Biodiversity Area Management Plan.

**Table 1.1 HVO South Project Approvals– Biodiversity Activities**

<b>Biodiversity Activity</b>	<b>Timeframe</b>	<b>Delivery Mechanism</b>
13. To ensure timely compensation for significant impacts the approved BOMP must be implemented at the Wandewoi Biodiversity Area within one month from date of its approval, regardless if the Wandewoi Biodiversity Area has been legally secured.	Draft Biodiversity Offset Management Plan has been submitted to DoEE (Oct 2017)	Wandewoi Biodiversity Area Management Plan. Preliminary activities have commenced, including cultural heritage surveys, fencing, track repairs, soil testing, seed collection and tubestock raising.

To demonstrate compliance of the BMP (Condition 33A), Table 1.2 provides a reference to the relevant section within the BMP as to where each requirement of Condition 33A is addressed.

**Table 1.2 Compliance Tracking for NSW Project Approval (Condition 33A)**

<b>Condition 33A Requirement</b>	<b>Comments</b>	<b>Operational Land</b>	<b>Non-Operational Land</b>	<b>Monitoring and Reporting</b>
a) (The BMP must) be submitted to the Secretary for approval within 3 months of determination of Modification 5, unless otherwise agreed by Secretary;	Extension was granted by DPE. BMP required to be submitted by 27 July 2018.	-	-	-
b) be prepared in consultation with OEH by a suitably qualified and experienced person/s;	Section 1.3.1 Section 1.3.2	-	-	-
c) describe the short, medium and long term measures to be undertaken to manage the remnant vegetation and fauna habitat on site and implement the Biodiversity Offset Strategy;		Section 3 describes measures to manage remnant vegetation and fauna habitat on operational land. Section 2 summarises Biodiversity Offset Strategy and implementation requirements are outlined.	Section 4 describes management of Biodiversity Areas and biodiversity values that occur outside of approved disturbance areas.	
d) describe the measures to be undertaken to avoid the Southern Biodiversity Area or Northern Biodiversity Area located within the site;		-	Section 4 outlines location and values of Southern and Northern Biodiversity Areas and how HVO will ensure they are not impacted.	-
e) incorporate the River Red Gum Strategy;		-	Section 4 describes the River Red Gum communities on site and commitments in the River Red Gum Strategy.	
f) describe the measures to be undertaken to protect the Hunter Lowland Red Gum Forest endangered ecological community;		-	Section 4 describes the Hunter Lowland Red Gum Forest and identifies their location on site. Management measures are outlined.	-
g) include detailed performance and completion criteria for evaluating the performance of the Biodiversity Offset Strategy and include triggers for remedial action, where the performance or completion criteria are not met;		Section 2 outlines completion criteria for the Biodiversity Offset Strategy and remedial actions.	-	-

**Table 1.2 Compliance Tracking for NSW Project Approval (Condition 33A)**

Condition 33A Requirement	Comments	Operational Land	Non-Operational Land	Monitoring and Reporting
<p>h) include a detailed description of measures to be implemented on site and in biodiversity areas for:</p> <ul style="list-style-type: none"> <li>• protecting vegetation and fauna habitat outside approved disturbance areas on site;</li> <li>• enhancing quality of existing vegetation, vegetation connectivity and fauna habitat on site and in offset areas;</li> <li>• minimising clearing and avoid unnecessary disturbance;</li> <li>• maximising salvage of resources within the approved disturbance area for beneficial reuse;</li> <li>• collecting and propagating seed;</li> <li>• utilising vegetation for visual screening of the site;</li> <li>• minimising the impacts on fauna on site, including undertaking pre-clearance surveys;</li> <li>• managing salinity;</li> <li>• controlling weeds and feral pests;</li> <li>• controlling erosion;</li> <li>• managing grazing and agriculture on the site;</li> <li>• controlling access; and</li> <li>• managing bushfire hazards;</li> </ul>		<p>Section 3 provides information on these requirements for operational lands.</p>	<p>Section 4 provides information on the applicable requirements for non-operational land and Biodiversity Areas.</p>	-
<p>i) be integrated with rehabilitation for the site;</p>		<p>Section 3 summarises proposed rehabilitation. Full details are provided in the HVO North and HVO South Mining Operations Plans.</p>	-	-
<p>j) include a seasonally based program to monitor and report on effectiveness of the above measures, progress against detailed performance and completion criteria, and any progressive improvements that could be implemented to improve biodiversity outcomes</p>	<p>Section 6 provides a summary of monitoring and reporting for HVO South.</p>	<p>Section 3 provides information on monitoring proposed for operational areas.</p>	<p>Section 4 provides information on monitoring proposed for non-operational areas and Biodiversity Areas.</p>	<p>Section 6 provides information on overarching monitoring proposed to measure effectiveness of management measures. .</p>

**Table 1.2 Compliance Tracking for NSW Project Approval (Condition 33A)**

<b>Condition 33A Requirement</b>	<b>Comments</b>	<b>Operational Land</b>	<b>Non-Operational Land</b>	<b>Monitoring and Reporting</b>
k) monitor and report on the impacts of the project on groundwater dependent ecosystems and riparian vegetation consistent with Groundwater Monitoring Program, and identify trigger levels for remediation of any material impacts to these ecosystems;	Section 6 also includes a summary of groundwater monitoring for GDEs and riparian vegetation	-	-	Section 5 summarises Groundwater Monitoring Program and trigger levels for remedial action associated with GDEs and riparian vegetation.
l) identify the potential risks to successful implementation of the Biodiversity Offset Strategy, and include a detailed description of contingency measures to be implemented to mitigate against these risks;	Section 2 identifies potential risks to implementation of the Biodiversity Offset Strategy and mitigation measures	-	-	-
m) include details of who would be responsible for monitoring, reviewing and implementing the plan.	Section 1.3.4	-	-	-



It is a requirement of Condition 33A that the BMP is prepared in consultation with NSW Office of Environment and Heritage (OEH). The draft HVO South Biodiversity Management Plan was provided to OEH on 4 July 2018 but OEH did not provide any comments. This is documented in Appendix A.

### 1.3.1 Authors

This BMP has been prepared by suitably qualified and experienced ecologists with expertise in the identification, assessment and management of biodiversity values of State and Commonwealth significance. The authors have extensive experience preparing management plans that outline appropriate management strategies to maintain and/or improve their conservation values, including threatened species and communities.

Berlinda Ezzy is the primary author with approximately 20 years of professional experience. She has worked for local and state government, as well as the private sector, across a range of environmental disciplines and projects providing her a broad depth of knowledge. Particular areas of expertise include; environmental planning and approvals, threatened species management, coordinating delivery of field ecology surveys and reporting, impact assessments and biodiversity offsets. Berlinda has worked on large-scale mining and resource projects in Queensland and NSW undertaking environmental impact assessments and preparing various management plans. These plans have addressed the protection, management and monitoring of threatened species and communities.

Nathan Garvey provided a technical review of the BMP. Nathan is a qualified ecologist with over 15 years' experience in conducting ecological assessments across eastern Australia. He possesses strong project management skills and has led teams working on some of Australia's largest infrastructure projects. Nathan has experience in the mining, oil and gas, linear infrastructure, renewable energy and residential development sectors. Nathan has extensive experience completing biodiversity assessments in NSW under the EP&A Act, BC Act and EPBC Act and is one of NSW's leading experts in offsets. Nathan is an Accredited Biodiversity Assessment Method (BAM) Assessor.

### 1.3.2 BMP review

The BMP is to be reviewed by the proponent of HVO South within three years from the date of its approval. The review and appropriate revisions will:

- incorporate new knowledge;
- support adaptive management to account for environmental factors, learnings that have been made, or other uncontrollable circumstances;
- update the performance and completion criteria for the conservation management strategies as appropriate; and
- adjust monitoring programmes where required.

The findings of the review, and revised BMP, will be submitted to DPE for approval. Where revisions may be proposed involving threatened species or communities, or approved offset sites consultation will also occur with OEH and Commonwealth Department of the Environment and Energy (DoEE).

### 1.3.3 Key stakeholders and roles

The key stakeholders and roles of the entities involved in implementation of the BMP are listed in Table 1.3.

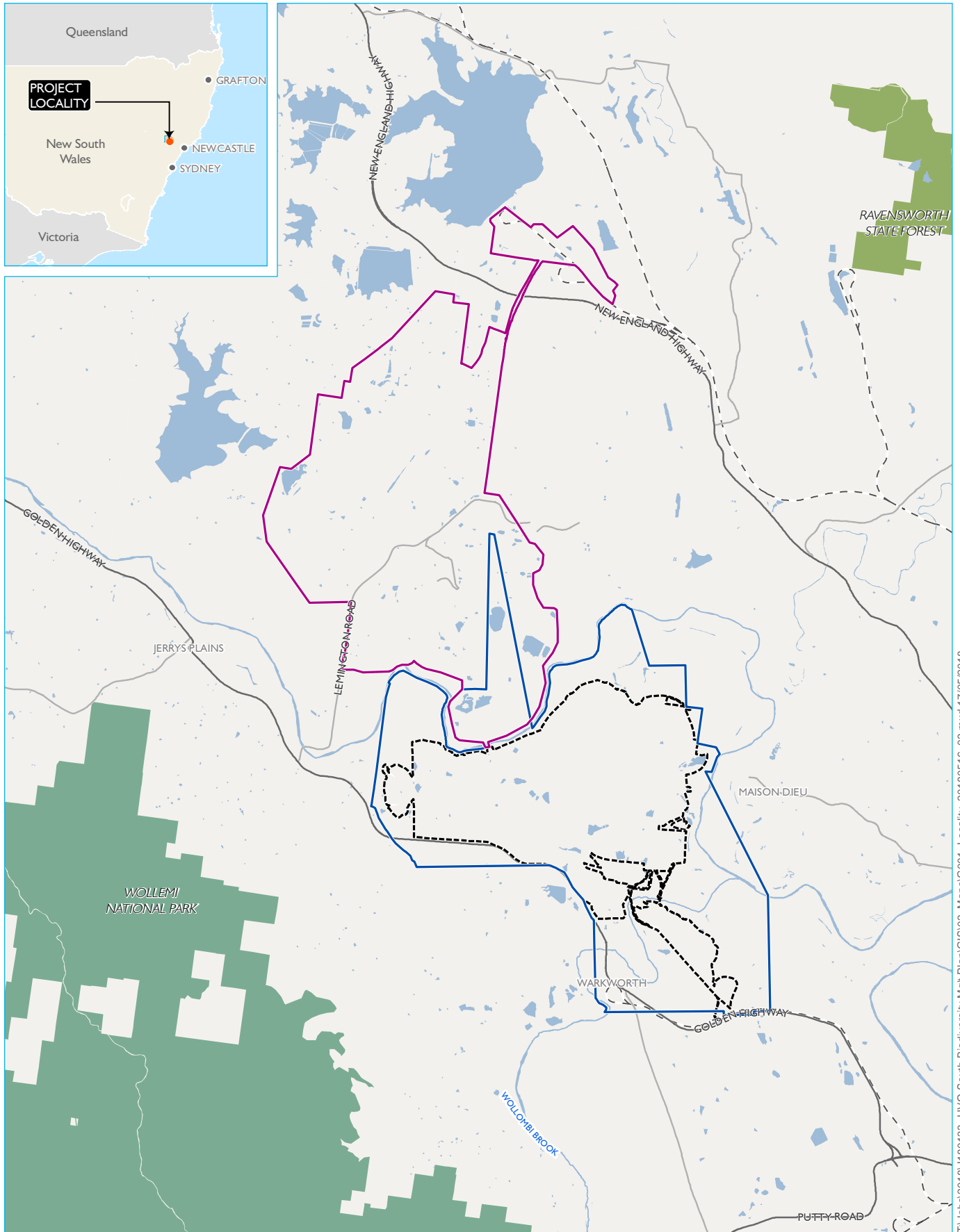
**Table 1.3 Key stakeholders and roles**

<b>Roles</b>	<b>Responsible Entity</b>	<b>Details</b>
NSW Regulator Administers approvals granted under EP&A Act Approves the BMP and receives Annual Environmental Reports	Department of Planning and Environment (DPE)	Singleton Office Compliance (Mining) Mining & Industry Projects <a href="http://www.planning.nsw.gov.au">http://www.planning.nsw.gov.au</a>
NSW Environmental Operations Consultation and Review of BMP	Office of the Environment and Heritage (OEH)	Regional Operations Hunter Central Coast Region Newcastle <a href="mailto:Rog.hcc@environment.nsw.gov.au">Rog.hcc@environment.nsw.gov.au</a>
Administers the BC Act and Offset Agreements	OEH	BioBanking Team OEH, Sydney Phone: 131 555 Email: <a href="mailto:biobanking@environment.nsw.gov.au">biobanking@environment.nsw.gov.au</a>
Commonwealth Regulator Administers approvals granted under EPBC Act Approval of Regional OMP and Offset Management Plans (OMPs)	Department of the Environment and Energy (DoEE)	<a href="mailto:EPBCMonitoring@environment.gov.au">EPBCMonitoring@environment.gov.au</a>
Project Proponent Prepare and implement the BMP including management, monitoring and reporting. Review progress of Biodiversity Offset Strategy and monitor performance outcomes are being achieved. Annual Reporting	Hunter Valley Operations Pty Ltd	Manager, Environment & Community
Leaseholders. Adhere to applicable requirements for the property as set out in the grazing lease. Requirements may be associated with grazing management, implementation of on-ground works, fence maintenance etc.	Leaseholders	Lease agreements held with Hunter Valley Operations Pty Ltd
Audit of project's compliance with approval conditions and approved plans etc.	Independent Auditor	To be appointed when required

#### 1.3.4 Access

Access to HVO North and HVO South operational areas is restricted by locked gates and visitation is monitored through site induction processes. Access to non-operational areas and Biodiversity Areas (BAs) within the approved project boundaries is also restricted access, and visitation is monitored through a site induction process. Clear signage is in place to identify the location of BAs and entry is not allowed without prior permission.

All requests for visitation to the above areas must come through the HVO General Manager. This is to ensure safety and environmental protocols are followed and all activities are in accordance with the applicable site management plans.



Source: EMM (2018); DFSI (2017); AHIMS (2018); GA (2015)

KEY

- ▭ Modified HVO North development consent boundary
- ▭ HVO South project approval boundary
- Approved disturbance associated with major activities - HVO South
- ▭ State forest
- ▭ NPWS reserve
- ▭ Waterbodies
- Major waterways
- Major road
- Local road
- Rail line

HVO North and South project localities

Hunter Valley Operations South Coal Project  
Biodiversity Management Plan

Figure 1.1



T:\Jobs\2018\180133-HVO South Biodiversity Mgt Plan\GIS02\_Maps\G001\_Locality\_20180516\_03.mxd 17/05/2018

## 2 Biodiversity Values

Each of the various HVO North and HVO South Environmental Impact Statements (EIS) (Coal & Allied 2008) and Environmental Assessments (EA) (Coal & Allied 2017) describe the biodiversity values that occur within the approved project disturbance areas, and residual impacts that will occur to native flora and fauna as a result of proposed mining activities. The assessments focused particularly, but not exclusively, on threatened ecological communities (TECs) and flora and fauna species protected under the NSW *Threatened Species Conservation Act 1995* (TSC Act – now repealed) and Commonwealth EPBC Act.

Sections below outline the confirmed biodiversity values and extent of approved impacts.

### 2.1 Native vegetation communities

The majority of HVO has historically been under grazing landuse prior to mining development. As such, vegetation within the approved disturbance areas of HVO North and HVO South are predominantly characterised by exotic and native pasture. While native and exotic vegetation will need to be removed from the HVO North and South extension areas, only a small proportion consists of remnant native vegetation. Four types of vegetation communities have been confirmed within the proposed extension areas which are typically small patches (<0.5ha), isolated and in poor condition (<50% native species present).

The native vegetation communities that have been confirmed within impact areas, their conservation status, and approved extent of impact is described in Table 2.1.

**Table 2.1 Ecological communities and approved impacts**

Ecological Community	Likely plant community type (PCT)	Status (BC Act/EPBC Act)	Approved impact area (ha)
Narrow-leaved Ironbark Grey Box Woodland (CEEC)	PCT 1603 Narrow-leaved Ironbark - Bull Oak - Grey Box shrub- grass open forest of the central and lower Hunter	Endangered / Critically Endangered	54.4
Narrow-leaved Ironbark Woodland (CEEC)	PCT 1603 Narrow-leaved Ironbark - Bull Oak - Grey Box shrub- grass open forest of the central and lower Hunter	Endangered / Critically Endangered	6.6
Narrow-leaved Ironbark Woodland (poor condition)	PCT 1603 Narrow-leaved Ironbark - Bull Oak - Grey Box shrub- grass open forest of the central and lower Hunter	Endangered / Nil	3.4
Grey Box Bull Oak Regeneration	PCT 1603 Narrow-leaved Ironbark - Bull Oak - Grey Box shrub- grass open forest of the central and lower Hunter	Endangered / Nil	0.2
Rough-barked Apple Woodland	PCT 1658 Rough-barked Apple - Narrow-leaved Ironbark - Blakely's Red Gum - Bull Oak - Coast Banksia woodland on sands of the Warkworth area	Endangered / Nil	1.3
Forest Red Gum Woodland	PCT 42 River Red Gum/ River Oak grassy riparian woodland of the Hunter Valley	Endangered / Nil	1
Derived native grassland	Unknown	Nil	104.7

### 2.1.1 Threatened ecological communities

Only one threatened ecological community (TEC) will be impacted by the HVO North and South projects. Central Hunter Valley Grey Box-Ironbark Woodland has been confirmed to occur within the HVO North and HVO South project boundaries. It is listed as the Central Hunter Valley eucalypt forest and woodland (CHVEF) Critically Endangered Ecological Community (CEEC) under the EPBC Act and the Central Hunter Valley Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions Endangered Ecological Community (EEC) under the BC Act. The TEC was listed in February 2010 under the BC Act and in May 2015 under the EPBC Act due to its significant decline (>70%) resulting in a highly fragmented and restricted distribution (DoEE 2016). The TEC is a eucalypt woodland/open forest that occurs in the Hunter River catchment in north-eastern NSW, predominantly found in the Central Hunter Valley around Muswellbrook, Singleton and Cessnock local government areas (DoEE 2016). This ecological community can be valuable as a source of winter-flowering eucalypts for transient threatened species such as Regent Honeyeater (*Lathamus discolor*).

Various classifications and thresholds need to be assessed for a vegetation community to meet the CEEC definition. These include, but are not limited to, the patch being at least 0.5ha in size, and at least 50% of perennial understorey vegetation cover being due to native plants. Diversity of native understorey species is also a consideration in whether a patch of vegetation meets the CEEC requirements.

Based on the vegetation surveys that have been completed for HVO it was confirmed that impacts would occur to 54.4ha of CHVEF in high condition (score of 7/10) and 6.6ha of CHVEF in poor condition (score of 3/10). Distribution of CHVEF in HVO North and HVO South project areas is shown in Figure 4.2.

A description of this Critically Endangered (CE) woodland community, the associated NSW PCT that occurs within HVO North and South boundaries, and its characteristics is provided below.

Attribute type	Attribute description
NSW Veg type IDs	PCT1603
Common name	Central Hunter Valley Grey Box-Ironbark Woodland
Vegetation description	Canopy dominated by one or more of the following eucalypt species; narrow-leaved ironbark ( <i>E. crebra</i> ), spotted gum ( <i>Corymbia citriodora</i> ), slaty gum ( <i>E. dawsonii</i> ) and grey box ( <i>E. moluccana</i> ). A number of other tree species may be subdominant including; rough-barked apple ( <i>Angophora floribunda</i> ), Blakely's red gum ( <i>E. blakelyi</i> ), slaty red gum ( <i>E. glaucina</i> ) and forest red gum ( <i>E. tereticornis</i> ). A ground layer is present, although it may vary in development and composition. A sparse to thick layer of native grasses and/or other predominantly native groundcover (small shrubs and ferns, daisies, orchids).
Vegetation formation	Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands

## 2.2 Threatened fauna species

During the various environmental impact assessments that have been completed across HVO North and HVO South project areas to date, a number of threatened fauna species have been observed and their associated breeding and/or foraging habitats confirmed as summarised in Table 2.2. No EPBC listed fauna species have been observed during surveys to date.

**Table 2.2** Threatened fauna species known to occur

Species	BC Act Status	EPBC Act Status
Grey-crowned Babbler ( <i>Pomatostomus temporalis</i> )	Vulnerable	-
Brown Treecreeper ( <i>Climacteris picumnus victoriae</i> )	Vulnerable	-
Speckled Warbler ( <i>Pyrrholaemus sagittatus</i> )	Vulnerable	-
Black Bittern ( <i>Ixobrychus flavicollis</i> )	Vulnerable	-
Squirrel Glider ( <i>Petaurus norfolkensis</i> )	Vulnerable	-
Eastern Freetail Bat ( <i>Mormopterus norfolkensis</i> )	Vulnerable	-
Yellow-bellied Sheath-tail Bat ( <i>Saccolaimus flaviventris</i> )	Vulnerable	-
Eastern Bent-wing Bat ( <i>Miniopterus schreibersii oceanensis</i> )	Vulnerable	-
Large-footed Bat ( <i>Myotis macropus</i> )	Vulnerable	-

Those threatened fauna species where a significant impact was found to occur as a result of the proposed mining activities, and approved extent of impact, are summarised in Table 2.3. Biodiversity offsets are required to be provided for these significant, residual impacts and a summary of each species is provided in Sections 2.2.1 to 2.2.3 below.

**Table 2.3** Fauna species and approved impacts

Threatened Fauna Species	Status (BC Act/EPBC Act)	HVO Approved Impact Area (ha)
Regent Honeyeater ( <i>Anthochaera phrygia</i> )	Critically Endangered/Critically Endangered	68.4 (breeding and foraging habitat)
Green and Golden Bell Frog ( <i>Litoria aurea</i> )	Endangered/Vulnerable	2.6 (breeding) 102.7 (foraging)
Swift Parrot ( <i>Lathamus discolor</i> )	Endangered/Critically Endangered	68.1 (foraging)

### 2.2.1 Regent Honeyeater

The Regent Honeyeater is listed as CE under both the EPBC Act and BC Act.

Potential habitat for the Regent Honeyeater was identified in the West Pit and Carrington Pit extension areas of HVO North and Cheshunt Pit and Riverview Pit extension areas for HVO South.

The Regent Honeyeater is a medium sized bird with distinct yellow and black colouration and a curved bill. Adults are generally between 20-24 cm long with a wingspan of 30 cm. Regent Honeyeaters typically inhabit open Eucalypt forests and woodlands; particularly box-ironbark woodlands. Generally favouring wetter more fertile sites with reliable nectar products, key Eucalypt species include Yellow Box, Blakely's Red Gum, Grey Box, Narrow-leaved Ironbark, Spotted Gum and Rough-barked Apple. The Regent Honeyeaters current known range extends from north-eastern Victoria and south-eastern Queensland. Their distribution has dramatically declined within the last thirty years, having once been recorded between Adelaide and the central QLD coast. Regent Honeyeaters are nomadic species, travelling large distances even hundreds of kilometres in search of their main food source nectar. The flowering events of key Eucalypt species are an influential factor in the Regent Honeyeater's movement (DoEE 2018b) (OEH 2018d).

The Regent Honeyeater breeds between July and January in Box-Ironbark and other temperate woodlands (OEH 2018d). There are four known key locations in which the nomadic species breeds: Hunter Valley (NSW), Capertee Valley (NSW), Bundarra-Barraba region (NSW) and Chiltern (north-east VIC). Eucalypt forests are an integral aspect to support the regular breeding events of the Regent Honeyeater providing habitat for nests and a food source (OEH 2018d). Occasionally nectar and fruit from mistletoes are also eaten during breeding season (OEH 2018d).

The major threat to the Regent Honeyeater is habitat reduction as a result of degradation, fragmentation and of land clearing. The continued destruction of key tree species and eucalypt forests from residential development and agricultural clearing has prompted the endangered species dramatic population decline. The Regent Honeyeaters reduced population and restricted habitat makes them highly vulnerable to a loss of genetic diversity, increased predation, reduced breeding and ultimately possible extinction (OEH 2018d).

### 2.2.2 Swift Parrot

The Swift Parrot is listed as Critically Endangered under the EPBC Act and Endangered under the BC Act.

Potential habitat for Swift Parrot was identified in the Carrington Pit and West Pit and Cheshunt Pit extension areas for HVO North and Riverview Pit extension area for HVO South.

Swift Parrots are one of only three migrating parrot species in the world. Males feature bright green and red colouration with a blue patch on their head, whereas females are slightly duller. The most distinguishable feature of the Swift Parrot is their long, thin pointed tail featuring scarlet red underneath (OEH 2018e).

Between September and January, Swift Parrots breed in colonies within blue gum forest in eastern Tasmania (PWST 2012). The Swift Parrot nests within dead and live eucalypt trees, mostly favouring the Tasmanian Blue Gum (*Eucalyptus globulus*), stringybark (*E. obliqua*) and white peppermint (*E. delegatensis*) (IUCN 2018). Following the breeding season during Autumn, the migratory birds make their way to mainland Australia where they spend their winter as semi-nomadic (PWST 2012). During this time the parrots disperse across a broad landscape, foraging on nectar and lerps amongst eucalypts mainly in Victoria and New South Wales. Small numbers of Swift Parrots are also recorded in the Australian Capital Territory, south eastern South Australia and southern Queensland (Saunders and Tzaros 2011). Their distribution across the landscape during winter greatly depends upon the climate and consequent food availability (IUCN 2018) Within the winter months the most favourable trees to feed from are flowering species such as Swamp Mahogany (*E. robusta*), Spotted Gum (*Corymbia maculata*) and Mugga Ironbark (*E. sideroxylon*), and those infested with lerps including Grey Box (*E. macrocarpa*) and Blackbutt (*E. pilularis*) (OEH 2018e).

Based on current knowledge of the ecology and distribution of the Swift Parrot, one of the most prevalent and persistent threats facing the Swift Parrot's population is habitat loss and alteration, particularly within breeding and drought refuge habitats (IUCN 2018). The main causes of habitat loss are from forestry activities including firewood harvesting, clearing for residential, agricultural and industrial developments, attrition of old growth trees in the agricultural landscape, suppression of forest regeneration, and frequent fire. Another significant threat towards the Swift Parrot is nest predation by Sugar Gliders, an introduced species to Tasmania (IUCN 2018). Previous surveys have revealed that almost 79% of Swift Parrot nests were predated on the mainland of Tasmania (IUCN 2018).

Swift Parrots also face a number of other threats including climate change causing changes in habitat phenology, reduced food availability due to drought conditions, competition for resources, Psittacine Beak and Feather Disease, predation from cats and the illegal capture and trading (OEH 2018e).



A national recovery plan for Swift Parrots was first created in 2001 and revised in 2011. The plan consists of conservation requirements of the species across its range and identifies actions to be taken to ensure its survival. The National Recovery Plan accounts for the direct benefits of Swift Parrot populations but also the benefit for the biodiversity within their dependent forest and woodlands. The primary action for the plan is to prevent further habitat destruction from land clearance in high quality breeding and nesting habitats (Saunders and Tzaros 2011).

### 2.2.3 Green and Golden Bell Frog

The Green and Golden Bell Frog is listed as Endangered under the BC Act and Vulnerable under the EPBC Act.

Green and Golden Bell Frog habitat was identified in the West Pit extension area for HVO North.

The Green and Golden Bell Frog is relatively large, ranging from 45mm to 100mm (snout to vent), and has a distinct gold or creamish white stripe with a dark brown stripe below extending from the upper eyelid to the lower back (OEH 2018f). The colour of its body can vary but is often a vivid green with brown or golden splotches (OEH 2018f). The Green and Golden Bell frog mainly occurs within lowland areas of eastern NSW and Victoria; and are known on three offshore islands, Bowen Island, Koorangang Island and Broughton Island (DoEE 2018d). There have been approximately fifty records of the species in NSW since 1990 along the coast (OEH 2018f). Most populations of the rare frog consist of 20 adults, however there are large populations within NSW with approximately 100 adults at Captains Flat and over 1000 in Homebush (DoEE 2018d). Within Sydney there are eight key populations that include some of the largest but also most isolated populations (ELA 2016).

The Green and Golden Bell frog is often associated with marshes, dams, stream-sides, coastal swamps and other estuarine wetlands (OEH 2018f). The habitat of the Green and Golden Bell frog can often change depending on their life cycle as well as seasonal changes. They may occupy natural, artificial habitats and some within highly disturbed areas. Favourable water-bodies are those with a grassy area that are unshaded and free from predation (OEH 2018f). Breeding will generally occur between September to February favouring warm and wet conditions, and peak during January and February. The male frogs will call floating in the water whilst the female produces a raft of floating eggs, eventually these settle to the bottom.

The Green and Golden Bell frog is highly mobile and may travel large distances between breeding sites (ELA 2016). Like most other pond-breeding frogs, their population can fluctuate depending on weather conditions (DoEE 2018d). Generally, other similar species of frogs will recolonise following a local population extinction. The Green and Golden Bell frog, however, is unlikely to undertake similar processes due to the extent of habitat fragmentation (DoEE 2018d). The most common and major threats facing the Green and Golden Bell frog are habitat removal, habitat degradation and fragmentation, reduction in water quality, diseases, predation and the direct threat of human occurrence (DoEE 2018d). Habitat reduction is a result of development projects such as dam constructions, pasture conversion, sewage treatment plants, industrial and residential development, golf courses and landfill disposal.

## 2.3 Threatened flora species

HVO North studies confirmed presence of Tiger Orchid (*Cymbidium canaliculatum*) and River Red Gum (*Eucalyptus camaldulensis*), both listed as Endangered populations under BC Act. These species were located in a proposed expansion area for the mine. Their occurrences were isolated, in a highly fragmented landscape at the edge of the existing Carrington Pit, therefore their long term viability was low. As avoidance was not possible, mitigation measures included translocation of the Tiger Orchid. Also as part of HV Operations broader activities in the region, they are protecting and managing a number of Tiger Orchid colonies within existing and proposed biodiversity offset areas. Mitigation measures for impacts to River Red Gums is through implementation of the River Red Gum Strategy including restoration and management of River Red Gums and communities across HVO project areas. Details are provided in Section 4.

There are no threatened flora species within HVO South project area.

## 2.4 Environmental legislation and policy

The HVO South EIS considered the following relevant contemporary government legislation and policies.

### 2.4.1 Environment Protection and Biodiversity Conservation Act 1999

Under the EPBC Act, any action (which includes a development, project or activity) that is considered likely to have a significant impact on Matters of National Environmental Significance (MNES) including threatened ecological communities and species, must be referred to the Commonwealth Minister for the Environment. The purpose of the referral is to allow a decision to be made about whether the action is a “controlled action” and therefore requires approval under the EPBC Act.

The HVO complex was submitted for determination under the EPBC Act to the former Department of the Environment (DoE) (now the Department of Environment and Energy (DoEE)) on 29 January 2016. On 3 March 2016, the Minister determined that the action was a controlled action under Section 75 of the EPBC Act and was required to be assessed by preliminary documentation.

The preliminary documentation was submitted to DoE on 5 May 2016 and concluded that the action was likely to result in significant impacts on the following protected matters:

- Central Hunter Valley eucalypt forest and woodland ecological community (CHVEF);
- Regent Honeyeater (*Anthochaera phrygia*);
- Swift Parrot (*Lathamus discolor*); and
- Green and Golden Bell Frog (*Litoria aurea*).

The preliminary documentation report included a preliminary strategy to provide offsets for the above protected matters, in accordance with the EPBC Act Environmental Offsets Policy (DSEWPaC 2012a). The offset requirements for the project under the EPBC Act have been assessed under the EPBC Act Environmental Offsets Policy (DSEWPaC 2012a) and included application of the Offsets Assessment Guide (DSEWPaC 2012b) which is a calculation tool that determines the capacity of proposed offset sites to compensate for significant impacts on protected matters.

The action was approved by the Acting Assistant Secretary on 10 October 2016, subject to conditions (EPBC 2016/7640). Condition 4 to 7 of the final approval decision notice provided the offset requirements relevant to the action. Applicable approval conditions pertaining to this BMP are summarised in Table 1.1.

#### 2.4.2 Environmental Planning and Assessment Act 1979

The EP&A Act is the overarching planning legislation in NSW that provides for the creation of planning instruments that guide land use. The EP&A Act also provides for the protection of the environment, including the protection and conservation of native animals and plants. This includes threatened species and communities listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and NSW *Fisheries Management Act 1994*.

The HVO North and South projects has been assessed and approved under the EP&A Act (Project Approvals DA 450-10-2003 and 06\_0261 as modified). The applicable approval conditions pertaining to this BMP are summarised in Table 1.1.

#### 2.4.3 Threatened Species Conservation Act 1995

At the time of preparing the HVO South EIS the *Threatened Species Conservation Act 1995* (TSC Act) was the primary piece of legislation in NSW relating to the protection and management of biodiversity. The TSC Act required consideration of whether a development (Part 4) or an activity (Part 5) is likely to significantly impact threatened species, populations, communities or their habitat.

The TSC Act has now been repealed and replaced by the BC Act. Please note the new BC Act was not in effect at the time of the EIS preparation, therefore biodiversity values were assessed under TSC Act. For the purposes of this BMP we have referenced a communities or species status under the BC Act.

#### 2.4.4 NSW Biodiversity Offset Policy for Major Projects

The NSW Biodiversity Offsets Policy for Major Projects (OEH 2014) applies to two types of developments being; State Significant Development (SSD) and State Significant Infrastructure (SSI). The offsets policy for major projects commenced on 1 October 2014. As HVO South was declared SSD, the assessment and delivery of state biodiversity offset requirements for the project have been consistent with the offsets policy requirements.

The policy:

- establishes a set of offsetting principles for major projects;
- defines key thresholds for when offsetting is required;
- adopts an assessment methodology to quantify and describe the offset required;
- defines preferred mechanism to establish offset sites;
- provides a range of flexible options that can be used in lieu of providing offsets including rehabilitation actions and supplementary measures; and
- sets out how payments to the NSW Biodiversity Offsets Fund can be used to acquit offset requirements.

## 2.5 Biodiversity Offset Strategy

Under Schedule 3 Conditions 29, 29A and 29B of the NSW Project Approval (06\_0261 - Modification 5) HVO must implement the Biodiversity Offset Strategy for the Warkworth EIS, including identifying a mechanism for the long term security of the Goulburn River Biodiversity Area, and not undertaking any activities other than conservation activities in the Southern and Northern Biodiversity Areas.

Under the EPBC Act approval, significant, residual impacts to MNES are proposed to be compensated for by the provision of 'biodiversity offsets'. Condition 10 of EPBC Act approval (EPBC 2016/7640) requires preparation of a BOS including:

- a) describe the development of the offset package and identify the proposed direct offset sites required by Conditions 5, 6 and 7, include a detailed description of the direct offset sites and demonstrate how the direct offset sites meet the EPBC Act Offset Policy and provide an adequate offset for the residual significant impacts to protected matters;
- b) include proposed timeframes in which the direct offset sites will be secured by a legal binding agreement and a detailed description of how the legally binding agreement will secure the direct offset sites in perpetuity;
- c) proposed measures for the long term management of the direct offset sites.

The HVO South Biodiversity Offset Strategy (BOS)(EMM 2017) has been developed to identify suitable direct offset sites that meet the project's offset requirements including CHVEF, and fauna species being Swift Parrot, Regent Honeyeater and Green and Golden Bell Frog. The HVO South BOS was finalised and approved by the Commonwealth Minister for the Environment on 23 October 2017. In accordance with the approval, the Wandewoi Biodiversity Area (BA) (owned by Coal & Allied Operations Pty Ltd and HV Resources Pty Ltd) will offset approximately 63% of the action's impacts on CHVEF and 100% of the offset requirements for Swift Parrot.

For the remaining offset requirements the BOS had three objectives:

1. To compensate for residual significant impacts to 22.7 ha of Class A condition CHVEF from the Riverview Pit extension area;
2. To compensate for residual significant impacts to 68.4 ha of breeding and foraging habitat for the Regent Honeyeater; and
3. To compensate for residual significant impacts to 2.6 ha of breeding habitat and 102.7 ha of foraging habitat for the Green and Golden Bell Frog.

A staged process was implemented to identify offset sites that achieve the objectives of the HVO South BOS. The first stage comprised a detailed desktop analysis of previous local studies and GIS datasets to identify multiple potential offset sites that contain CHVEF, Regent Honeyeater and/or Green and Golden Bell Frog habitat. A large number of potential offset sites were identified as part of the desktop analysis. The list of these sites was refined to landowners willing to enter into a contract and/or provide access for site assessment purposes.

Preliminary surveys were conducted to determine if the properties identified contained the required biodiversity values. Three suitable offset sites were then shortlisted (Mitchelhill BA, Condon View BA, Crescent Head BA (comprising Crescent Head (North) and Crescent Head (South))). Detailed surveys were completed at these sites to determine the extent of CHVEF and Regent Honeyeater habitat, and targeted surveys and habitat assessment for the Green and Golden Bell Frog. The Offset Assessment Guide (DSEWPac 2012b) was completed for each of the three properties to determine the percentage of direct offset provided for CHVEF, Regent Honeyeater and Green and Golden Bell Frog. The sites provide a 100% (or higher) direct offset for CHVEF and Regent Honeyeater, and a 99.25% direct offset for the Green and Golden Bell Frog (EMM 2017).

The primary measures to achieve the BOS objectives comprise:

- the provision of Mitchelhill BA, Crescent Head BA and Condon View BA as direct offsets that deliver 100% of offset requirements for CHVEF and Regent Honeyeater and 99.25% of the offset requirement for the Green and Golden Bell Frog;
- contribution to a research or conservation program to satisfy the 0.75% residual offset requirement for the Green and Golden Bell Frog;
- implementation of management measures at the direct offset sites, comprising:
  - strategic grazing and weed management to improve the quality of CHVEF and Regent Honeyeater habitat;
  - revegetation of corridors through derived native grasslands to increase the area and resilience of CHVEF and Regent Honeyeater habitat;
  - investigation of the need for Noisy Miner management in Regent Honeyeater habitat;
  - management of Mosquito Fish to create suitable conditions for Green and Golden Bell Frog breeding; and
  - maintenance of vegetation structure in existing open areas as Green and Golden Bell Frog foraging habitat.

Individual offset site specific management plans have been prepared, which include comprehensive information for that particular offset including:

- conservation objectives, key performance indicators and completion criteria;
- management actions including weed control, grazing management, fire management, infrastructure improvement, revegetation, feral animal control etc;
- for each management area performance criteria for short and medium term and triggers for corrective actions, actions and response;
- monitoring programme including monitoring sites, data collection methods, analysis and interpretation to measure the key performance indicators and completion criteria and identify if corrective actions are required. Monitoring will also guide adaptive management and identify where improvements or efficiencies could be made; and

- risk assessment to identify risks in implementing the offset management plan and attainment of objectives.

HV Operations is responsible for ensuring each of the offset management plans are being implemented including management actions, monitoring activities and submission of annual reports. Annual Reports will include a summary of management actions completed and any notable management outcomes, analysis of monitoring data collected in that annual period, assessment of any new risks or threats to the area and actions to be undertaken to manage those risks (if identified). Annual Reports will be submitted to DPE, OEH and DoEE for their information.

A summary of each offset site, the biodiversity values they are offsetting and how much, and applicable management plans containing detailed information is provided in Table 2.4. The location of each offset site in proximity to the HVO South project is shown in Figure 2.1.

**Table 2.4 HVO South Biodiversity Offset Areas**

Biodiversity value being offset	Offset Area (ha)	Offset Site	Management Plan
<b>NSW Offset Requirement (06_0261 - Modification 5)</b>			
Narrow-leaved Ironbark Woodland	140	Goulburn River BA	Regional Offset Management Plan – Warkworth Mine and HVO
<b>EPBC Offset Requirement (EPBC 2016/7640)</b>			
CHVEF	175.80 (remnant)	Wandewoi BA	Wandewoi Biodiversity Area Management Plan (Yancoal, 2018a)
	230 (revegetation)	Wandewoi BA	
	312.70 (remnant)	Mitchelhill BA	Mitchelhill Biodiversity Area Management Plan (Yancoal 2018b)
	31.50 (revegetation)	Mitchelhill BA	
	Total 488.5 (remnant)		
Total 261.5 (revegetation).			
Swift Parrot	175.80	Wandewoi BA	Wandewoi Biodiversity Area Management Plan (Yancoal, 2018a)
	132 (West) + 113 (East)	Mitchelhill BA	
	Total 420.8		
Regent Honeyeater	132 (West)+113 (East)	Mitchelhill BA	Mitchelhill Biodiversity Area Management Plan (Yancoal 2018b)
	168	Condon View BA	
	Total 420.8		Condon View Biodiversity Area Management Plan (Yancoal 2018c)
Green and Golden Bell Frog	190.40	Crescent Head BA	Crescent Head Biodiversity Area Management Plan (Yancoal 2018d)

### 2.5.1 Monitoring performance of the Biodiversity Offset Strategy

The HVO South BOS (EMM 2017) includes requirements for the management and legal security of four direct offset sites, and proposed contribution to a research or conservation program to satisfy the 0.75% residual offset requirement for the Green and Golden Bell Frog not provided by the Crescent Head Biodiversity Area.

Progress to date in terms of implementing the BOS includes:

- all direct, land-based offset sites (Goulburn River BA, Wandewoi BA, Crescent Head BA, Mitchelhill BA and Condon View BA) have been identified and submitted for approval;
- all offset site management plans have been prepared and submitted to OEHL, NSW National Parks and/or DoEE (where required) for review. It is anticipated management plans will be finalised mid-2018; and
- discussions between HV Operations and OEHL in relation to suitable legally binding mechanisms for each offset site are progressing.

The key performance objectives for implementation of the BOS and completion criteria that will be monitored, as approved by DoEE, are outlined in Table 2.5.

**Table 2.5 BOS performance objectives and monitoring**

<b>BOS Objective</b>	<b>Completion Criteria</b>	<b>Status</b>
To compensate for residual significant impacts to 22.7 ha of Class A condition CHVEF from the Riverview Pit extension area.	Mitchelhill BA Management Plan is approved and implemented.	Currently under review by OEHL, NSW National Parks and DoEE.
To compensate for residual significant impacts to 68.4 ha of breeding and foraging habitat for the Regent Honeyeater.	Mitchelhill BA and Condon View BA Management Plans are approved and implemented.	Currently under review by OEHL, NSW National Parks and DoEE.
To compensate for residual significant impacts to 2.6 ha of breeding habitat and 102.7 ha of foraging habitat for the Green and Golden Bell Frog.	Crescent Head BA Management Plan is approved and implemented.	Currently under review by OEHL, NSW National Parks and DoEE.
To legally secure offset sites within 12 months from approval of the Offset Strategy.	Offset sites are legally secured by the applicable approval date.	The most suitable legal mechanisms to be applied are being discussed between HVO Pty Ltd and OEHL.
To undertake management actions that will achieve performance and completion criteria set in BA management plans.	Management actions achieve the completion criteria set out in applicable management plan.	Management of offset sites has commenced as per the draft management plans that have been reviewed by DoEE.
To implement monitoring programme for each offset site as detailed in BA management plan.	Monitoring occurs as detailed in applicable management plan.	Monitoring of offset sites has not commenced. Monitoring will commence once management plans are approved.
Annual Reporting on progress of implementation of HVO South BOS.	Submit an Annual Report within three months of every 12 month anniversary of the commencement of the action. Report will include a summary of findings from monitoring activities and progress of the offset site against completion criteria.	Two Annual Reports are prepared. A Regional Biodiversity Areas Annual Report and a Local Biodiversity Areas Annual Report. The last reports were finalised in April 2018.

### 2.5.2 Risks to delivery of the Biodiversity Offset Strategy

A summary of the identified risks to successful implementation of the BOS and appropriate corrective actions to be implemented to reduce the likelihood of risks occurring are outlined in Table 2.6.

The risk framework applied to categorise risks is summarised below.

### Risk framework

		Consequence				
		Minor	Moderate	High	Major	Critical
Likelihood	Highly Likely	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

The risk level is determined by combining the likelihood and the consequence of the objective not being achieved. The criteria to determine the level of likelihood and criteria for determining the level of consequence are summarised below.

### Criteria to determine likelihood

#### Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management actions have been put in place/are being implemented)

Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances

### Criteria to determine consequence

#### Qualitative measure of consequences (what will be the consequence/result if the issue does occur)

Minor	Minor incident of environmental damage that can be reversed
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts
High	Substantial instances of environmental damage that could be reversed with intensive efforts
Major	Major loss of environmental amenity and real danger of continuing
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage



**Table 2.6 Risks to delivering Biodiversity Offset Strategy**

Objective	Event or circumstance <sup>1</sup>	Likelihood	Consequence	Risk level	Trigger	Corrective action/s
1 To compensate for residual significant impacts to 22.7 ha of Class A condition CHVEF from the Riverview Pit extension area	Delays in negotiation with OEH and DoEE regarding a suitable offset mechanism	Possible	Medium	Medium	Delay in securing offset site under legally binding agreement	Additional consultation with OEH and DoEE
	Proposed management measures do not achieve completion criteria	Possible	Medium	Medium	Monitoring indicates acceptable targets are not being achieved	As detailed in the Mitchelhill BA OMP. Adaptive management to be applied which may mean change in management actions or increase effort
	Natural disaster event (eg bushfire/flood) sets back achieving performance objectives and completion criteria	Possible	High	Medium	Loss of vegetation and/or infrastructure as a result of natural disaster	Undertake preventative actions where appropriate such as fire breaks and manage fuel loads. Detailed in Mitchelhill OMP Consult with OEH and DoEE to revise management plan and timeframes
2 To compensate for residual significant impacts to 68.4 ha of breeding and foraging habitat for the Regent Honeyeater	Delays in negotiation with OEH and DoEE regarding a suitable offset mechanism	Possible	Medium	Medium	Delay in securing offset site under legally binding agreement	Additional consultation with OEH and DoEE

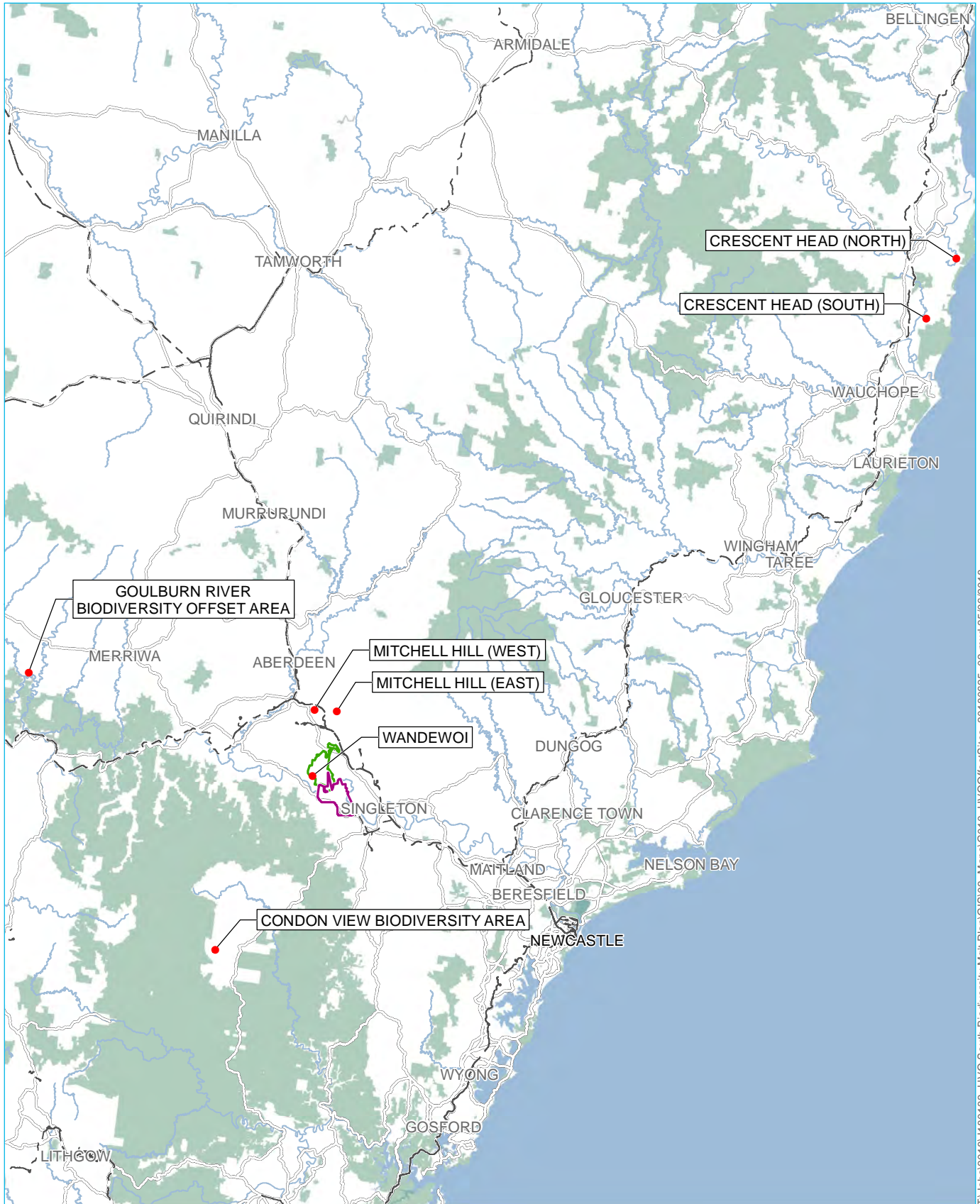
**Table 2.6 Risks to delivering Biodiversity Offset Strategy**

Objective	Event or circumstance <sup>1</sup>	Likelihood	Consequence	Risk level	Trigger	Corrective action/s
	Proposed management measures do not achieve completion criteria	Possible	Medium	Medium	Monitoring indicates acceptable targets are not being achieved	To be detailed in the Mitchelhill BA and Condon View BA OMPs Adaptive management to be applied which may mean change in management actions or increase effort
	Natural disaster event (eg bushfire/flood) sets back achieving performance objectives and completion criteria	Possible	High	Medium	Loss of vegetation and/or infrastructure as a result of natural disaster	Undertake preventative actions where appropriate such as fire breaks and manage fuel loads. Detailed in OMPs Consult with OEH and DoEE to revise management plan and timeframes
3 To compensate for residual significant impacts to 2.6 ha of breeding habitat and 102.7 ha of foraging habitat for the Green and Golden Bell Frog	Delays in negotiation with OEH and DoEE regarding a suitable offset mechanism	Possible	Medium	Medium	Delay in securing offset site under legally binding agreement	Additional consultation with OEH and DoEE
	Proposed management measures do not achieve completion criteria. Mosquito Fish Management unsuccessful within applicable ponds	Likely	Moderate	Medium	Monitoring indicates acceptable targets are not being achieved. Mosquito Fish management is not achieved within applicable ponds	To be detailed in the Crescent Head OMP

**Table 2.6 Risks to delivering Biodiversity Offset Strategy**

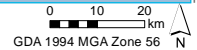
Objective	Event or circumstance <sup>1</sup>	Likelihood	Consequence	Risk level	Trigger	Corrective action/s
	Natural disaster event (eg bushfire/flood) sets back achieving performance objectives and completion criteria	Possible	High	Medium	Loss of vegetation and/or infrastructure as a result of natural disaster	Undertake preventative actions where appropriate such as fire breaks and manage fuel loads. As detailed in OMP.  Consult with OEH and DoEE to revise management plan and timeframes

Note: 1. Assumes effective implementation of management measures, as described in the plan.



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Source: DFSI (2018); EMM (2014, 2015, 2016, 2017); RTCA (2014, 2015, 2016, 2017)



**KEY**

- HVO offset site
- - Rail line
- Main road
- River
- HVO North development consent boundary
- HVO South project approval boundary
- NPWS reserve

HVO offset sites

Hunter Valley Operations South Coal Project  
Biodiversity Management Plan

Figure 2.1



## 3 Operational lands

This section of the BMP details the processes, mitigation measures and rehabilitation that will be implemented in operational areas to mitigate the site's impact upon biodiversity values. These actions are consistent with commitments detailed within the HVO North and HVO South Mining Operations Plans (MOP) and HVO Vegetation Clearance Plan (EMM 2016). The operational areas are those that are contained within an area approved for mining development that will be progressively cleared, mined and then rehabilitated.

### 3.1 Ground Disturbance Permits

The Ground Disturbance Permit (GDP) approval process applies to all areas of land owned or managed by HVO Pty Ltd that have not been previously disturbed by mining or mining associated activities. It also applies to rehabilitated areas and areas where there is real or potential risk of environmental impacts. The GDP process is an internal process to ensure that all appropriate approvals and mitigation measures are in place prior to any ground disturbance.

The GDP process is an online process that requires a complete description of the activity and approvals by all relevant stakeholders prior to works commencing. It requires a clear identification of vegetation communities and species habitats to be impacted, and the specific measures that will be implemented during clearance to minimise impacts on State and Commonwealth matters.

The GDP process includes the following checklist:

- cultural heritage – determine if there are any present from available sources;
- land ownership and tenement – ensure action is located on land owned and/or managed by Hunter Valley Operations;
- environment- identify the presence of any listed ecological communities, flora or fauna both state and federal;
- regulatory approval – legal authority is in place;
- offsets – is the proposed area an offset or are there offsets required;
- rehabilitation – is area required for rehabilitation; and
- water – identify any potential water impacts, implement any necessary soil and erosion controls.

### 3.2 Mitigation and management measures

The following is a summary of key management and mitigation measures to be implemented in the operational areas to ensure direct and indirect impacts to remaining biodiversity values are avoided and minimised.

#### 3.2.1 Progressive clearing

All vegetation clearing is progressive, that is a staged operation immediately in advance of mining operations. Vegetation clearing is avoided during the breeding season of identified threatened fauna species that may reside in the particular area proposed to be disturbed.

The area of vegetation cleared ahead of mining operations is kept to a minimum, consistent with the space required by the pre-stripping fleet, which is usually about a 100 m wide mining strip. The clearing area allows for the establishment of mine infrastructure, such as haul roads and access tracks, power lines, pipelines, transformers and drainage control structures.

### 3.2.2 Pre-clearing surveys

Pre-clearing surveys are routinely undertaken to identify any resident fauna, threatened flora or habitat features that may be relocated. Clearance protocols and pre-clearance survey requirements are outlined in the HVO Vegetation Clearance Plan which addresses both HVO North and HVO South (EMM 2016).

To ensure only approved areas are disturbed, clearance limits will be clearly identified on plans and on the ground (using durable markers and or signage and exclusion fencing). Habitat trees and appropriate microhabitats such as fallen logs are surveyed and marked to determine if fauna are using them. Any marked trees that show signs of current or recent use are reserved for latest possible removal to encourage fauna to abandon the area of their own accord or undertake possible physical relocation.

In accordance with the HVO Vegetation Clearance Plan (EMM 2016), if the Regent Honeyeater and/or Swift Parrot are recorded during pre-clearance surveys, a two-stage clearance protocol must be implemented. The two-stage clearance protocol requires targeted searches for habitat trees for the two species, and targeted nest searches for the Regent Honeyeater. All habitat trees and/or nests are required to be marked in the field and recorded using a GPS for management during clearance and reporting purposes.

Following the removal of useable timber for habitat features, as well as collection of viable seed for use in rehabilitation, the remaining smaller vegetation is generally mulched and incorporated into the topsoil, and may be relocated to rehabilitation areas.

### 3.2.3 Pathogen Management

Control measures will be implemented to reduce the risk of introducing and spreading fungal pathogens including Root Rot Fungus (*Phytophthora cinnamomi*) which can affect native vegetation and Amphibian Chytrid Fungus (*Batrachochytrium dendrobatoides*) which can affect populations of amphibians including the Green and Golden Bell frog.

Control measures to be implemented will include; wash-down facilities to remove all soil and mud from clearing machinery prior to entering, and leaving, the HVO Complex which minimises the risk of spreading fungus into the site, and off site, cleaning and disinfecting survey equipment such as dip nets prior to using them, and at the end of each day, and following frog handling procedures as detailed in the HVO Vegetation Clearance Plan (EMM 2016).

### 3.2.4 Translocation of salvaged resources

Resources salvaged from areas to be cleared for mining activity, such as topsoil, mulch, timber and plant material, are considered valuable resources for the re-establishment of a similar vegetation community in a different location. It provides an opportunity to transfer ecological characteristics to the re-establishment site to support natural regeneration, such as seed sources and microbial soil organisms. The use of these materials is dependent upon their availability and should be used when safe and practical.

The following outlines critical factors in the use and management of these resources:

- topsoil management:
  - stockpiling of material is to be avoided where possible;
  - to translocate the majority of seed it is recommended that the top ten centimetres is scalped;
  - complete assessment of the in-situ vegetation community in the area where the topsoil is to be sourced. The following performance measures and criteria are to be used as a minimum standard to assess the potential value of the topsoil to be targeted as a resource salvageable as potential seed source:
    - weed species – absence of noxious weeds and subjective consideration of the density of the weed seed bank;
    - ground cover - <10% weed species;
    - suitable growing media – presence of A Horizontal in soil profile; and
    - native species area producing seed – evidence of recruitment of native flora and/or presence of fruit/seed.
- mulch:
  - all overstorey and understorey vegetation at the disturbance site may be coarsely mulched to provide a potential seed source at the re-establishment site; and
  - to mitigate the potential lock up of nutrients in the soil, composted mulch should be applied prior to application, to a depth of 5 cm. This will also provide soil disturbance and prepare the restoration site.
- timber:
  - large trees, with their branches intact and roots removed, may be relocated to provide seed sources, habitat augmentation and protect the soil to create an improved micro climate for restoration;
- plant material:
  - seeds or plants should be salvaged from the disturbance area to further assist in the establishment of ecological characteristics in the re-establishment areas. Species that are known to be difficult to grow from seed may be targeted for translocation from the disturbed areas; and
  - it is preferable that seed for planting and seeding activities in the BAs and rehabilitation areas is from local or endemic provenances. To support the BA re-establishment programme, viable seed is collected prior to clearing, when it is safe and practical.

### 3.2.5 Weed and vertebrate pest control

Across the operational areas the weed species targeted for control include those listed as Weeds of National Significance (WoNS), priority weeds under NSW *Biosecurity Act 2015* and/or environmental weeds.

Weed management to date has targeted a variety of biodiversity areas including the Carrington Billabong and River Red Gum populations.

Weed control treatments are conducted annually and at other times as determined by seasonal conditions that may promote excessive weed growth, and is reported in the HVO Annual Environmental Reporting.

Additionally, as part of HVO's ongoing Vertebrate Pest control, the following key efforts will proceed:

- Seasonal baiting programs across sites and offsets coordinated with LLS where possible;
- commercial kangaroo harvesting under NPWS tag system (year round based on tag availability);
- opportune shooting of key pest species (i.e. dog, pig, deer, hare etc) during commercial kangaroo harvests; and
- specific and targeted additional programs on needs basis.

### 3.2.6 Bushfire management

Bushfire management is undertaken in accordance with the HVO Bushfire Management Plan (Yancoal 2017). The Bushfire Management Plan was last updated in June 2017 in consultation with the NSW Rural Fire Services (RFS).

The following controls may be implemented to control the risk associated with bushfire:

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



### 3.2.7 Erosion and sedimentation control measures

Clean water diversion structures are employed to divert clean water away from the active pits. Prior to release from site this water is managed to minimise sediment load. A GDP is required for all disturbance activities. Prior to disturbance, appropriate erosion and sediment controls consistent with current best practice standards will be established. Where ground conditions allow, erosion and sediment controls will be designed generally in accordance with the 'Blue Book': Managing Urban Stormwater: soils and construction (Volume 1 and 2E – Mines and Quarries) (Department of Environment and Climate Change 2008).

## 3.3 Rehabilitation

### 3.3.1 Progressive rehabilitation

The progressive rehabilitation at HVO aims to deliver a final landform that achieves outcomes for sustainable agriculture, conservation and biodiversity by integrating the rehabilitation of mined areas into the surrounding landscape, in consultation with the community. The long term vision is to create a network of vegetation corridors connecting mine rehabilitation areas and existing remnant vegetation with vegetation outside the mine boundary. Final rehabilitation areas are shown in Figure 3.1. This will deliver conservation and biodiversity outcomes by combating the loss of connectivity, which is recognised as the most serious long term threat to biodiversity.

The pre-mining (pre-1960) environment was heavily cleared (approximately 90% of Project Application area). The cumulative effects of agriculture along with more recent mining activities have resulted in a significant reduction of native vegetation and the removal of habitat for native fauna. The pre-mining agricultural and natural land uses included cultivation, improved pastures, selectively cleared land for grazing, remnant native vegetation and riparian vegetation. Agricultural activities that now occur in the Hunter Valley area include dairies, cultivation (lucerne), grazing cattle, horse studs, vineyards, orchards and forestry.

Rehabilitation at HVO is being undertaken in accordance with commitments made in the HVO North MOP and HVO South MOP. Rehabilitation designs for the final landform have been designed to follow the principles and strategies outlined in the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales* (Department of Mineral Resources 1999).

The 2017 Annual Report identified that large areas are under active rehabilitation. A monitoring program for rehabilitated land returned to native vegetation commenced in 2015 which included monitoring at 19 rehabilitated sites. Monitoring was also completed at 12 reference sites placed in two target vegetation communities being Central Hunter Grey Box-Ironbark Woodland EEC, and Ironbark-Spotted Gum-Grey Box Forest EEC.

### 3.3.2 Rehabilitation at HVO South

The aim of the rehabilitation at HVO South will be to:

- maximise long term landform stability and minimise erosion;
- ensure final landform is compatible with surrounding landforms;
- ensure final land use is compatible with surrounding land uses;
- restore 50-60% of mined land to a sustainable and productive grazing use;

- restore 40-50% of mined land to sustainable native vegetation comprising local species and create native vegetation corridors that connect to existing remnants areas of forest or woodland to provide opportunities for wildlife habitat and migration;
- provide additional habitat for threatened species including installation of artificial roosting/nesting boxes; and
- establishing a network of tree corridors to ensure connectivity of woodland community areas.

a. **Woodland Rehabilitation**

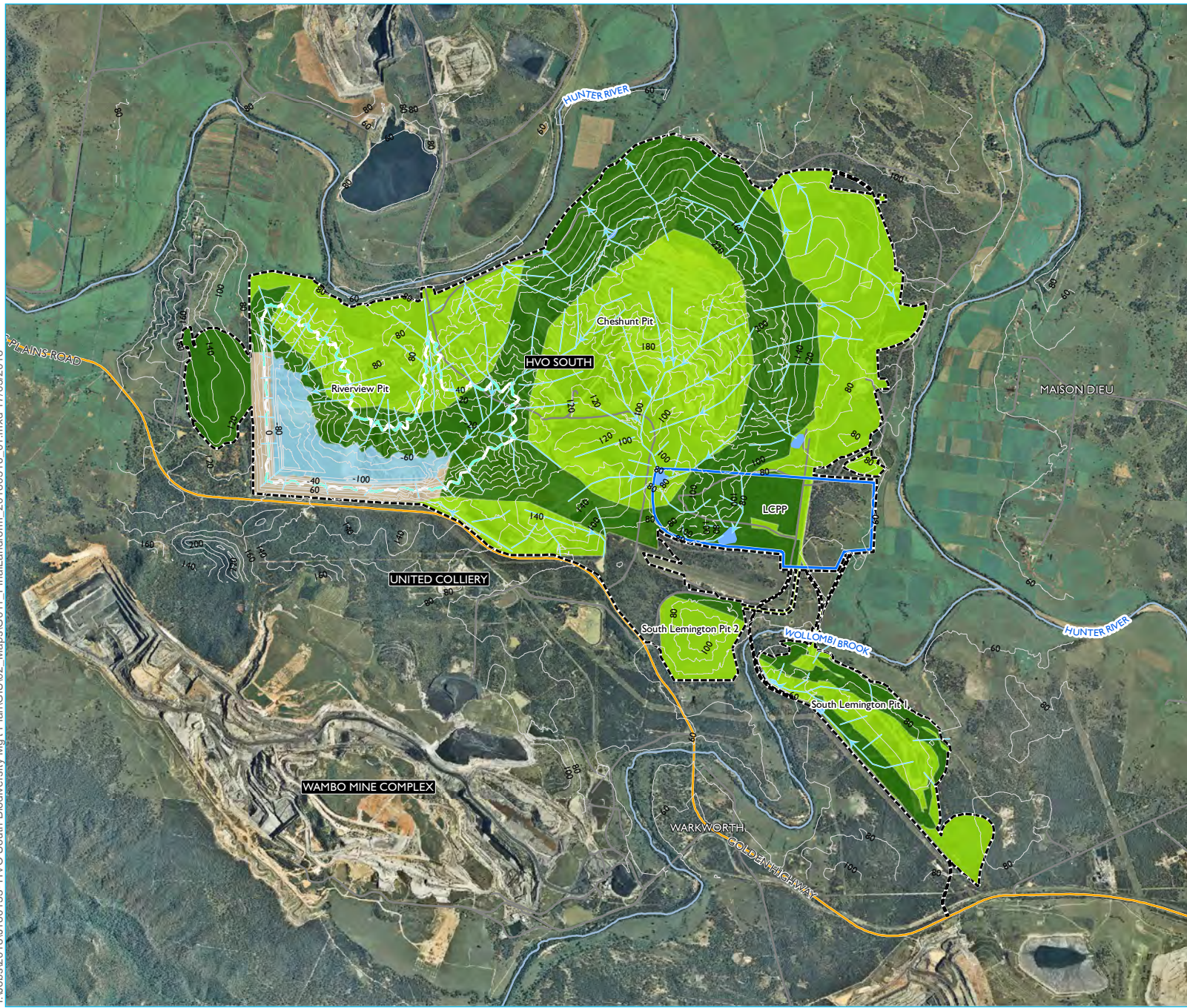
Native woodland rehabilitation within HVO South, aimed at enhancing biodiversity, will be promoted by:

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

Further details of woodland rehabilitation including native flora species to be used, performance indicators and criteria is provided in the HVO South MOP.



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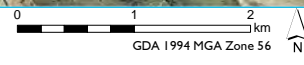
- KEY**
- Approved disturbance associated with major activities
  - LCPP and infrastructure envelope
  - Major waterways
  - Major roads
  - Local roads
  - Final landform - 20m contours
- Indicative final rehabilitated landform
- Wildlife corridor
  - Grassland
  - Highwall
  - Evaporative basin (30 years)
  - Dams
  - Modelled final landform drainage lines
  - Evaporative basin at equilibrium level (300 years)

Final landform with rehabilitation

Hunter Valley Operations South Coal Project  
Biodiversity Management Plan  
Figure 3.1



Source: EMM (2018); DFSI (2017); Yancoal (2018)







## 4 Non-operational land

There are a number of Biodiversity Areas (BAs) and biodiversity values such as native vegetation and fauna habitats that occur within the HVO North and HVO South project approval boundaries, in non-operational areas. These lands act as a buffer to mining operations and are in the ownership and control of HV Operations. The location of the BAs and biodiversity values addressed in this BMP in non-operational lands are illustrated in Figure 4.1, Figure 4.2 and Figure 4.3.

The non-operational land has a number of land uses including agriculture, grazing, patches of native vegetation and individual trees through to BAs (which are a more formal conservation area with statutory requirements for conservation and management). Where appropriate, HV Operations will look to maintain all native vegetation within non-operational areas. If clearing should be required the internal GDP process (as described in Section 3) will be applied to ensure the biodiversity values of vegetation are assessed and all applicable approvals and mitigation measures are in place.

This section outlines the various biodiversity values and management activities that will be implemented across the non-operational lands to ensure operations do not indirectly impact on these areas.

### 4.1 Biodiversity Values

Below is a summary of the key biodiversity values that occur in the non-operational lands of HVO North and HVO South.

#### 4.1.1 River Red Gum Forests & Carrington Billabong

River Red Gums (*Eucalyptus camaldulensis*) are widespread riparian and floodplain trees that have become increasingly rare in the Hunter Valley, to the extent the entire population of the trees occurring in Hunter Valley are now listed as an Endangered population under the NSW BC Act. Naturally occurring River Red Gums are thought to be largely dependent on groundwater for the majority of their water requirements, occurring mostly in shallow alluvial groundwater systems in Hunter Valley (Umwelt 2010). Their habitats therefore are considered to be groundwater-dependent ecosystems (GDEs, Umwelt 2010).

The River Red Gum Forest is associated with the TEC Hunter Lowland Red Gum Forest in the Sydney Basin and New South Wales North Coast Bioregions, protected under the BC Act. A HV Operations River Red Gum Rehabilitation and Restoration Strategy (RRGRRS) (Umwelt 2010) has been prepared to meet HVO EP&A Act approval requirements and guides the management of River Red Gum communities across HVO. The strategy also addresses the management of Carrington Billabong (which is situated in HVO North project area), as well as the Hunter River and Wollombi stands of River Red Gum occurring in HVO South project area. The location of Carrington Billabong, River Red Gums and Hunter Lowlands Redgum Forest are shown in Figure 4.2 and Figure 4.3.

Comprehensive River Red Gum site assessments have been completed which found that the majority of remnant patches were in poor health, there was little recruitment, a high weed incidence and low diversity. Key threats to the River Red Gums at Carrington Billabong and HVO South were identified as:

- relatively unrestricted access to remnants, particularly by stock;
- historical vegetation clearance throughout catchment;
- periodic drought conditions;

- at Carrington Billabong local mining activities may have interfered with water usage regime of River Red Gums; and
- surface water catchment around Carrington Billabong has been temporarily modified due to local mining activities reducing surface water runoff to the billabong.



**Photograph 4.1** Scattered occurrences of River Red Gums along the southern bank of the Hunter River with very limited alluvial floodplain between the river and Cheshunt Pit (view towards south-west)



**Photograph 4.2** Scattered occurrences of River Red Gums along southern bank of the Hunter River with limited floodplain between the river and Riverview Pit (view towards north-west)

The RRGRRS proposes to dedicate resources for restoration and management of River Red Gum remnants to target sites through a three tier management approach based on level of impact and probability of success. The classifications are:

- High level intervention: Carrington Billabong has been identified as a high level site;
- Intermediate level intervention: these comprise 11 other remnants where vegetation is in relatively better condition, such as those with more native recruitment, connectivity and floristic and structural diversity. Moderate level management of these sites will be undertaken; and

- Low level intervention: these comprise remaining remnants in poor condition where restoration would require significant amounts of time and resources. These sites will be managed largely in the same way that other areas of non-operational land will be managed. Management will include regular weed control, pest control, grazing management and monitoring. If monitoring suggests intervention is appropriate, HVO Operations will reassess the Strategy and consider redirecting resources to improve their recovery.

No intermediate or low level intervention River Red Gum remnants will be impacted by mining operations and will be protected for their conservation value. Carrington Billabong may experience some minor impacts from operations which is why it has been given a higher intensity of management effort. The location of Carrington Billabong and high and intermediate sites is illustrated in Figure 5.1.

Detailed performance objectives and management commitments in the short, medium and long terms for River Red Gum remnants is provided in the RRGRRS. An example of management actions include:

- establish and maintain appropriate fencing around the remnant patch and adjacent areas to exclude grazing, allow recruitment and support expansion of the remnant over time;
- undertake groundwater monitoring and monitor extent and duration of inundation in Carrington Billabong after flood events, and review data;
- undertake regular ecological monitoring making use of baseline data;
- undertake appropriate weed and pest control programs;
- monitor frequency and duration of flood events and responses to those events;
- encourage natural recruitment of River Red Gums;
- establish a seed harvesting and propagation program; and
- encourage natural regeneration of other native species such as grasses and forbs.

A detailed monitoring program is outlined in Section 7 of the RRGRRS. Monitoring will include the health of River Red Gums, groundwater, ecological health assessments using permanent monitoring sites established and an evaluation if there is an improvement in the health and recruitment of River Red Gums. Each monitoring event's results will be evaluated, and reported on in the HVO Annual Report. A review of the RRGRRS will occur in 2018.

#### 4.1.2 Groundwater Dependent Ecosystems

Known groundwater dependent ecosystems (GDEs) and ecosystems that potentially use groundwater are identified by the National Atlas of Groundwater Dependent Ecosystems. Riverine vegetation along Hunter River has been classified as having a high potential for groundwater interaction, while known GDEs have been identified along Wollombi Brook.

River Red Gums are thought to be largely dependent on groundwater for the majority of their water requirements, occurring mostly in shallow alluvial groundwater systems in Hunter Valley (Umwelt 2010). The species relies on flooding regimes for recruitment (ERM 2008). Their habitats therefore are considered to be GDEs (Umwelt 2010).

Cumberland Ecology (2014) also identified the Hunter Valley River Oak Forest as a GDE, which is present in a thin riparian zone along Wollombi Brook and likely accesses shallow alluvial groundwater. Previous ecology surveys (ERM 2008) identified GDEs along the Hunter River and Wollombi Brook. Presence of GDEs in proximity to the HVO mines are illustrated in Figure 4.1 and Figure 4.2.

The Groundwater Assessment Report (ERM 2008b) concluded that primary drawdown impacts from mining in the Riverview and Cheshunt Pits were likely to be localised to the pit areas and that impacts to shallow groundwater in alluvium would be minimal. Drawdown in the vicinity of the River Red Gums (potentially reliant on groundwater) was predicted to be 1 m. This was not predicted to adversely impact River Red Gums as they are reliant on flooding for germination, and no changes to the flooding or flow regimes were expected to occur.

#### 4.1.3 Warkworth Sands Woodland

Areas of Warkworth Sands Woodland (WSW) growing on Aeolian sands which overlie areas of the Permian coal measures are found within HVO South project area. They occur within the dedicated Northern BA and small patches in adjacent areas. Other large patches also occur to the south including within the Southern BA. The known distribution of WSW is shown in Figure 4.2 and Figure 4.3. Vertical flow of groundwater is impeded by a layer of clay at the base of the sands forming a thin ephemeral perched water table, which is recharged from rainfall through the sandy soils. WSW would access this perched water table during low rainfall periods. The perched aquifer is reliant on rainfall and not the groundwater within the Permian fractured rock.

WSW was listed as Critically Endangered under the EPBC Act on 5 May 2016 and is listed as an Endangered Ecological Community (EEC) under BC Act. WSW is a unique vegetation community due to the presence of sand substrate and its confined distribution across Aeolian sand deposits in the vicinity of Warkworth, south-east of Singleton in mid Hunter Valley, NSW (Rio Tinto 2017).

A WSW Integrated Management Plan has been prepared by Rio Tinto which outlines where the WSW have been confirmed to occur, ecology of the community, threats and commitments in relation to the retention and restoration of this EEC. The remnant areas of WSW occur on private land, the majority of which are owned by mining companies including HVO Pty Ltd. A forum between three mining companies (Glencore, Peabody and HVO Pty Ltd) has been established to enable integration of management actions and knowledge sharing.

## 4.2 Biodiversity Areas

Note that this plan does not reflect the management of these biodiversity areas. The Southern BA and Northern BA are offset sites established for the Mount Thorley Warkworth mine (MTW) to the south. They are therefore managed accordingly by MTW. For the purposes of this plan a short description of the BAs and how HV Operations will ensure they are not impacted by mining operations is described.

### 4.2.1 Southern Biodiversity Area

The Southern Biodiversity Area (Southern BA) is situated in the southern portion of the HVO South mine project area (Figure 4.3). The Southern BA was put in place to offset residual impacts from the nearby Warkworth Mine providing offset credits for the Warkworth Sands Woodland (WSW) EEC, and meet statutory approval requirements.

It is accessible from Putty Road, Wallaby Scrub Road and the private Lemington Haul Road. The land surrounding the Southern BA is owned by different parties; majority of which is owned by HVO Pty Ltd. The land to the south and west of that is owned by Peabody and other private landholders.



The management and monitoring of the Southern BA is detailed in the Local Offset Management Plan - Warkworth Mine, NSW (Rio Tinto 2014). Negotiations with OEH are continuing regarding the mechanism to secure the offset in perpetuity.

This area is not permitted to be developed and a number of activities are prohibited to occur including grazing, removal of firewood or native plants (unless pre-approved such as regrowth control), removal of rock, sand or gravel etc.

The avoidance and mitigation measures to protect the Southern BA from mining activities and other threats include those undertaken by MTW as the manager of the site, and HV Operations as an adjacent land owner:

- the area will be legally secured on title in perpetuity to ensure it cannot be developed or cleared in the future;
- the area will be managed and monitored by MTW in accordance with the approved Local Offset Management Plan (Rio Tinto 2014);
- Southern BA will be fenced to ensure livestock cannot access the area, and there are locked gates to allow access to be managed;
- it will be appropriately signed so that all parties recognise it is a conservation area; and
- within HVO, adjacent lands will be managed to minimise threats to the Southern BA including weed control, grazing management and bushfire management (as per the non-operational land management actions).

#### 4.2.2 Northern Biodiversity Area

The Northern Biodiversity Area (Northern BA) is dedicated as a biodiversity offset for the Warkworth Mine (Figure 4.2) to provide offset credits for the Warkworth Sands Woodland EEC.

It is located in the north-eastern portion of the HVO South project approval boundary. It is situated on the western side of a loop on the Hunter River, near the confluence with Glennies Creek and accessed via Comleroi Road (Rio Tinto 2014). The majority of adjacent land is owned by HV Operations with remaining adjacent land in east and north being privately owned.

The management and monitoring of the Northern BA is detailed in the Local Offset Management Plan - Warkworth Mine, NSW (Rio Tinto 2014). Negotiations with OEH are continuing regarding the mechanism to secure the offset in perpetuity.

This area is not permitted to be developed and a number of activities are prohibited to occur including grazing, removal of firewood or native plants (unless pre-approved such as regrowth control), removal of rock, sand or gravel etc.

The avoidance and mitigation measures to protect the Northern BA from mining activities and other threats include those undertaken by MTW as the manager of the site, and HV Operations as an adjacent land owner:

- the area will be legally secured on title in perpetuity to ensure it cannot be developed or cleared in the future;

- the area will be managed and monitored in accordance with the approved Local Offset Management Plan (Rio Tinto 2014);
- Northern BA will be fenced to ensure livestock cannot access the area, and there are locked gates to allow access to be managed;
- it will be appropriately signed so that all parties know it is a conservation area; and
- adjacent lands will be managed to minimise threats to the Northern BA including weed control, grazing management and bushfire management (as per the non-operational land management actions).

### 4.3 Mitigation and management measures

The following is a summary of key mitigation and management measures to be implemented in the non-operational areas to ensure direct and indirect impacts to biodiversity values are avoided and minimised.

#### 4.3.1 Access management

Access to HVO North and HVO South non-operational areas and Biodiversity Areas (BAs) within the approved project boundaries is restricted access, and visitation is monitored through a site induction process. Clear signage is in place to identify the location of BAs and entry is not allowed without prior permission.

All requests for visitation to the above areas must come through HVO General Manager. This is to ensure safety protocols are followed and all actions are consistent with the conservation strategies outlined within the various BA management plans.

#### 4.3.2 Pathogen Management

As required in the HVO Vegetation Clearance Plan control measures will be implemented to reduce the risk of introducing and spreading fungal pathogens including Root Rot Fungus (*Phytophthora cinnamomi*) which can affect native vegetation and Amphibian Chytrid Fungus (*Batrachochytrium dendrobatoides*) which can affect populations of amphibians including the Green and Golden Bell frog.

Control measures to be implemented will include; wash-down facilities to remove all soil and mud from vehicles prior to entering and leaving the HVO complex which minimises the risk of spreading fungus off site, cleaning and disinfecting survey equipment such as dip nets prior to using them, and at the end of each day, and following frog handling procedures as detailed in the HVO Vegetation Clearance Plan (EMM 2016).

#### 4.3.3 Weed and vertebrate pest control

As for operational areas HVO will undertake weed control in accordance with HV Operations Environmental Procedure 10.4– *Weed Control and Weed Management Plan* and Weed Management Plan (including WWAP).

Weed management occurs in BAs (as per approved management plans) and other targeted areas including the Carrington Billabong and River Red Gum populations. Weed control treatments are conducted annually and at other times as determined by seasonal conditions that may promote excessive weed growth, and is reported in the HVO Annual Environmental Reporting.

HVO also undertakes vertebrate pest management in accordance with HVO's ongoing pest control management works across non-operational areas as discussed in Sect 3.2.5. Within BAs, vertebrate pest management will occur in accordance with specific requirements set out in applicable management plans for that area.

#### 4.3.4 Bushfire management

Bushfire management is undertaken in accordance with the HVO Bushfire Management Plan. The Bushfire Management Plan was last updated in June 2017 in consultation with the NSW Rural Fire Services (RFS). It addresses both operational and non-operational lands under ownership and control of HV Operations. Bushfire management has objectives for both managing the safety of personnel and infrastructure, as well as biodiversity to ensure remnant patches and BAs are protected from hot, intense fires and can receive controlled burns when needed for regenerative purposes.

The following controls will be implemented to control the risk associated with bushfire:

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

Any fuel hazard reduction burns will be planned in accordance with the Bush Fire Environmental Assessment Code for New South Wales (NSW Rural Fire Service 2006). Current recommendations under the code are:

- in woodland vegetation fire should not occur within 5 years of a previous fire and consideration should be given to burning within 40 years of any previous fire; and
- in grassland vegetation derived from woodland vegetation, the recommended fire intervals are same as woodland vegetation.

Annual meetings will be held between RFS and HV Operations to review the Bushfire Management Plan and prepare annual actions list to prepare for proceeding fire season.

### 4.3.5 Grazing

Grazing in rehabilitation and non-operational areas that contain grasslands will be controlled through formal licence agreements with the graziers involved. The typical arrangements under HV Operations include:

- licence conditions requiring the Licensee to manage the property in accordance with approved management plans or best agricultural and environmental practice i.e. grazing management, bushfire management, weed management and avoidance of vegetation clearing;
- property inspections by the Specialist- Land Management, Land & Tenements to audit quality of property management; and
- soil testing to check nutrient and soil carbon levels are being maintained.

### 4.4 Monitoring programme for BAs

The monitoring programme comprises three components to capture environmental change at different scales:

1. Landscape Monitoring: to assess vegetation changes and habitat connectivity at the landscape scale in the long-term (7-10 years);
2. Ecological Monitoring: vegetation and habitat, and bird assemblage to quantify changes in vegetation structure, key fauna habitat features and bird assemblages in medium-term (3-6 years); and
3. General Monitoring: assessments to identify threats and inform management activities consistent with the adaptive management approach in the short term (annually) and survival assessments to assess the performance of planting activities.

All monitoring results will be stored and accessible on the HVO Biodiversity Offsets Portal. Monitoring commenced in 2014 and has been ongoing as per the approved Local Offset Management Plan (Rio Tinto 2014).

#### 4.4.1 Objectives

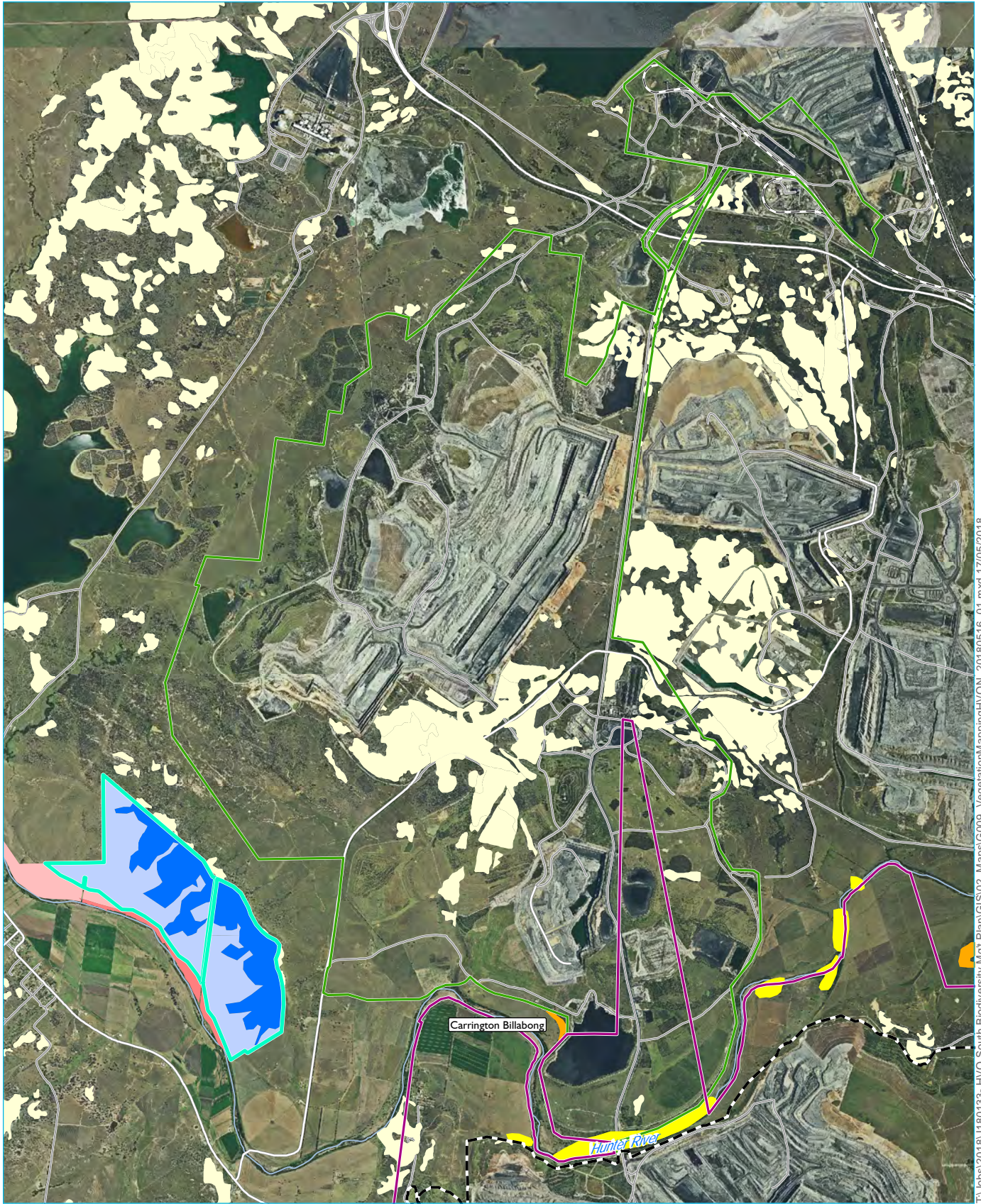
The objectives of the vegetation and habitat monitoring are to:

- demonstrate changes in vegetation community composition, structure and habitat features towards the Reference sites;
- demonstrate changes in vegetation composition, structure and habitat features towards the BioMetric Vegetation Types benchmarks; and
- demonstrate recruitment of canopy species through transition up age classes (measured as Diameter at Breast Height (DBH)).

The objectives of bird assemblage monitoring is to:

- demonstrate ongoing habitat usage by woodland birds and a decrease in the relative abundance of bird species typical of forest margins and grasslands; and
- assess the presence of bird species within the BA with bird assemblages used as indicators of general ecosystem condition. Patterns in the distribution and abundance of bird assemblages can be indicative of biodiversity as a whole and of environmental change.





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Source: EMM (2014, 2015, 2016, 2017); Peake (2011); RTCA (2014, 2015, 2016, 2017)

**KEY**

- |                                                                                                                                                                        |                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| <span style="display: inline-block; width: 15px; height: 10px; background-color: yellow; border: 1px solid black;"></span> CHVEF (Peake, 2011)                         | Main road                              |
| <b>Vegetation mapping</b>                                                                                                                                              | Local road                             |
| <span style="display: inline-block; width: 15px; height: 10px; background-color: blue; border: 1px solid black;"></span> Central Hunter Box Ironbark Woodland          | River                                  |
| <span style="display: inline-block; width: 15px; height: 10px; background-color: lightblue; border: 1px solid black;"></span> Central Hunter Box Ironbark Woodland DNG | HVO North development consent boundary |
| <span style="display: inline-block; width: 15px; height: 10px; background-color: red; border: 1px solid black;"></span> Hunter Valley River Oak Forest                 | HVO South project approval boundary    |
| <span style="display: inline-block; width: 15px; height: 10px; background-color: pink; border: 1px solid black;"></span> Hunter Valley River Oak Forest DNG            | HVO South disturbance footprint        |
| - - Rail line                                                                                                                                                          | Wandewoi Biodiversity Area             |

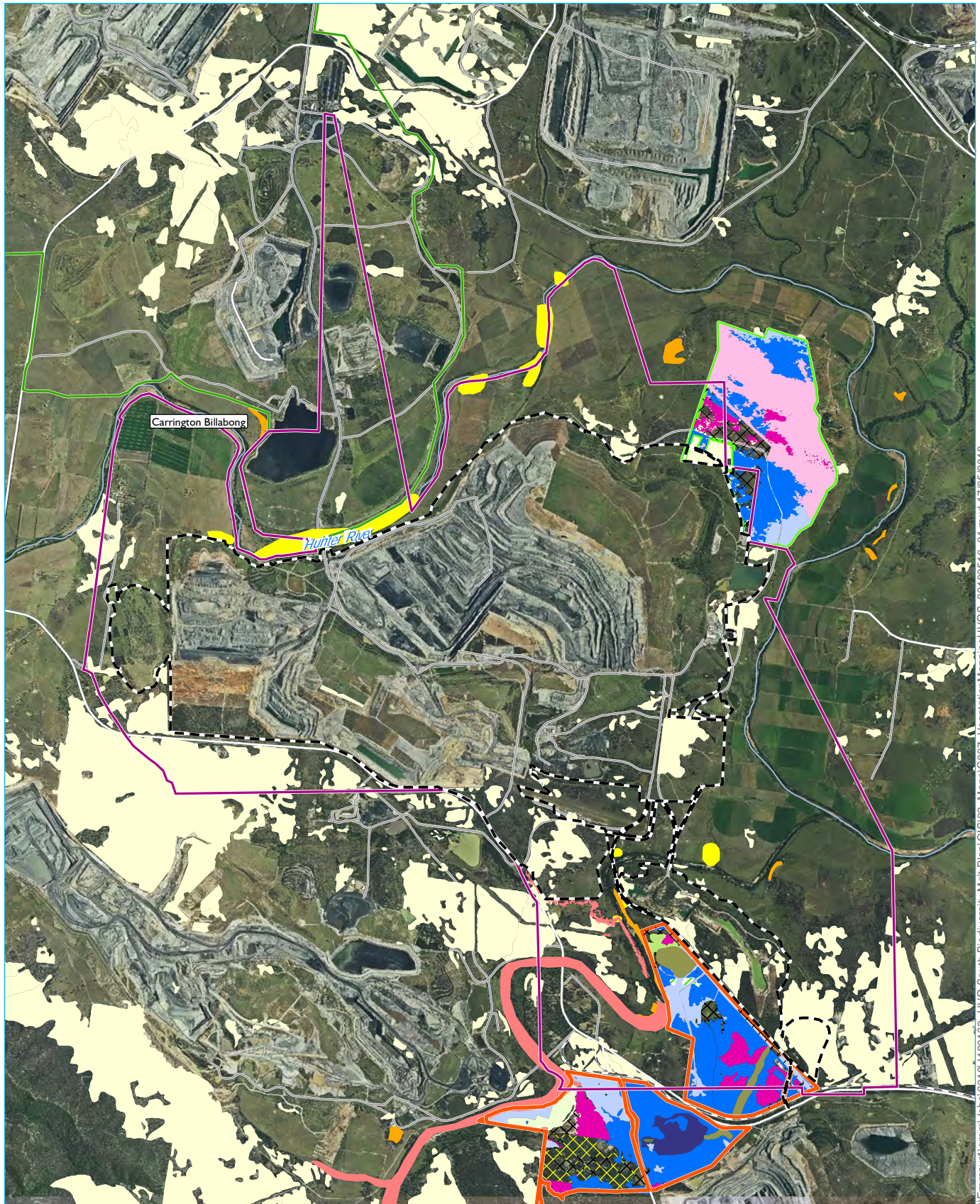
**HVO North Biodiversity values and areas**

Hunter Valley Operations South Coal Project  
Biodiversity Management Plan

Figure 4.1







Source: EMM (2014, 2015, 2016, 2017); Peake (2011); RTCA (2014, 2015, 2016, 2017)

**KEY**

- |                                                                        |                                             |                                        |
|------------------------------------------------------------------------|---------------------------------------------|----------------------------------------|
| Warkworth consent area                                                 | Hunter Valley River Oak Forest              | Rail line                              |
| 2003 consent reestablishment area                                      | Regenerating Hunter Valley River Oak Forest | Main road                              |
| 2003 consent offset area                                               | River Red Gums                              | Local road                             |
| Warkworth Continuation and HVO South Modification 5 vegetation mapping | Hunter Valley Vine Thicket                  | River                                  |
| Central Hunter Grey Box - Ironbark Woodland                            | Hunter Floodplain Red Gum Woodland          | HVO North development consent boundary |
| Regenerating Central Hunter Grey Box - Ironbark Woodland               | Warkworth Sands Woodland                    | HVO South project approval boundary    |
| Central Hunter Grey Box - Ironbark Derived Grassland                   | Warkworth Sands Grassland                   | Southern Biodiversity Area             |
| Hunter Lowlands Redgum Forest                                          | White Box Woodland                          | Northern Biodiversity Area             |
|                                                                        | Yellow Box Woodland                         | HVO South disturbance footprint        |
|                                                                        | Exotic                                      |                                        |
|                                                                        | CHVEF (Peake, 2011)                         |                                        |

**HVO South biodiversity values and areas**

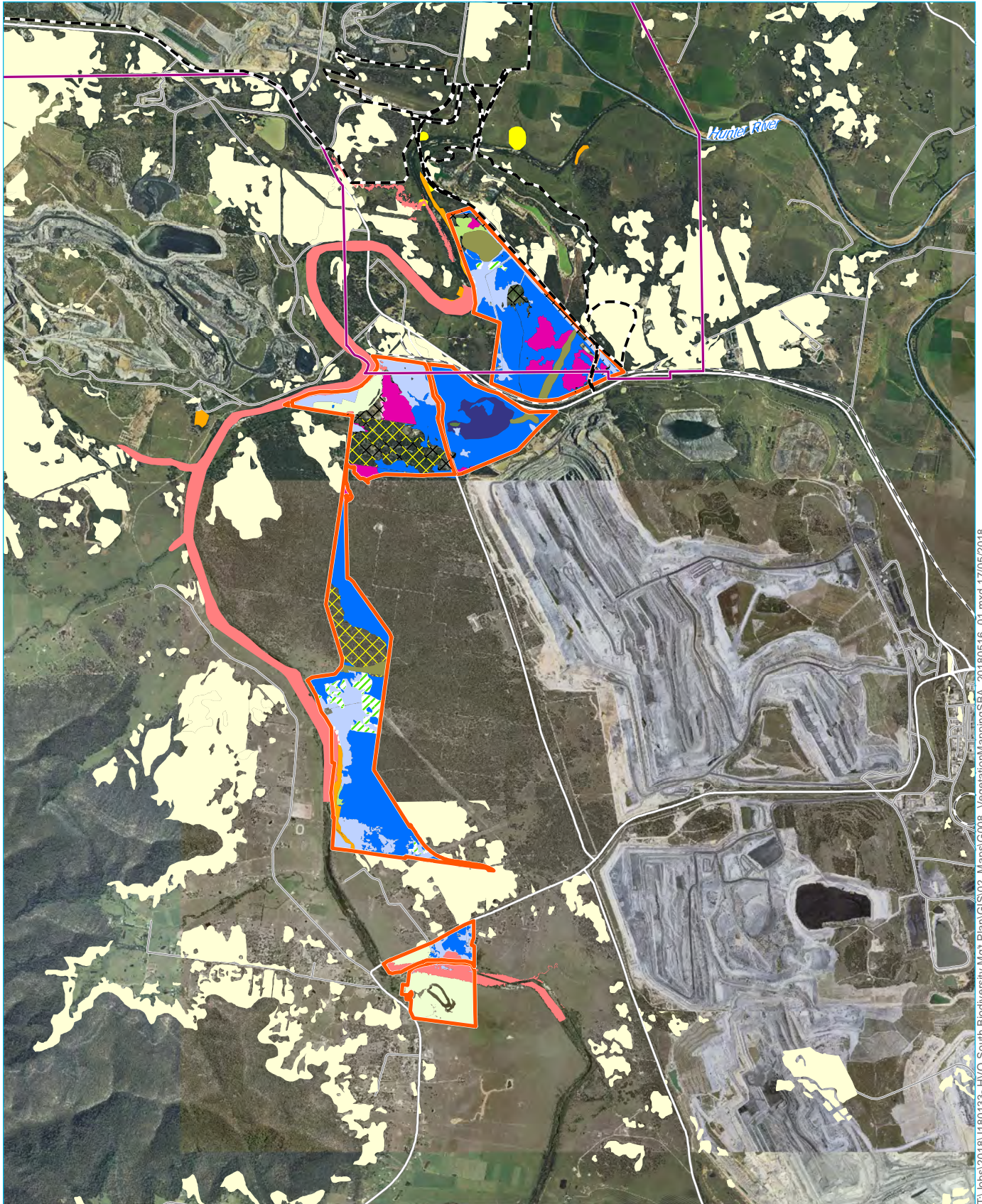
Hunter Valley Operations South Coal Project  
Biodiversity Management Plan

Figure 4.2



\\Emmsvr1\hemm\Jobs\2018\1180133-HVO South Biodiversity Mgt Plan\GIS\02\_Maps\G007\_VegetationMapping\HVO\_South\_20180516\_01.mxd 17/05/2018





Source: EMM (2014, 2015, 2016, 2017); Peake (2011); RTCA (2014, 2015, 2016, 2017)

**KEY**

- |                                                                        |                                             |                                     |
|------------------------------------------------------------------------|---------------------------------------------|-------------------------------------|
| Warkworth consent area                                                 | Hunter Valley River Oak Forest              | Rail line                           |
| 2003 consent reestablishment area                                      | Regenerating Hunter Valley River Oak Forest | Main road                           |
| 2003 consent offset area                                               | River Red Gums                              | Local road                          |
| Warkworth Continuation and HVO South Modification 5 vegetation mapping | Hunter Valley Vine Thicket                  | River                               |
| Central Hunter Grey Box - Ironbark Woodland                            | Hunter Floodplain Red Gum Woodland          | HVO South project approval boundary |
| Regenerating Central Hunter Grey Box - Ironbark Woodland               | Warkworth Sands Woodland                    | Southern Biodiversity Area          |
| Central Hunter Grey Box - Ironbark Derived Grassland                   | Warkworth Sands Grassland                   | HVO South disturbance footprint     |
| Hunter Lowlands Redgum Forest                                          | White Box Woodland                          |                                     |
|                                                                        | Yellow Box Woodland                         |                                     |
|                                                                        | Exotic                                      |                                     |
|                                                                        | CHVEF (Peake, 2011)                         |                                     |

0 2 4 km  
GDA 1994 MGA Zone 56 N

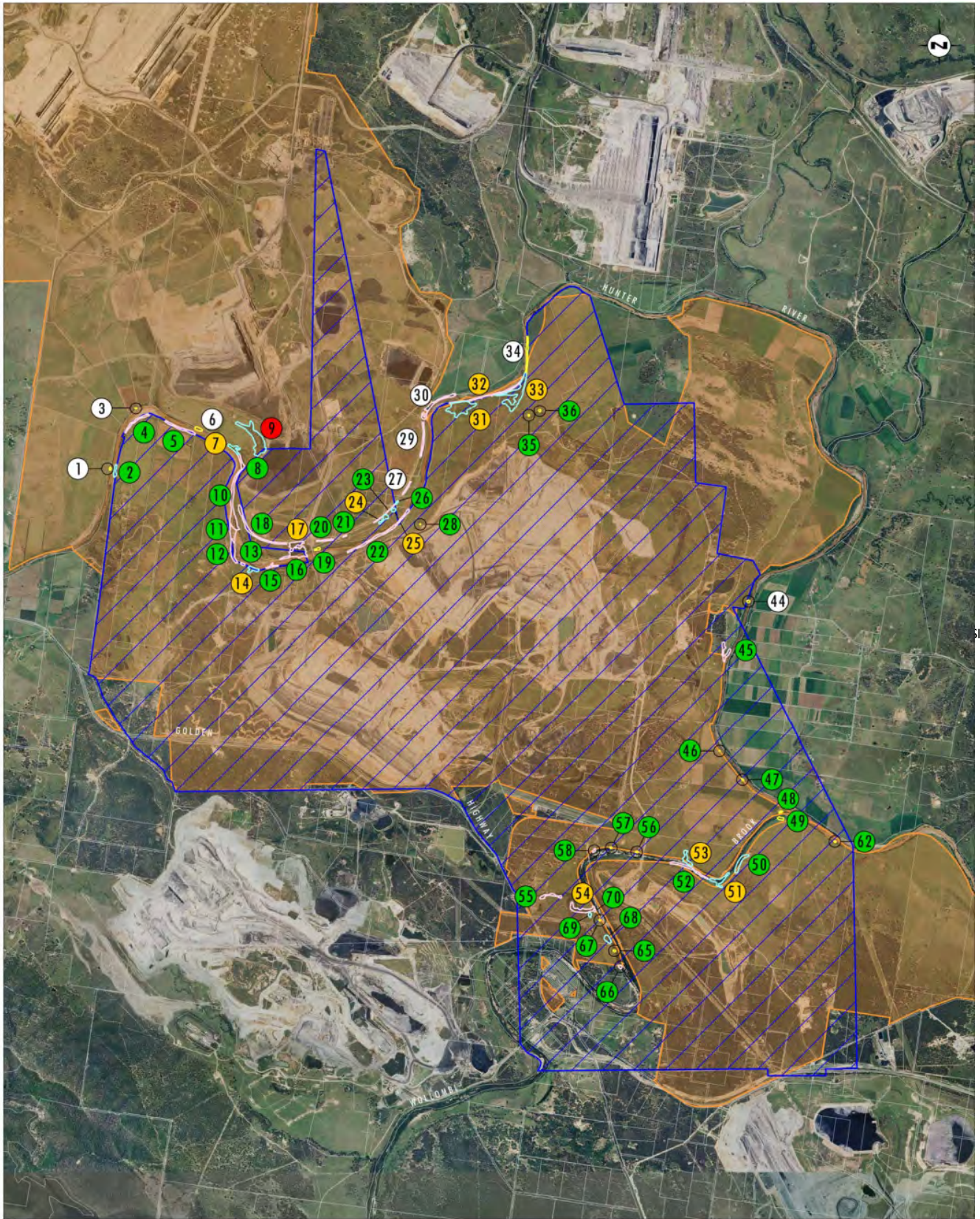
**Southern Biodiversity Area**

Hunter Valley Operations South Coal Project  
Biodiversity Management Plan

Figure 4.3



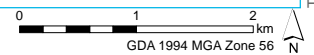




Source: Umwelt (2010)

**KEY**

- |                                                                                                                  |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li> HVO South Project Approved Boundary</li> <li> HVO Owned Lands</li> </ul> | <p>River Red Gum Remnants:<br/>Frequency of <i>Eucalyptus camaldulensis</i></p> <ul style="list-style-type: none"> <li> Dominant</li> <li> Common</li> <li> Occasional</li> </ul> | <p>Site and Proposed Management Intervention Categories:</p> <ul style="list-style-type: none"> <li> High Level Management (Carrington Billabong)</li> <li> Moderate Level Management (Priority Sites)</li> <li> Low Level Management</li> <li> Sites Outside of HVO South</li> </ul> |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



River Red Gum restoration sites  
 Hunter Valley Operations South Coal Project  
 Biodiversity Management Plan  
 Figure 5.1

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## 5 GDE and riparian vegetation monitoring

### 5.1 Groundwater Monitoring

A HVO Water Management Plan (WMP) has been prepared that addresses the management and monitoring of both surface water and groundwater across both HVO North and HVO South. In particular the WMP has recently been revised in 2018 to include a program to monitor:

- groundwater inflows to the open cut mining operations;
- impacts of the project on the region's aquifers, any groundwater bores, and surrounding watercourses, and in particular, the Hunter River and Wollombi Brook and adjacent alluvium;
- impacts of the project on groundwater dependent ecosystems (GDEs), riparian vegetation and River Red Gum populations; and
- a plan to respond to any exceedances of the performance criteria or surface water impact assessment criteria, and repair, mitigate and/or offset any adverse groundwater impacts of the project.

The purpose of the WMP is to provide reasonable and feasible measures to address potential water impacts of the Project as identified in approvals and satisfy the relevant conditions. An integrated management approach is employed at HVO to mitigate the potential impacts of mining on the groundwater environment and other groundwater users, including dependent ecosystems (HVO 2018).

The key groundwater management measures are:

1. Physical water management;
2. Groundwater monitoring, data management and reporting;
3. Groundwater model revisions and verification of predictions;
4. Salinity trading and water sharing; and
5. Direct compensation measures.

Groundwater monitoring will be undertaken in accordance with the Groundwater Monitoring Programme in Appendix D of the WMP. This programme is in accordance with *AS 5667.1:-1998, Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples* and *AS 5667.11-1998, Guidance on Sampling of Groundwaters*.

The groundwater monitoring programme includes over 80 groundwater monitoring locations which are identified in the WMP. These will be sampled on a monthly basis. Groundwater trigger limits are summarised in Appendix D, Table 2 of the WMP.

To ensure the AIP criteria for GDE's has been met, bores located in the alluvium near to the recognised GDE communities at HVO (CFW55R, CFW57, CGW52a, CGW53a, CGW55a) will adopt the 5th/95th percentile of the available validated data record for the standing water level for each site as the basis of groundwater management trigger guideline.

Continued groundwater monitoring combined with a 3-yearly review of the site numerical groundwater model will inform future decision making with respect to quantifying impacts on the groundwater environment.

### 5.1.1 GDE monitoring

Groundwater dependent ecosystems (GDEs) in proximity to HVO operations are limited to river red gum stands along the Hunter River and Wollombi Brook. The impact on these GDEs has been assessed as part of prior approval EIS documentation. It is not anticipated that groundwater drawdown (as a result of this project) will result in stress to the associated vegetation communities. Whilst the species utilises groundwater, it relies on flooding regimes for recruitment. Current flooding regimes are not predicted to be significantly affected as a result of the project.

The HVO RRGRS outlines the management and monitoring regime to ensure these communities are maintained. The RRGRS stipulates that groundwater monitoring data will be made available to the persons undertaking the ecological monitoring in order to assess the impact that fluctuating groundwater levels may have on the health of the Carrington Billabong and the Priority Sites listed in the strategy document.

Performance criteria for groundwater and GDEs is summarised in Table 5.1.

**Table 5.1 Groundwater Impact Assessment Criteria**

Criteria	Description
1	The groundwater level does not decline more than 2m from at any privately owned bores and wells identified in the HVO complex EA's
2	Water quality does not lower the beneficial use category of the groundwater source beyond 40m from mining pit
3	A measurable reduction in flow in the Hunter River and Wollombi Brook upstream and downstream of the HVO mining area does not exceed 10% and is attributable to mining operations
4	The highly productive alluvial groundwater source within 40m of the recognised GDE communities does not experience more than a 10% cumulative variation in the water table due to mining operations, allowing for typical climatic "post-water sharing plan" variations

Monitoring associated with River Red Gums as a GDE community is outlined in the current version of HVO RRGRS. A summary of monitoring commitments is provided in Table 5.2.

**Table 5.2 River Red Gum GDE monitoring at priority sites**

<b>Monitoring survey type</b>	<b>Frequency</b>	<b>Attributes recorded</b>	<b>Comments</b>
Monitoring ecological health at 14 established permanent River Red Gum sites.	Every 3 years	Grazing Weed invasion Clearing or mowing of understorey Dieback Canopy plants age diversity/regeneration Native diversity at different strata Erosion Fire history Time since last flood Connectivity of remnant Remnant shape Photo monitoring	Results will be compared with the original baseline results. 11 of 14 sites included photo monitoring. Results were reported on after each monitoring event and reviewed. The last River Red Gum monitoring event occurred in November 2017. This plan is currently under review.

### 5.1.2 Riparian vegetation monitoring

A programme to monitor surface water flows on stream and riparian vegetation health in the Hunter River potentially affected by the HVO South Project will commence by 28<sup>th</sup> February 2019 (within 12 months of the Project Approval being granted). Performance criteria will be established on the basis of the monitoring program.

### 5.1.3 Response to exceedance & performance indicators

The following management responses will be routinely implemented as per below.

- formal review of measured depressurisation of coal measures and alluvial aquifers will be undertaken annually by a suitably qualified hydrogeologist;
- the predicted loss of water from the alluvial aquifer and from baseflow in the Hunter River will be offset by ensuring sufficient entitlements are held from the Hunter Regulated River Water Sharing Plan; and
- HVO would purchase and retire existing water licences from the Wollombi Brook Water Source Zone for the predicted loss of water from the alluvial aquifer and from baseflow in Wollombi Brook if required.

In the event that a water quality measurement exceeds a predetermined trigger value, exceedances will be recorded and HVO will initiate a site specific investigation if:

- professional judgement determines that the single deviation or a developing trend could result in environmental harm.
- three consecutive measurements of EC, pH or Standing water level (for specific groundwater sites only) exceed trigger values.
- one measurement of TSS exceeds the trigger value.

The investigation will:

- determine the source and risk of impact on downstream water quality.
- determine the need for and extent of contingency measures and/or the impact of the results on the long term viability of recognised GDE's;
- communicate outcomes to senior management; and
- be reported in the HVO Annual Report.

#### 5.1.4 Management of unpredicted impacts to groundwater

Contingency measures will be implemented commensurate with the degree of impacts determined by the investigation. Depending on the outcomes of an investigation, one or a number of remedial actions may be taken.

Remedial actions for groundwater may include:

- more intensive monitoring and/or seeking professional advice in regards to model predictions; and/or
- geotechnical investigations; and/or
- structural assessments; and/or
- contingency measures to ensure the long term viability of recognised GDE's, as guided by suitable professionals, (to the satisfaction of the Minister, as required in the AIP) and/or.
- consideration of changes to the mine plan if required.

Monitoring and reporting would be continued to demonstrate the effectiveness of the remedial actions.

## 6 Biodiversity Monitoring

HVO are required to implement various monitoring programs that relate to the conservation and restoration of biodiversity values and areas as per State and Commonwealth approval requirements. The specific monitoring requirements are outlined in each specific management plans (as referenced in this BMP) which includes monitoring actions to be undertaken, schedule as to when the monitoring will occur, and performance outcomes sought to be achieved against which monitoring results will be evaluated.

A summary of the main biodiversity values and areas that HV Operations is required to undertake monitoring include:

- Biodiversity Areas, including:
  - Wandewoi BA;
  - Crescent Head BA;
  - Mitchelhill BA;
  - Condon View BA; and
  - Goulburn River BA;
- River Red Gum communities;
- groundwater monitoring including GDEs and riparian vegetation;
- land management including weed control, feral animal management and bushfire management; and
- revegetation areas.

Annual reports will be prepared that summarise the management actions that have been completed, results of monitoring activities, and how the management and restoration activities are progressing towards performance objectives. The reports will identify if there are any areas for improvement, or issues occurring where progress may not be meeting completion criteria. If corrective actions are required they will be identified and outlined for implementation. This adaptive management approach will ensure that the best available information and approach to management is being applied, and issues are identified early.

The applicable annual reports, biodiversity values and information they include are summarised in Table 6.1.

**Table 6.1 Annual Reporting**

<b>Annual Report Type</b>	<b>Biodiversity values</b>	<b>Information Addressed</b>
Local Biodiversity Areas Annual Report	Wandewoi BA	<ul style="list-style-type: none"> <li>• Describes management actions completed in 12 month period</li> <li>• Monitoring activities completed in 12 month period</li> <li>• Progress against completion criteria</li> <li>• Corrective actions that may be required</li> <li>• Planned actions for the next 12 months</li> </ul>
Regional Biodiversity Areas Annual Report	Goulburn River BA, Crescent Head BA, Mitchelhill BA, Condon View BA	<ul style="list-style-type: none"> <li>• Describes management actions completed in 12 month period</li> <li>• Monitoring activities completed in 12 month period</li> <li>• Progress against completion criteria</li> <li>• Corrective actions that may be required</li> <li>• Planned actions for the next 12 months</li> </ul>
EPBC Annual Compliance Reports	MNES including TECs and listed species	<ul style="list-style-type: none"> <li>• Compliance with applicable approval conditions</li> <li>• Reporting of any compliance issues</li> </ul>
HVO Annual Environmental Review	Groundwater Rehabilitation Land management (including weed control and pest animal management)	<ul style="list-style-type: none"> <li>• Applicable approvals and management plans/programs</li> <li>• Operations Summary</li> <li>• Groundwater monitoring activities and results</li> <li>• Rehabilitation activities and rehabilitation performance</li> <li>• Restoration activities such as replanting at Carrington Billabong</li> <li>• Weed control completed and results of annual weed survey</li> <li>• Vertebrate pest activities</li> <li>• Results of independent audit (if one was required)</li> </ul>

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Appendix A

OEH comments

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Steven Cox <Steven.Cox@environment.nsw.gov.au>

Lloyd, Michael; Robert Gibson ▾

Fri 20/07

RE: Biodiversity Management Plan

**i** Follow up. Start by Monday, 23 July 2018. Due by Monday, 23 July 2018.

Hi Michael,

Thank you for providing OEH with the opportunity to comment on the HVO Biodiversity Management Plan. However, OEH is currently unable to provide comment on the plan.

Please provide a copy of the plan to the Department of Planning and Environment without comment from OEH.

Also, please send any future requests for advice/comment to [rog.hcc@environment.nsw.gov.au](mailto:rog.hcc@environment.nsw.gov.au) rather than directly to individual team members or me. Such emails will be forwarded to me within 24 hrs and if I'm on leave/sick/etc they will go to the Acting Team Leader.

Regards  
Steven

**Steven Cox**

Senior Team Leader Planning  
Hunter Central Coast Branch  
Regional Operations Division  
Office of Environment & Heritage

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**From:** Lloyd, Michael [<mailto:Michael.Lloyd@coalandallied.com.au>]  
**Sent:** Wednesday, 4 July 2018 3:31 PM  
**To:** Robert Gibson <[Robert.Gibson@environment.nsw.gov.au](mailto:Robert.Gibson@environment.nsw.gov.au)>  
**Subject:** Biodiversity Management Plan

Hi Robert,

Condition 33A of the Hunter Valley Operations Project Approval 06\_0261 requires the preparation of a Biodiversity Management Plan. The development of the plan requires the consultation with OEH.

Please find attached the HVO's Biodiversity Management Plan for your review. If I am required to submit the document via another method or if you would prefer that I consult with someone else in your organisation, can you please let me know?

The BMP is required to be submitted to the Department by 27 July 2018. To enable me to comply with this timeframe, it would be appreciated if any comments on this plan could be returned to me by Friday 20<sup>th</sup> July.

If you would like to discuss this document, please do not hesitate to contact me as below.

Regards

**Michael Lloyd**

Approvals Specialist – Project Approvals

M: 0477 335 409

**HUNTER VALLEY  
OPERATIONS**

Hunter Valley Services

PO Box 315 | Singleton | NSW | 2330

[michael.lloyd@coalandallied.com.au](mailto:michael.lloyd@coalandallied.com.au)

Appendix B

DPE Approval

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**Resource Assessments**

**Planning Services**

Contact: Melissa Anderson

Phone: 8275 1392

Email: [melissa.anderson@planning.nsw.gov.au](mailto:melissa.anderson@planning.nsw.gov.au)

Mr Michael Lloyd  
Approvals Specialist – Project Approvals  
Hunter Valley Operations  
PO Box 267  
SINGLETON NSW 2330

*Michael*

Dear Mr Lloyd

**Hunter Valley Operations  
Approval of Biodiversity Management Plan**

I refer to your email, dated 25 July 2018, submitting the Biodiversity Management Plan for approval, as required under condition 33A, Schedule 3 of the HVO South Project Approval (MP 06\_0261).

The Department has reviewed the plan and finds that it meets the requirements of the project approval.

Consequently, the Secretary has approved the plan. Please place the approved plan on the project's website at your earliest convenience.

Should you have any enquiries in relation to this matter, please contact Melissa Anderson at the details above.

Yours sincerely

*Howard Reed*

Howard Reed *2.8.18*  
**Director**  
**Resource Assessments**  
as nominee of the Secretary