Offset Management Plan

Putty Road Offset,

Southern Biodiversity Area

Hunter Valley, New South Wales

Document Title	Version	Date effective	Comment
Putty Road Offset Management Plan	1	14 April 2014	Draft submitted for approval.
	2	24 June 2014	Final draft in response to regulator comments

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1 Introduction

1.1 Background

The Mount Thorley Warkworth (MTW) mine is approximately 15 kilometres (km) southwest of Singleton in the Hunter Valley(**Figure 1**), New South Wales (NSW).

MTW is the integration of the Warkworth Mine and the adjoining Mount Thorley Operations (MTO). In 2004 the Warkworth Mine owners Warkworth Mining Limited (WML) entered into an agreement with the owners of MTO to integrate mining operations. Coal & Allied Operations Limited (Coal & Allied), which is managed by Rio Tinto Coal Australia (RTCA), manages the MTW coal mine on behalf of WML and MTO.

Operations commenced at Warkworth Mine in 1981 and it currently operates under consents issued by the NSW and Commonwealth governments. In May 2003 NSW Minister for Planning issued the development approval DA 300-9-2002i. The Commonwealth Minister for the Environment, under provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC), has issued two approvals the first in February 2004 (EPBC 2002/629) and the second in August 2012 (EPBC 2009/5081).

1.1.1 EPBC Approval

In August 2012, the Commonwealth Minister for the Environment, under provisions of the EPBC Act, issued an approval (EPBC 2009/5081) relating to the proposed action to extend the existing Warkworth coal mine over an additional 705 hectares (ha) of land at Warkworth, NSW. The approval requires WML to offset the impact on the foraging habitat for *Anthochaera phrygia* (regent honeyeater) and *Lathamus discolor* (swift parrot).

EPBC 2009/5081 was varied in December 2013, to allow WML to stage the clearing of vegetation. Phase 1 of the approved action involves disturbance, under the proposed Warkworth Mine Modification 6 (350m extension to the West Pit), of approximately 31 ha, approximately 30 ha of which is vegetated and 1 ha is a dam. Phase 2 of the approved action involves the disturbance of the balance of approximately 674 ha of the total 705ha approved under EPBC 2009/5081 on 9 August 2012.

A copy of the EPBC approval is in **Appendix A**.

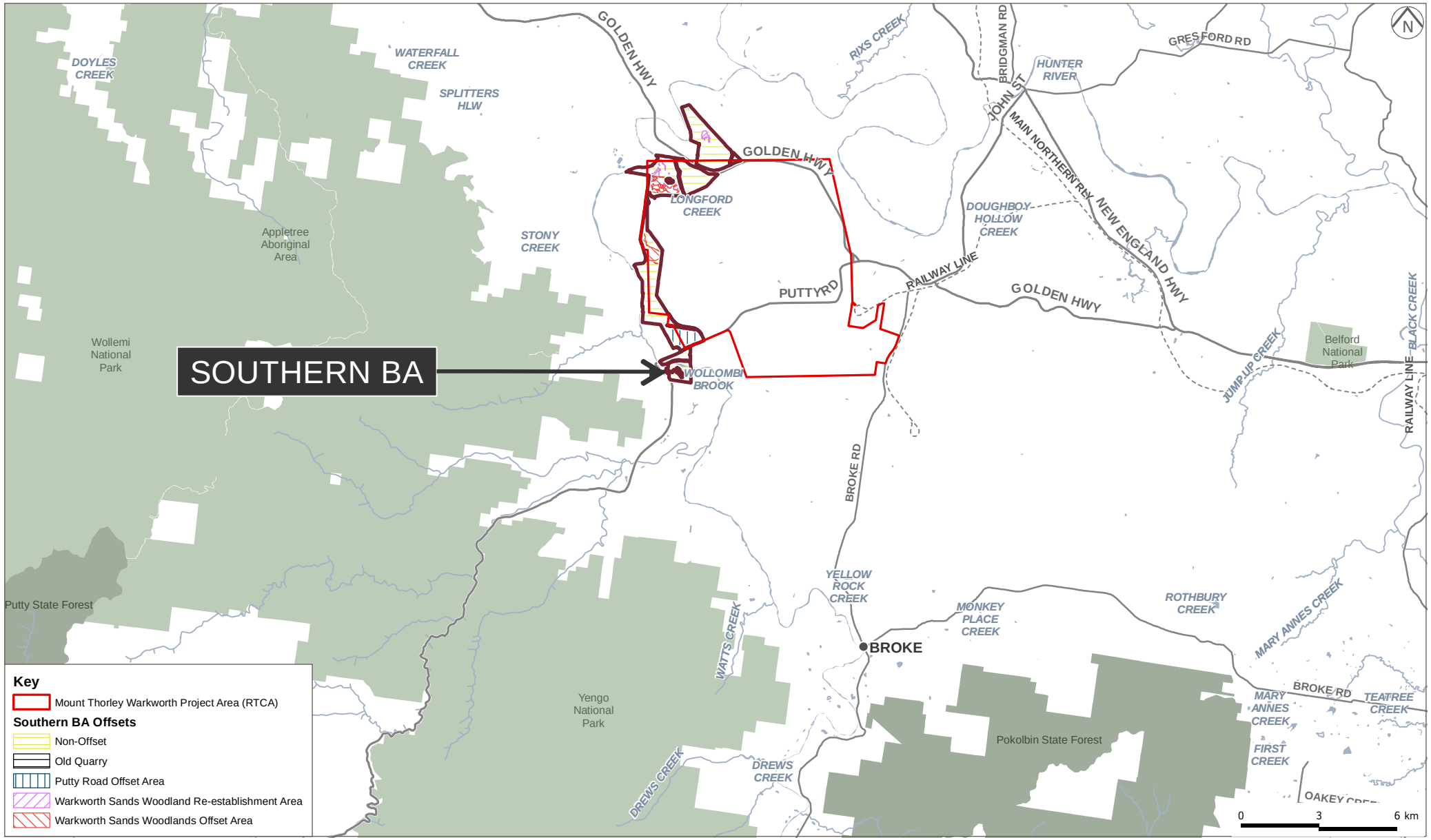
The Putty Road Offset is also required under the NSW Development Consent for the Warkworth Mine (DA 300-9-2002-i).

1.1.2 Offset Security

WML is required to register a legally binding conservation mechanism over the Putty Road Offset, as per Condition 1 of EPBC 2009/5081:

> *To offset the impact on the foraging habitat for* Anthochaera phrygia *(regent honeyeater) and* Lathamus discolor *(swift parrot), the person taking the action must register a legally binding conservation mechanism over 94ha of land, as illustrated in the map at Attachment A as the Phase 1 Offset. The conservation mechanism must provide enduring protection for the Phase 1 Offset and must be registered within 12 months of the Commencement of Construction of Phase 1 of the action. The person taking the action must notify the department in writing within 1 month of the registration of the conservation mechanism.*

Figure 1 Location of Mount Thorley Warkworth Mine



1.2 Function of the Offset Management Plan

The Putty Road Offset Offset Management Plan (OMP) will provide the management framework for the Putty Road Offset with the aim to protect and enhance biodiversity values through the implementation of conservation management strategies.

1.2.1 Structure

For the Putty Road Offset OMP to be successful it needs to define the management areas, provide clear conservation objectives, detail the conservation management strategies and measure success. To that end the OMP comprises the following chapters:

- Offset Areas: This chapter describes Putty Road Offset;
- Conservation Objectives, Key Performance Indicators and Completion Criteria: This chapter outlines the conservation objectives for the OMP as well as the biodiversity values, nested conservation values and key performance indicators that guide the development of conservation management strategies and the monitoring programme;
- Conservation Management Strategies: This chapter outlines primary management strategies used to improve the condition of the Putty Road Offset;
- Monitoring: This chapter details the data collection to measure short, medium and long term impacts of the conservation management strategies. These assessments will provide quantitative data to guide adaptive management, monitor long term trends in biodiversity values and attainment of Key Performance Indicators; and
- Conclusion: This chapter describes the risk matrix to cross check activities against key risks to ensure the OMP is comprehensive.

1.2.2 Information Management

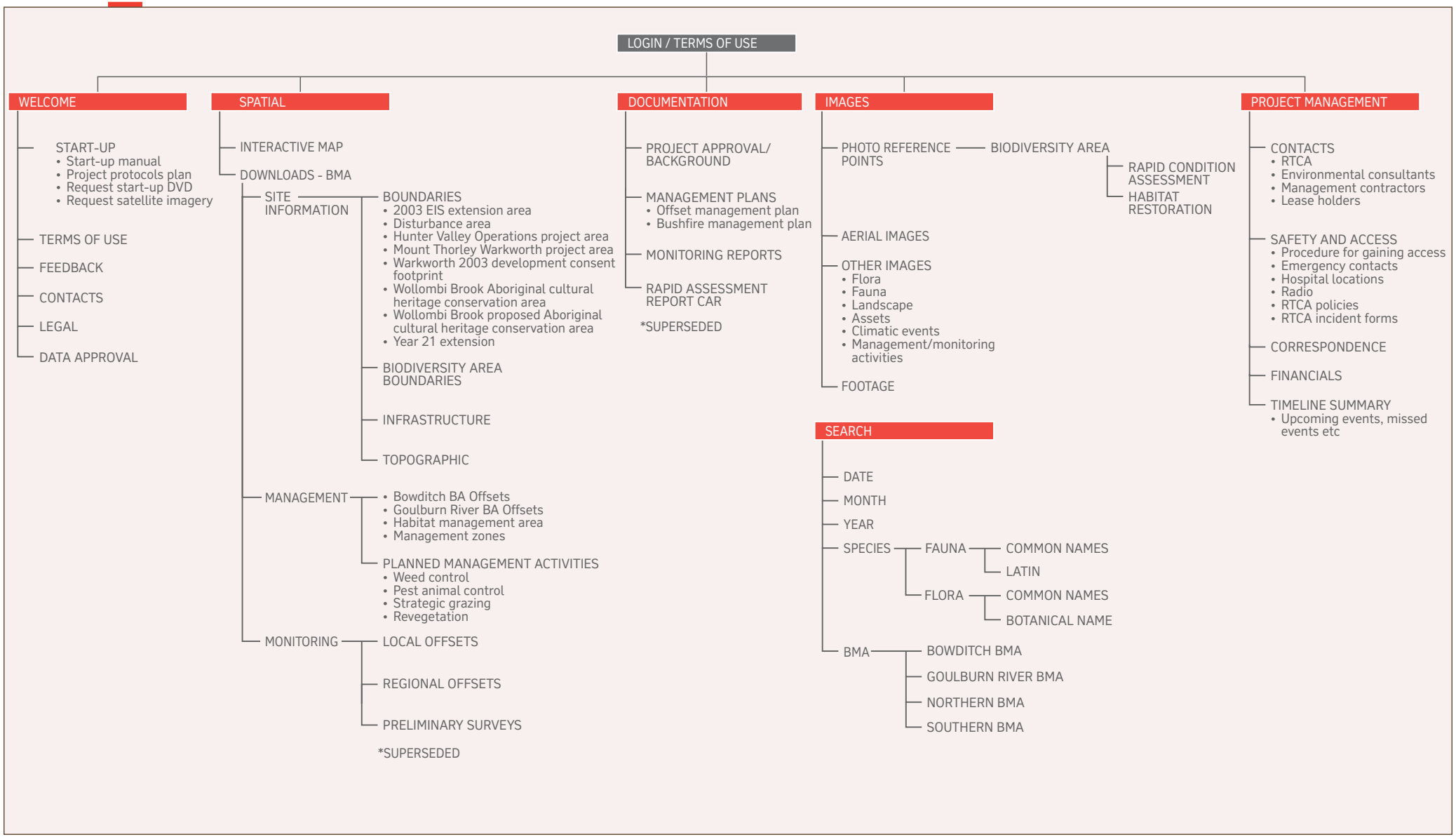
Successful implementation of the Putty Road Offset OMP will rely upon the sharing of skills, knowledge and resources, as well as careful monitoring of activities.

The sharing of information will be facilitated through the online Biodiversity Offsets Portal. This Portal has been designed to centralise and share information among authorised users and will include spatial data, an image library, reports and other non-spatial data as well as project management information such as stakeholder details and safety information. The Portal will greatly improve communication among stakeholders, transparency of management and monitoring activities and will ensure data security and integrity (e.g. preventing risks of data loss due to staff turnover and minimising the risk of using superseded information). Ultimately, this will result in improved decision making and adaptive management that is responsive to seasonal conditions and current operational challenges.

The Portal will also provide access to an Interactive Map that will allow users to visualise data in a geo-spatial context, assisting in data interpretation. This data will include aerial imagery, site information (e.g. cadastral, site access, topographic, infrastructure, geology) and data relating to management and monitoring activities. The Interactive Map will allow users to query information, turn layers on and off, mark up and print maps. This is an easy to use but powerful tool that does not require knowledge of Geographic Information Systems on the part of the user.

The following **Figure 2** provides an outline of the Portal and elements of the database that will form an important component in the overall planning, management and compliance of the Offset Areas.

Figure 2 Portal Structure



1.3 Key Project Stakeholders and Roles

The key project stakeholders are identified by their roles in **Table 1**.

Table 1 Key project roles and stakeholders

Roles	Responsible Entity	Details
Commonwealth Regulator Administers the EPBC 2009/5081. Approves OMP and receives annual reports.	Australian Government Department of the Environment	PostApproval@environment.gov.au
Project proponent and land owner Prepare plans and operational documents. Supervise management of the Putty Road Offset, review monitoring reports and adapt management.	Coal & Allied	Principal Advisor - Offsets info@rtca.riotinto.com.au 1300 727 745
Biodiversity Auditor Monitor the ecological monitoring and improvement in extent and condition of the biodiversity values.	Person/s engaged by Coal & Allied to undertake monitoring programme.	Coal & Allied will engage suitably qualified person/s.
Regulate control of noxious weeds	Upper Hunter Weeds Authority	Works Coordinator, Upper Hunter Weeds Authority 02 6549-3802 www.muswellbrook.nsw.gov.au/Council-services/Environment/Weeds/ uhwa@muswellbrook.nsw.gov.au
Regulate control of pest animals	Hunter Local Land Services	Hunter Local Land Services (Scone) 02 6545 1311 www.hunter.lls.gov.au

1.4 Review and Reporting

It is anticipated that the Putty Road Offset OMP will be incorporated in the Local Offset Management Plan in mid-2014, to ensure the consistency in management and monitoring for the offset obligations for the Commonwealth and NSW regulators. However, if this does not occur, the Putty Road Offset OMP is to be reviewed in three years from its approval or by the end of 2017, to update information on the condition and extent of the vegetation communities across the Putty Road Offset and refine conservation management strategies. The document may be updated on an irregular basis to amend changes to contact details, agency names or other secondary information.

Annual reports will be the critical tool to review performance of the Putty Road Offset OMP and adapt conservation management strategies. The reports will include a summary of monitoring data and management highlights.

Condition 15 of EPBC 2009/5081 requires WML to prepare and publish an annual compliance report within 3 months of every 12 month anniversary of the Commencement of Construction of Phase 1 (i.e. 3 May 2015), until such time as agreed in writing by the Minister.

The Annual Report for the Putty Road Offset Area will be prepared as part of the MTW Annual Review.

Annual reports will include the following information as a minimum:

- Name and contact details of the Landholder and/or Leaseholder;

- List of conservation management activities undertaken, detailing scope of works, skill and expertise of the responsible entity/ies completing the works and performance;
- Monitoring results - all data will be correctly labelled with date, location and GPS points;
- An assessment of progress in attaining the conservation objectives against the key performance indicators;
- An assessment of any new risks or potential threats to the Offset Areas and actions to be undertaken to manage these threats and/or risks; and
- Where the proponent is proposing that the completion criteria have been achieved and the report is being submitted as the final report, the proponent must provide evidence that all conservation objectives and have been achieved in full.

2 Putty Road Offset

2.1 Location and description

The Putty Road Offset is located in the Hunter Valley, approximate 15km to the south-west of the township of Singleton NSW. The Putty Road Offset is approximately 94ha in size and is located approximately 2 km to the west of the MTW mine (**Figure 3**). The Putty Road Offset is located across the following landholdings:

- Lot 1 DP816643;
- Lot 2 DP816643;
- Lot 6 DP587986 (part); and
- Lot 549 DP 589662 (part).

The Putty Road Offset is located within the existing Southern Biodiversity Area (BA). The Southern BA is a contiguous tract of native vegetation that is managed for conservation and cultural heritage purposes.

The Putty Road Offset encompasses land that is on the Warkworth and Mount Thorley Mining Leases. Land tenures include Coal & Allied owned land and land owned by Mount Thorley Warkworth joint venture partners.

The Putty Road Offset is accessed from Putty Road. The surrounding land uses include:

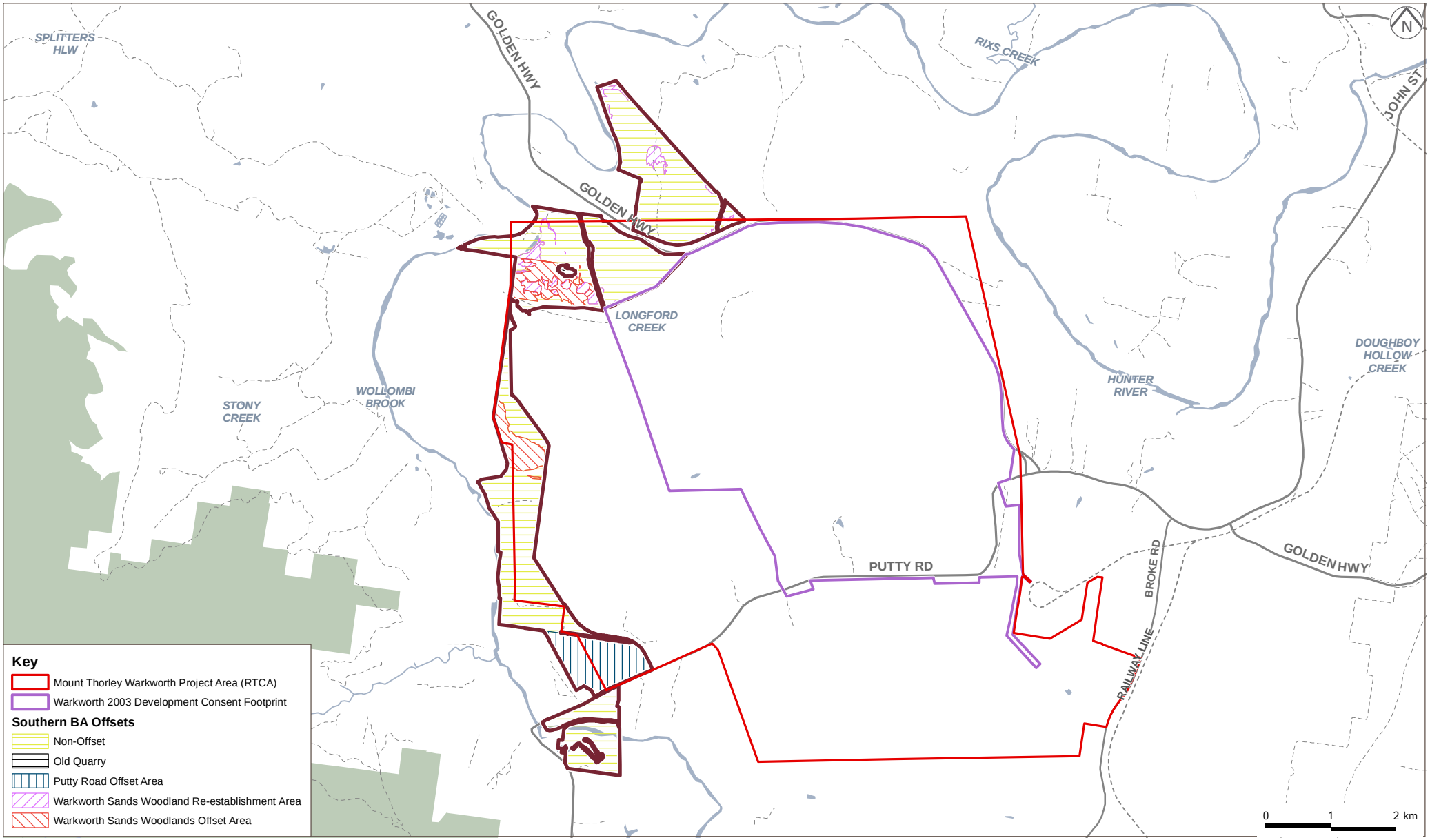
- Agricultural including cattle grazing and improved pastures;
- Coal mining;
- The WML Southern Biodiversity Area Offsets; and
- Wollombi Brook Aboriginal Cultural Heritage Conservation Area.

As the MTW operation was originally two mines there are two Mining Leases that apply include:

- ML 1412 covers the South Site (Mount Thorley) and has two sections:
    - Section A is from surface to 100 m below AHD or 30 m above Bayswater; and
    - Section B is from 20 m below surface to 100 m below AHD or 30 m above Bayswater.
- CCL 753 covers the North Site (Warkworth) and has two sections.
    - Section A is surface to unlimited depth, and
    - Section B is 20 m below surface to unlimited depth.

The Mining Leases are held over land whose background land tenure was predominately agricultural. The most common form of land use prior to mining in the local area was grazing by sheep, beef and dairy cattle on native pastures.

Figure 3 Location of Putty Road Offset



2.2 Land use history

The locality of the Putty Road Offset supported its first European settlers from 1826. This area was initially apportioned into large freehold leases by crown grants (1824-5) and was predominantly used as grazing land for cattle stock, or simply held and traded for its financial value (Weir & Phillips 2007). Following the passing of the Land Act in 1863, many of the earlier large leaseholds were divided into smaller lots. A significant number of these properties were used as dairies, as grazing for dairy dry stock, or for orchards (Weir & Phillips 2007).

The Putty Road Offset was part of a former Royal Australian Air Force (RAAF) base. Most of the planned facilities were never constructed and only two dominant features remain: two intersecting runways (located immediately to the north of the Putty Road Offset) and a dilapidated kitchen building. Grazing of cattle and livestock resumed at the former RAAF base around 1956 (Weir & Phillips, 2007).

Grazing of cattle has been excluded from the Putty Road Offset since 2008.

2.3 Vegetation communities

The Putty Road Offset contains approximately 67 ha of Central Hunter Grey Box – Ironbark Woodland and 27 ha of Central Hunter Grey Box – Ironbark Derived Grassland, and includes some farm dams and buildings (see **Figure 4** and **Table 2**). It is adjacent to other woodland and forest areas to the north and east, and good connectivity is present between this area and vegetation in the minor extension area, through a wide band of woodland and forest vegetation connecting the two areas. This is likely to be used by a range of species for foraging and dispersal.

The dominant canopy species within this community are Grey Box (*Eucalyptus molucanna*) and Narrow-leaved Ironbark (*Eucalyptus crebra*). There are also local abundances of Bulloak (*Allocauarina luehmannii*) and White Feather Honeymyrtle (*Melaleuca decora*) in the midstorey (Cumberland Ecology 2010).

Table 2 Vegetation communities within Putty Road Offset

Scientific Name	Common Name	Total (ha)
Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	Central Hunter Grey Box – Ironbark Woodland	67
	Central Hunter Grey Box – Ironbark Derived Grassland	27
TOTAL		94

2.3.1 Threatened species

No threatened flora species have been recorded within the nominated offset area, however three threatened flora species have recorded in and near the study area (see **Figure 4** and **Table 3**) and a number of additional threatened flora species listed under the NSW *Threatened Species Act 1997* (TSC Act) and EPBC Act recorded from the locality were considered to have potential to occur in the study area (Cumberland Ecology 2010). These are also considered to have potential to occur in the nominated offset area due to its close proximity and the presence of the same habitat.

Table 3 Threatened flora species recorded in the wider study area

Scientific Name	Common Name	Status
Bothriochloa biloba	Lobed Blue Grass	Vulnerable (EPBC)
Ancistrachne maidenii		Vulnerable (TSC)
Eucalyptus glaucina	Slaty Red Gum	Vulnerable (EPBC) Vulnerable (TSC)

Figure 4 Vegetation Communities and Threatened Species

Due to the similarity of the vegetation in the nominated offset area to the woodland communities in the minor extension area and its close proximity, it is considered to provide very similar habitat for flora species.

Two threatened microchiropteran bats have been recorded within the Putty Road Offset; the Eastern Freetail Bat (*Mormopterus norfolkensis*) and Large-eared Pied Bat (*Chalinobolus dwyeri*), and several other threatened species have been recorded in close proximity; the Greycrowned Babbler (*Pomatostomus temporalis*), the Speckled Warbler *Pyrrholaemus sagittatus*) and the Hooded Robin (*Melanodryas cucullata*) (see **Figure 4**). In addition to these species, due to the presence of high quality woodland vegetation, the Putty Road Offset is likely to provide suitable foraging, shelter and breeding habitat for a wide range of threatened fauna species listed under the EPBC Act and/or the TSC Act. The nominated offset area is located in close proximity to the minor extension area and is connected by a wide band of woodland and forest vegetation, and it is likely that some species currently utilise habitats in both areas.

2.4 Habitat

The Putty Road Offset sits within a system of reserves that protects the sandstone-based links between the Sydney, Hunter and Central West regions of NSW. The area supports a wide range of fauna habitat features, including various forest and woodland communities with mixed age trees, grassland, waterbodies, hollow- bearing trees, rocky outcrops, forage resources and ground debris. These features provide suitable forage, shelter, breeding or roosting habitat for a range of fauna species.

The EPBC 2009/5081 Approval Conditions require that the Putty Road Offset is protected and provide suitable habitat values for the Regent Honeyeater and Swift Parrot. Surveys of the area indicate that the vegetation communities present would meet their habitat requirements.

2.4.1 Regent Honeyeater

The Regent Honeyeater is a winter migrant endemic to south eastern Australia where it is widespread but sparsely scattered, and strongly associated with the western slopes of the Great Dividing Range (Garnett and Crowley 2000). The species is also known to forage and breed in Box-Ironbark woodland in the Hunter Valley region. It is found in temperate eucalypt forests and woodlands but prefers Box-Ironbark associations and River Oak riparian forest in wet, fertile sites along creek lines and river valleys (DEC (NSW) 2006).

The Regent Honeyeater is strongly nomadic and follows blossoming trees and mistletoe (Franklin, Menkhorst *et al*. 1989; NSW Scientific Committee 2004). Numbers fluctuate greatly between years and sites, and movement outside of breeding season is poorly understood. Only 1,500 individuals are thought to make up the single subpopulation of this species. Regent Honeyeaters forage in the canopy tops of mature feed trees, but roost in saplings (Oliver, 1998). This suggests that the species requires a more extensive area of habitat than other similar nectarivorous species.

The Putty Road Offset is within the known distributional range for the Regent Honeyeater and offer suitable breeding and winter forage resources in the form of mature flowering eucalypt trees, mistletoes and shrubland. There is also a high potential for the species to utilise forage resources at the Offset Areas due to the proximity of known records. The species has been known to occur in large flocks at Howes Valley (151 individuals recorded in 1994) (SEWPaC 2012) and at Goulburn River, Yengo and Wollemi National Parks and Munghorn Gap Nature Reserve. One of the three key breeding regions for the species is in the Capertee Valley (OEH 2012b), south-west of the Putty Road Offset.

The Regent Honeyeater is considered to have potential to occur in the Putty Road Offset during migrations. There is one Atlas record for the species within the locality of Putty Road (OEH 2014).

2.4.2 Swift Parrot

The Swift Parrot is a predominantly nectarivorous, migratory species endemic to south eastern Australia. The species breeds in Tasmania and migrates to the mainland in winter, where it is most commonly found in dry, open eucalypt forests and woodlands

containing Grey Box, White Box and Yellow Gum (Garnett and Crowley 2000; OEH 2012). The species is reliant on Box-Ironbark communities for winter foraging and movement is strongly associated with the availability of lerps and winter-flowering eucalypt species. Swift Parrots often occur in urban areas, including farmland with remnant patches of eucalypt woodland (DEC (NSW) 2005; Saunders and Heinsohn 2008).

The Putty Road Offset supports forage habitat for Swift Parrots in the form of winter flowering mature and regenerating eucalypt species that also support lerps and a high proportion of mistletoes. Suitable habitat areas include mistletoes, valley eucalypt woodland and Ironbark communities.

The Swift Parrot is considered to have the potential to occur in the Putty Road Offset, infrequently visiting to forage during winter migrations. The species may occur occasionally and in low numbers but is unlikely to visit these regions regularly every year. There are two Atlas records for the species within the locality the Putty Road Offset (OEH 2014).

2.5 Baseline biodiversity condition assessment

2.5.1 Rapid Condition Assessment

The Southern BA (including the Putty Road Offset) is principally mature woodland communities with few management issues. Therefore, a Rapid Condition Assessment (RCA) technique was used as a preliminary assessment of woodland condition within the Southern BA. The RCA (described in **Appendix B**) is derived from the 'Save the Bush Toolkit' technique (Wakefield and Goldney, 1997), which identifies the presence or absence of key habitat components and threatening processes. This technique is not applicable to all types of native vegetation (e.g. native grasslands, wetlands or pastures) but is a quick and reliable way to assess the condition of woodland communities. Details of the more comprehensive monitoring programme, which is to be implemented in the long-term to complement the RCAs, are provided in **Chapter 5**.

A series of permanent RCA sites were established across the BAs in November 2013 (**Figure 5**). The results for the Southern BA are summarised in **Table 4**.

As shown in **Figure 5**, there are currently no sites established within the Putty Road Offset. RCA sites within the Putty Road Offset will be established as part of the 2014 monitoring programme.

2.5.2 Bird survey

MTW has had a bird monitoring programme since 2008 The aim of the ongoing bird monitoring programme is to use avifauna as indicator species to monitor the enhancement of remnant woodland/open woodland in the Southern BA, by comparing bird populations at the same sites originally surveyed by Andrews Neil (2006). Surveys have been completed in autumn and spring 2008, winter 2009 and July 2011. The following are the results from the survey completed by Dr Stephen Debus in 2011. Figure 5 indicates the historical sightings of fauna near the Putty Road Offset.

The nine MTW survey sites in July 2011 were the same survey sites as those of Debus (2008, 2009), and the survey method was repeated. Each site was surveyed four times over almost consecutive days, and survey times at each site were rotated between early, mid or late morning, and mid or late afternoon. Birds were surveyed by habitat (area) search, using visual and aural cues, by a random meander through 4 ha around the survey point during 40 minutes (= 2× the standard 2-ha/20-minute search commonly used and recommended for bird surveys). In practice, tracks through the sites were used as much as possible, to maximise the detectability of birds and the counting of individuals. Also, because bird foraging activity continued through the day in winter, counts continued until later in the morning, and started earlier in the afternoon, than in the autumn and spring surveys. For each site and replicate count, species and individuals were again counted in 10-minute intervals (taking care not to double-count individuals). Survey effort was 2.67 hrs (4 × 40 minutes) per site.

Weather conditions during the winter 2011 MTW survey (11–14 and 19–21 July) were mostly dry, but often cold and gusty in the first week, and cold, overcast, gusty and

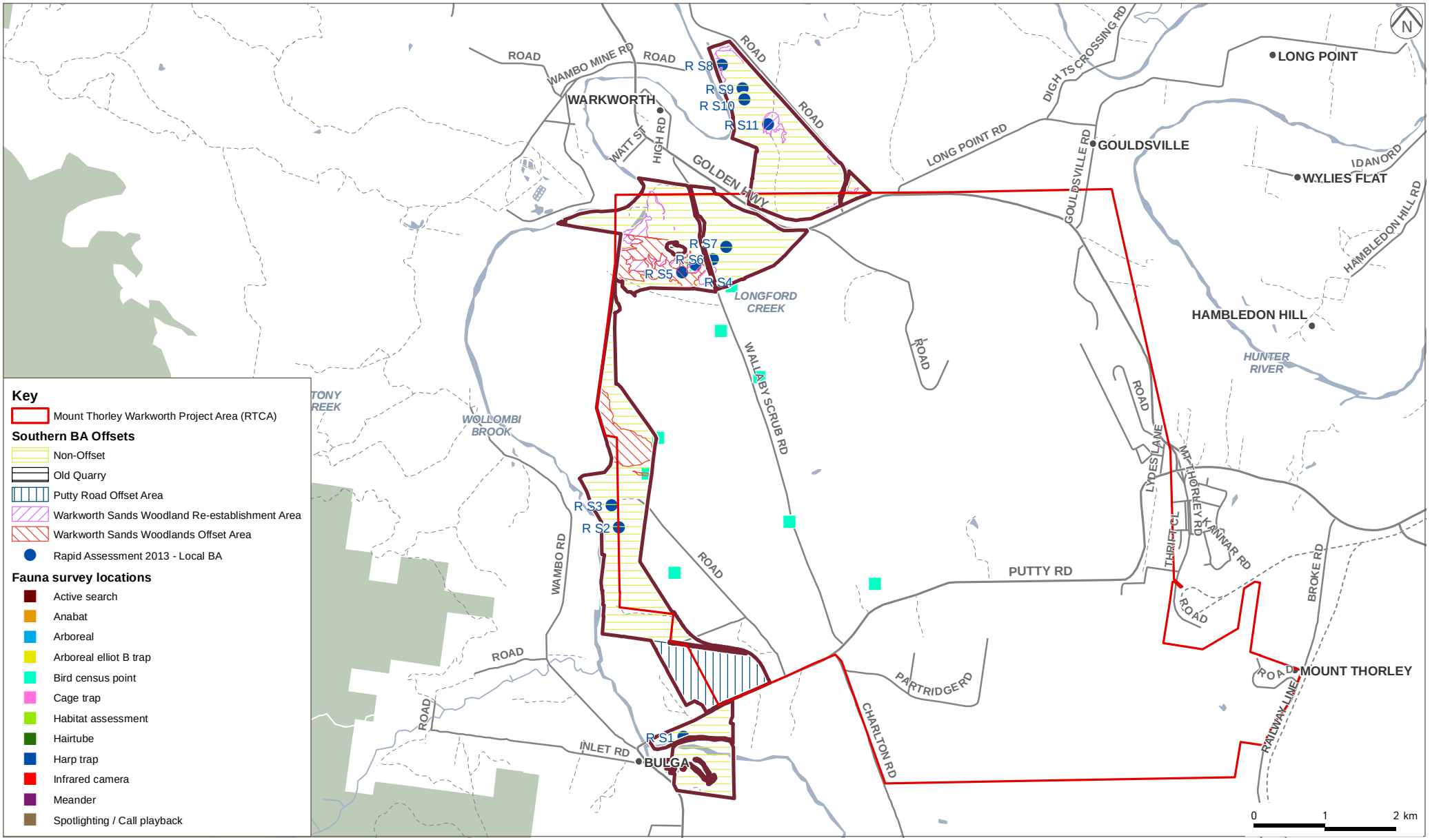
occasionally showery in the second week (counts were not conducted during rain). Mining operations had also approached more closely to sites MTWB01 (especially, where habitat clearing had intruded), MTWB03 and MTWB04 (i.e. those sites east of Wallaby Scrub Road), meaning that there was machinery noise interference at these sites, and the 4-ha search area at sites MTWB01 and MTWB04 was adjusted slightly south and west to compensate.

Eight hundred and seventy individuals, of 74 species, were recorded on MTW. Please refer to **Appendix C** for species list and location of monitoring sites. 68 species on the survey plots, and six seen or heard off site during counts or while travelling between the sites. This is a similar number of species to autumn 2008 (76) and winter 2009 (71), although fewer species than spring 2008 (85), and 100 more individuals than in autumn or spring 2008. These differences can be explained by the winter absence of spring-summer migrant species, the winter influx of certain species (Eastern Spinebill, Yellow-faced Honeyeater and Golden Whistler), and the greater detectability of some species in spring (e.g. singing, breeding). The winter influx of honeyeaters included a new species for MTW, the White-cheeked Honeyeater, and was related to the winter flowering of Coast Banksia on the Warkworth Sands. Six other new species for the MTW monitoring plots may have been winter visitors to the area. Recorded species diversity at MTW in winter 2011 may have been slightly depressed by the weather conditions, and the habitat loss or disturbance and/or the noise interference resulting from encroachment of mining activity on sites 1, 3 and 4. These sites will be relocated for the 2014 monitoring surveys.

Table 4 Rapid Condition Assessment results (Southern BA) November 2013

Remnant attribute	RS1	RS2	RS3	RS4	RS5	RS6	RS7	RS8	RS9	RS10	RS11
Low grazing intensity - never farmed		1			1	1	1	1	1		
Tree and shrub regeneration present (<2m)		1				1	1	1	1		
Infrequent fire regime (<5year intervals)		1			1	1	1	1	1		
Healthy mature trees (no dieback)		1			1	1	1	1	1		
Little to no evidence of rabbits		1			1	1	1	1	1		
Little to no evidence of foxes/cats		1			1	1	1	1	1		
Low abundance of weeds (most remnants contain some weeds)		1				1	1	1			
No evidence of firewood collection	exotic grasslands	1	CHGBIW grasslands	WSW grasslands	1	1	1	1	1	CHGBIW grasslands	WSW grasslands
No obvious signs of erosion or salinity		1			1	1	1	1	1		
Not susceptible to fertiliser application, herbicide or pesticide drift		1			1	1	1	1	1		
Less than 20% trees with Mistletoe (NB some mistletoe is healthy)		1			1	1	1	1	1		
Few tracks, trails or fence lines		1			1	1	1	1	1		
Presence of native shrubs		1			1	1	1	1	1		
Presence of large, old growth trees with hollows											
Dead timber is left standing		1			1	1	1		1		
Fallen timber and logs are left on the ground		1			1	1	1	1	1		
Abundance of native ground flora						1		1			
Presence of litter, cryptogams, cracks and rocks											
Remnant is large (> 5ha is optimum)		1			1	1	1	1	1		
Connected to or in close proximity to other remnant vegetation		1			1	1	1	1	1		
Total No. True answers (x/20)	0	17	0	0	15	18	17	17	16	0	0

Figure 5 Monitoring Locations (Southern BA)



3 Objectives and Key Performance Indicators

3.1 Conservation Objectives

The Putty Road Offset will be managed to achieve the following objectives:

- Maintain or increase the condition of the forest/woodland habitats of the Offset Areas;
- Improve fauna movement and flora dispersal opportunities within the surrounding landscape;
- Provide refuge and core habitat for local fauna populations and transient species, particularly threatened species; and
- Provide an extension of protected reserves for threatened fauna species, including the Regent Honey-eater and Swift Parrot and other threatened fauna species known to occur in the area; and
- Contribute to and enhance the existing network of protected vegetation within the Hunter Valley.

The conservation management strategies described in the following Chapter 3 outline management activities that are permissible within the Putty Road Offset and aim to achieve the conservation objectives.

The methods to monitor the attainment of these objectives are described in Chapter 5.

3.2 Key Performance Indicators

Table 5 lists the key biodiversity values and the nested conservation values for the Putty Road Offset and key performance indicators. The monitoring programme, outlined in **Chapter 5**, will describe the on-going measurement to demonstrate achievement of the Key Performance Indicators.

Table 5 Key Performance Indicators

Biodiversity Value	Condition	Nested Conservation Values	Key Performance Indicator
Woodland		Total area: 67ha RCA 17/20	Maintain or increase area, connectivity and habitat condition over 15 years
	Fauna Habitat	Moderate potential habitat for Swift Parrot and Regent Honeyeater	Maintain or increase the condition and extent of habitat over 15 years
Grassland		Total area: 27ha	Maintain or increase area, connectivity and habitat condition over 15 years
	Fauna Habitat	Low potential habitat for Swift Parrot and Regent Honeyeater	Maintain or increase the condition and extent of habitat over 15 years

3.3 Completion Criteria

The objectives will be deemed to be attained when the Key Performance Indictors defined in **Table 5** have been achieved.

4 Conservation Management Strategies

This chapter outlines the management activities and methods to protect and enhance the biodiversity values of the Putty Road Offset. It will focus on the protection and enhancement the extent and condition of habitat values of the offset areas including revegetation, weed control, fire management, erosion and sediment control, management of livestock and restrictions on access to habitat for the regent honeyeater and swift parrot.

4.1 Controlled activities

The Putty Road Offset is to be protected under a conservation agreement and will have legal protection. All employees, contractors, consultants and visitors must be aware of their responsibilities when entering the Putty Road Offset.

Under no circumstances are the following activities permitted within the Putty Road Offset:

- littering or dumping;
- removal of firewood, native plants or animals;
- removal of rocks, sand or gravel;
- clearing or destruction of native vegetation (some exemptions for construction and maintenance of infrastructure (see Section 4.2);
- hunting;
- trapping or shooting (unless controlling pest animals);
- use of fertilisers;
- aerial application of herbicide from planes or helicopters;
- grazing of livestock;
- use of livestock feed;
- keeping or bringing exotic animal including dogs, cats and European bee hives; or
- lighting camp fires.

Vehicles may cause soil compaction, dispersal of weed and vegetation disturbance. To minimise the impact vehicles on the Putty Road Offset, vehicle access shall be restricted to defined access tracks with vehicles to be driven by authorised personnel only. Vehicles should always be driven to road conditions and not exceed the legal speed limits for roads and not exceed 40km/hour on internal access tracks.

Access to the Putty Road Offset is through locked gates and fences, and key entry points are signposted to inform all visitors they are entering a protected area. Locks and signs will be installed by Coal & Allied by the end of 2014.

4.2 Revegetation

To achieve an increase in the extent and condition of the ecological communities, a range of revegetation techniques may be adopted including assisted natural regeneration, replanting and regrowth management.

4.2.1 Management Objective

To observe an increase in native plant abundance and diversity across the Putty Road Offset over a period of ten years.

4.2.2 Method

Assisted natural regeneration

To assist natural regeneration across the Putty Road Offset, to achieve an increase in the extent and the condition of the ecological communities, a range of re-establishment, restoration and enhancement techniques are to be adopted including replanting, seed collection and regrowth control.

Replanting and Seed Collection

Replanting involves the establishment of indigenous plants to create self-sustaining functional remnant vegetation communities. Replanting will be undertaken in areas that have been highly disturbed, have lost the ability to regenerate naturally and/or require soil stabilisation. Replanting techniques may include direct seeding or planting of tube stock.

The following activities described in **Table 6** must be adhered to.

Table 6 Replanting activities

Activity	Minimum requirement
Species selection	Species selected are to be listed on the description of the vegetation communities issued by the NSW Scientific Committee or NSW government description. Seed can be collected from site or regionally from equivalent vegetation communities.
Cultivation	Cultivation for tube stock planting should be to a depth of 500-600mm at least 6 months prior to planting and when soil moisture is low to improve sub surface soil shatter. Cultivation for direct seeding may include light soil scarification.
Preplant weed control	Chemical control of weeds at least 1week prior to planting or seeding. An area of at least 1m diameter around each tree or seeding patch is to be sprayed to remove all competition for site resources.
Tube stock planting	Planting must only occur when there is suitable soil moisture, typically 1 -2 days after 25mm of rainfall, in spring or autumn. Tube stock is to be at least 25mm in height, with a well-established root system and in good condition. The tube stock root plug is to be saturated at the time of planting. Soil conditioner is to be applied into the planting hole and all plants should be planted deep, with their root plug at least 50mm below ground and gently firmed in to remove any air pockets in the soil.
Direct seeding	Seed is to be free of weed seed. Seeding must only occur when there is suitable soil moisture, typically 1 -2 days after 25mm of rainfall, in spring or autumn.
Mulching / weed mat	Tube stocks are to have weed mats installed at the time of planting to provide longer term control of competition.
Watering	Watering is to occur at the time of planting or seeding, and if required for 6 months post planting.
Maintenance	Maintenance period should apply for at least 18months.

It is preferable that seed for planting and seeding activities is from local or endemic provenances. Therefore, it will be permissible to collect seed from remnant patches of vegetation communities across the property. However seed collection must be for non-commercial purposes and meet the standards of the “Guidelines and Codes of Practice” developed by Florabank (www.florabank.org.au), or subsequent equivalent, and the following limitations and permissions apply:

- Collect seed in the BA only if seed of the particular species and genotype is not available elsewhere or if the seed collected is intended for seedlings that will be planted within the BA;
- Seeds may be collected from within endangered ecological communities;
- Seeds may not be collected from species individually listed on schedules 1, 1A or 2 of the TSC Act without prior written approval from the Director General, or under a licence granted under S132c of the Act or S91 of the TSC Act;

- Seeds may be collected from any protected species listed under Section 131 (Schedule 13) of the TSC Act; and
- Seeds may be collected from any other native species.

Regrowth management

Very dense stands dominated by Eucalyptus saplings can occur after significant site or soil disturbance, locking the vegetation community in an unnatural state. These stands prevent the recruitment of other species and are unlikely to achieve the biodiversity and conservation objectives in the longer term. Regrowth control or thinning of these stands will ensure that a diverse and sustainable woodland community is established with a similar structure, function and composition to the medium to high quality woodlands occurring within the BAs.

Thinning of regrowth will be undertaken according to techniques specified in "A Guide to Managing Box Gum Grassy Woodlands" (Rawlings, 2010). Permits under the *Native Vegetation Act 2003* will be required to for thinning activities, therefore sound ecological evidence will be required to support this activity.

4.2.3 Implementation and Reporting

Prior to rehabilitation activities being undertaken, Coal & Allied will prepare a Re-establishment Plan (REP) for the Putty Road Offset. As per Condition 6 EPBC 2009/5081, the REP is required to be prepared and approved by the Minister within 12 months of the commencement of construction of Phase 1 (i.e. 3 February 2015).

Rehabilitation activities are likely to commence in late 2015 (post approval of the REP) and these operations will be administered by Coal & Allied. Seed collection activities will also be administered by Coal & Allied.

All revegetation activities are to be reported to Coal & Allied, including location, area, method and date. This information will be stored and accessed by the online Biodiversity Offsets Portal.

4.2.4 Performance and completion criteria

	Year 1 PC	Year 2 PC	Year 3 PC	CC
Re-Establishment Plan (REP)	Prepared and approved by Minister			REP prepared and approved by Minister
Seed collection		To have commenced and report submitted		Completed and reports submitted
Re-establishment and restoration activities		To have commenced		BA contain species and a density of plantings representative of the target vegetation type and is self sustaining.
Monitoring	Baseline monitoring completed	Monitoring completed	Monitoring completed	Monitoring completed for all years.

4.3 Weed control

Weed species are effective competitors for resources and have the potential to exclude native species from the landscape, resulting in changes in the composition and structure of plant communities. Control of weed species is critical to restoring the natural composition, diversity and structure of the ecological communities across the Putty Road Offset. Weeds are typically non-indigenous plants which invade areas after significant disturbance, such as land clearing or over grazing. They exclude native species from the landscape, leading to a change in the composition and structure of plant communities and degrade the condition and functionality of the ecosystems.

Weed control will focus on species that exclude or have the potential to exclude, native species, disrupt recruitment of native species or impede ecological processes. Priority will be given to declared noxious weed species under the *Noxious Weeds Act 1993* and environmental weeds listed in **Table 7**. These weeds were recorded in the Putty Road Offset and adjacent areas during previous the annual weed control programmes.

Noxious weeds will undergo the recommended level of control in accordance with their control class (as per the *Noxious Weeds Act 1993*) and where available, the relevant regional weed management plan.

Table 7 Noxious Weeds Recorded in the Putty Road Offset

Common name	Scientific Name	Control Class
African boxthorn	*Lycium ferocissimum*	4
Bathurst/Noogoora/Hunter/South American/Californian/cockle burr	*Xanthium spp.*	4
Creeping Pear	*Opuntia humifusa*	4
Green Cestrum	*Cesrum parqui*	3
Golden Dodder	*Cuscuta campestris*	4
Johnson grass	*Sorghum halepense*	4
Lantana	*Lantana camera*	4
Mother-of-millions	*Bryophyllum delagoense*	3
Pampas Grass	*Cortaderia spp.*	4
Paterson's Curse	*Echium spp.*	4
Prickly pear	*Opuntia spp.*	4
Star thistle	*Centaurea calcitrapa*	4
Tiger Pear	*Opuntia aurantiaca*	4
Willows	*Salix spp.*	5
Galenia	*Galenia pubescens*	N/A
Galvanized burr	*Sclerolaena birchii*	N/A
Peppercorn Tree	*Schinus areira*	N/A
Various Garden/Ornamental Plants	Various	N/A

Source: Coal & Allied (2002); Flora Search (2004); HLM (2006)
Noxious Weed Control Categories
3: The plant must be fully and continuously suppressed and destroyed.
4: The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction.

4.3.1 Management Objective

To observe a decline in the abundance of noxious and environmental weeds across the Putty Road Offset over a period of three years.

4.3.2 Method

The aim is to incorporate a variety of control methods and reduce the reliance on herbicides. This integrated weed management strategy will use of a range of suitable chemical and non-chemical control methods.

It is important to keep un-infested areas clear of weeds. Outbreaks in these areas will be a priority for intensive eradication and will be closely monitored to identify re-infestation or spread.

The preferred control methods are described in **Table 8**. The detailed prescription for implementation will be developed in consultation with Coal & Allied and the Upper Hunter Weeds Authority, the relevant agency responsible for administering the *Noxious Weeds Act 1993*.

The use of chemicals in the Putty Road Offset will be undertaken by accredited professionals with verified specific experience in native plant and weed identification and management. All chemical weed control will be in accordance with the registered label or current minor use permit, Material Safety Data Sheet (MSDS) and appropriate safety standards. Chemical use in the vicinity of waterways will be restricted to herbicides and adjuvants registered for use in or near aquatic environments.

Chemical weed control operations pose a substantial risk to successful natural regeneration processes unless carefully planned, implemented and monitored. Planning considerations relevant to weed control operations in natural or assisted revegetation areas include:

- Selection of personnel based on demonstrated experience and skill in selective weed control methods in regeneration areas; and
- Timing of proposed application in relation to recent or planned revegetation works.

Table 8 Weed Control Methods

Control Method	Potential use in control regime
Biological Control – is a long term control technique and may require several years to become effective. This is a complementary strategy and alone it may not eradicate the weed.	Lantana Rust for Lantana Cochineal and Cactoblastis for Pricky Pear.
Herbicide Control – is the application of chemical to kill the weed by interfering in the plants growth processes.	Application: Spot application of herbicide is the preferred method of application. Herbicides: Only registered herbicides should be used for the control of the weed species and used in accordance with the directions on the label. Users have a legal obligation to read and follow the instructions on the label. Where appropriate, selective herbicides will be used to minimise impacts on native vegetation. Handling: Herbicides must be handled and applied with consideration of their toxic nature and potentially harmful effects on human health, livestock and the environment. Only accredited and trained operators are permitted to apply herbicides. Timing: For effective control, the weather, soil conditions and time of spraying must be considered. Weather conditions are to be closely monitored throughout application to reduce the risk of drift and subsequent off- target damage. Reporting: The Pesticides Regulation 2009 requires all commercial pesticide users (that includes farmers, leaseholders and spray contractors) to keep records on their pesticide application.
Manual removal – removal of the weed plant and roots from the site.	Physical removal of new weeds in, unearthing of root systems and containment and removal of seed.

The Noxious and environmental weed control hand book (NSW DPI 2011) may provide additional technical information.

4.3.3 Implementation and Reporting

Coal & Allied is responsible for the development and implementation of weed management programmes within the Putty Road Offset.

The adaptive management monitoring programme requires regular observation of weeds within the Putty Road Offset. This will include identification and mapping of noxious and environmental weed infestations and the preparation and implementation of an annual weed control programme prepared by Coal & Allied in consultation with weed contractors. All control activities will be reported to Coal & Allied, including locations, method, date, duration and type and quantity of herbicide applied. This information will be provided through monthly reports that will be stored and accessed by the online Biodiversity Offsets Portal.

The impact of weeds will be observed through the monitoring programmes. This information will be used to monitor the success of the control methods.

4.3.4 Performance and Completion Criteria

	Year 1 PC	Year 2 PC	Year 3 PC	CC
Weed extent and density mapping	Baseline and Year 1 revision completed	Year 2 revision completed	Year 3 revision completed	All revisions completed
Twice a year weed inspections and reporting	Inspections and reports completed	Inspections and reports completed	Inspections and reports completed	All inspection completed
Weed control programme	Weed control programme implemented and reported	Weed control programme implemented and reported	Weed control programme implemented and reported	All weed control events implemented and reported
Weed species and extent				Weeds should not have spread to previously un-infested areas. Weed densities and sprawl across the offset areas broadly comparable to (or less than) reference site.

4.4 Vertebrate pest control

Many pest (or feral) animals pose a threat to native fauna through competition for habitat resources, degradation of habitat and direct predation. The recovery plans for Swift Parrot and Regents Honeyeater list the following key threatening processes, which are relevant to the pest animal control across the BAs:

- competition and grazing by the feral European rabbit;
- competition and habitat degradation by feral goats;
- competition from feral honey bees;
- environmental degradation caused by feral deer;
- predation by feral dogs;
- predation by the European red fox;
- predation by the feral cat; and
- competition from starlings.

In addition there are legal obligations to control pest animals under the Rural Lands Protection Act 1998. Listed animals for control observed across all BAs include:

- feral pig;
- European rabbit; and
- feral dog.

The Game and Feral Animal Control Act 2002 requires the control of feral deer.

4.4.1 Management Objective

To observe a decline in the abundance of vertebrate pest populations and evidence of damage across the Putty Road Offset over a period of three years.

4.4.2 Method

An annual vertebrate pest animal control programme is to be developed by Coal & Allied in conjunction with the Hunter Local Land Services (HLLS). The target pest species will include feral pigs, dogs, foxes, cats, rabbits and hares.

Control methods include sandpad monitoring and baiting. Other methods may also be considered provided they are:

- species specific (wherever possible);
- cause no or little damage to the natural environment;
- are humane;
- meet relevant Work, Health, Safety and Environment regulatory requirements; and
- are regularly monitored.

4.4.3 Implementation and Reporting

Coal & Allied is responsible for the development and implementation of vertebrate pest management programmes within the Putty Road Offset.

Pest animal control management activities will commence immediately. Annual control programmes are to be prepared by the end of 2014.

All control activities are to be reported to Coal & Allied, including locations, method, date, duration and estimate of number of target pest animals controlled. This information will be stored and accessed by the online Biodiversity Offsets Portal.

The pest management programme will be guided by regular observation by Coal & Allied personnel and information gathered through the monitoring programmes.

4.4.4 Performance and Completion Criteria

	Year 1 PC	Year 2 PC	Year 3 PC	CC
Pest control and monitoring	At least one control period complete. Report complete and recommendation followed	At least one control period complete. Report complete and recommendation followed	At least one control period complete. Report complete and recommendation followed	All control events completed and reported
Pest species population size based on monitoring	Stable or down-ward trend in population size	Stable or down-ward trend in population size	Stable or down-ward trend in population size	Stable or down-ward trend in population size
Area of impact per species based on monitoring			<10% of each vegetation community in the BMAs	<10% of each vegetation community in the BMAs

4.5 Fire management

Bushfire prevention is required under the *Rural Fires Act 1997*. The absence of fire and the previous removal of livestock grazing will lead to a build-up of fire fuel and risk of high intensity bushfire. Coal & Allied, as the owner, is required to take practicable steps to prevent the occurrence of bush fires on the land and minimise the spread of bushfire.

Coal & Allied has prepared a Bushfire Management Plan for the MTW mine site and non-operational land (which includes the Putty Road Offset) which identifies fire risks, control measures and communication procedures.

The quick identification of a threatening bushfire, notification of the Rural Fire Service and suppression is the primary goal.

4.5.1 Management Objective

To protect lives, biodiversity values and infrastructure assets from the impacts of bushfires.

4.5.2 Method

Key control measures will focus on:

- documentation of access and water supply points for suppression activities;
- maintain access for fire suppression activities;
- security and controlling access;
- use of slashing to reduce fuel build-up along potential ignition sources, such as public roads, prior to the fire season;
- use of cool burns (with any required approvals and/or permits from Rural Fire Service) to reduce fuel build-up to protect biodiversity and nested conservation values;
- establishment of asset protection zones around priority infrastructure;
- investment in water and other fire suppression assets; and
- communication of Bushfire Management Plan and response procedures with key stakeholders, including Leaseholders, neighbours, consultants, contractors and employees.

Any fuel hazard reduction burns will be planned in accordance with the *Bush Fire Environmental Assessment Code for New South Wales* (Rural Fire Service, February 2006) and the guidelines contained in the Threatened Species Hazard Reduction Lists for the Bush Fire Environmental Assessment Code.

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 the woodland vegetation, the recommended fire intervals are the same as woodland vegetation.

4.5.3 Implementation and Reporting

Annual meetings will be held between Rural Fire Service and Coal & Allied to review the Bushfire Management Plan and prepare the annual actions list to prepare for the proceeding fire season.

4.5.4 Performance and Completion Criteria

	Year 1 PC	Year 2 PC	Year 3 PC	CC
Bushfire Management Plan for MTW (including Putty Road Offset)	Annual revision	Annual revision	Annual revision	

4.6 Erosion Control

Soil erosion occurs when vegetation has been removed exposing bare soils, making them susceptible to erosion where water flow is able to mechanically remove or disperse the soil. This often occurs along creek lines but can occur in bare paddocks where vegetation clearing or over grazing exposes bare soils. Bare soils in locations where high volumes of water occur can lead to severe soil erosion.

4.6.1 Management Objective

To minimise the erosion and sedimentation of land, watercourses and waterbodies within the Southern BA.

4.6.2 Method

There is some potential for erosion to occur within the Putty Road Offset. Management options for erosion control include excluding grazing (discussed in section 4.2.4 above), controlling vehicle access, maintenance of tracks and rehabilitation of drainage lines, watercourses and riparian areas where significant erosion impacts are identified.

4.6.3 Implementation and reporting

Erosion within the Putty Road Offset will be monitored through inspections by Coal & Allied, as well as other observations recorded during the adaptive management monitoring programme. Appropriate erosion remediation measures will be undertaken in consultation with the HLLS and NSW OEH.

4.6.4 Performance and completion criteria

	Year 1 PC	Year 2 PC	Year 3 PC	CC
Annual inspections and reporting	Completed, trends identified and ameliorative measures implemented	Completed, trends identified and ameliorative measures implemented	Completed, trends identified and ameliorative measures implemented	Annual reports completed

4.7 Management of livestock

Stock allowed free and uncontrolled access to woodland vegetation can limit the regeneration of native plants and alienate middle and understorey vegetation.

The Putty Road Offset has historically been grazed by livestock. Grazing by livestock will be excluded from the Putty Road Offset during 2014, and will continue to be excluded over the life of this OMP.

4.8 Access and infrastructure improvement

Construction of new or maintenance of existing infrastructure (such as access/fire tracks, fences or gates) will be required to implement re-establishment and restoration activities, undertake monitoring programmes and provide safe access for Coal & Allied personnel, consultants and contractors.

Maintenance and construction activities may cause localised site disturbance. To protect biodiversity and cultural heritage values, the Coal & Allied Ground Disturbance Permit (GDP) process will be followed to ensure compliance with all legal and environmental protection measures.

Maintenance of fence lines is necessary to maintain security to the Putty Road Offset and to exclude cattle from neighbouring properties accessing the sites for grazing.

4.8.1 Management Objective

To maintain and construct where necessary, infrastructure that supports the implementation of the Putty Road Offset OMP, principally access for management and emergency purposes and fences to maintain security, with minimal impact on biodiversity values.

4.8.2 Method

The following are the permissible actions and guidelines for the maintenance (and construction where necessary) of infrastructure:

- Site disturbance along access/fire tracks may be required to facilitate re-establishment and restoration activities within the Putty Road Offset and in adjacent areas;
- Clearing of vegetation within the BAs for the maintenance or construction of access/fire trails will be no greater than a six metre track width (as per the *Native Vegetation Regulation 2005*);

- All works will be undertaken in a manner that minimises disturbance to soil and hydrological characteristics and avoids erosion; and
- The Coal & Allied GDP process will be adopted to ensure compliance with all legal and environmental protection measures.

4.8.3 Implementation

Prior to any significant disturbance, the Coal & Allied GDP process will be completed by the person responsible for undertaking the activity and approved by Coal & Allied.

Routine inspections and maintenance of infrastructure (access/fire tracks, fence lines and gates) will be undertaken to ensure they are to standard and fit for purpose.

4.8.4 Performance and completion criteria

	Year 1 PC	Year 2 PC	Year 3 PC	CC
Access track mapping and access point signage and security	Map all internal trails install signposts and locks on key access points.			Mapped and installed.
Track Management Plan	Update Track Management Plan showing tracks to be retained and rehabilitated.	Rehabilitation of tracks in accordance with Track Management Plan	Rehabilitation of tracks in accordance with Track Management Plan	All tracks to be in sound condition in line with the track category.
Fence mapping showing fencelines and gate types, redundant fences and fences to be retained	Map all internal fences			Mapped.
Fence maintenance		Initiate maintenance based on inspection results		All fences maintained and in sound condition.
Redundant fence removal	Identify redundant fences	Remove redundant fences	Remove redundant fences	All redundant fences removed
Annual inspections and issues rectified within 4 weeks if possible	To be completed annually and a record of maintenance kept.	To be completed annually and a record of maintenance kept	To be completed annually and a record of maintenance kept	All annual inspection completed.

4.9 Waste management

Previous landowners of the Putty Road Offset had created small rubbish dumps and/or former agriculture infrastructure or equipment had become dilapidated, broken down or collapsed within the Putty Road Offset and adjacent areas.

4.9.1 Method and Implementation

From observation, all the material would be recyclable (i.e. scrap steel) or would be classed as “General Solid Waste – Non-putrescible” and may be disposed of at the mine (were permissible by relevant waste legislation and regulations) or taken to the Singleton Waste Depot.

If any rubbish was not to be classified as “General Solid Waste – Non-putrescible”, then Coal & Allied would assess the waste in accordance with the Waste Classification Guidelines (OEH) and dispose of the material appropriately.

4.9.2 Performance and Completion Criteria

	Year 1 PC	Year 2 PC	Year 3 PC	CC
Annual inspections, rubbish dumping locations mapped and reported within 4 weeks	To be completed annually	To be completed annually	To be completed annually	Completion of inspection reports
Remove reported dumped rubbish	Action and remove any dumped rubbish reported	Action and remove any dumped rubbish reported	Action and remove any dumped rubbish reported	No dumped rubbish

4.10 Cultural Heritage

Cultural heritage sites or values identified have been recorded and managed to ensure their protection. Management of cultural heritage sites will continue be aligned with the Rio Tinto Coal Australia Cultural Heritage Management System and the NSW OEH Due Diligence Code of Practice for the Protection of Aboriginal Objects, to guide the protection of and interaction with the sites across the Putty Road Offset.

The location and information relating to cultural heritage sites will be stored and accessed from the online Biodiversity Offsets Portal.

5 Monitoring Programme

5.1 Monitoring Approach and Frequency

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

- Landscape monitoring: to assess vegetation changes and habitat connectivity at the landscape scale in the long-term (7-10 years);
- Habitat and bird assemblage monitoring: to quantify changes in vegetation structure, key fauna habitat features and bird assemblages in the short to medium-term (2 years); and
- Restoration Assessment: to identify threats and inform management activities consistent with the adaptive management approach in the short term (quarterly).

The frequency of monitoring activities will vary according to the monitoring schedule provided in **Table 9**. To enhance understanding and knowledge of all key stakeholders in the management of the Offset Areas, Coal & Allied representatives, where feasible, should accompany the Biodiversity Auditors during the field based components of this monitoring programme.

All monitoring results will be stored on the Biodiversity Offsets Portal.

Table 9 Monitoring Schedule

Monitoring	2013	2014	2015	2016	2017	2018	2019	2020
Landscape	X							X
Habitat		X		X		X		X
Bird Assemblage		X		X		X		X
Restoration	Quarterly							

5.2 Landscape Monitoring

Aerial photographic imagery will be updated every 7-10 years. This imagery will be analysed and the findings ground-truthed to assess the extent of canopy regeneration within the Putty Road Offset.

The analysis of tree canopy cover will be used to map changes in the distribution and condition of woodland habitats and the connectivity of vegetation remnants. An increase in the extent and condition of woodland habitats will be indicative of successful management of the Putty Road Offset towards the Key Performance Indicators.

5.3 Habitat and Bird Assemblages Monitoring

Habitat restoration and bird assemblage monitoring aims to assess changes in the condition and extent of the woodland habitats within the Putty Road Offset and the ongoing usage of these habitats by woodland birds.

5.3.1 Habitat Monitoring

Birds and reptiles are widespread and typically abundant taxa whose populations are easily surveyed. Although they are relatively mobile taxa, many species can show specialisation in their habitat requirements. Patterns in the distribution and abundance of bird and reptile assemblages can be indicative of biodiversity as a whole and of environmental change. Accordingly, bird and reptile assemblages will be monitored as indicators of habitat condition. In addition, details of general fauna habitat features will also be recorded at each fauna monitoring site. Patterns in bird and reptile populations and habitat will be assessed to test the predication that:

- as grassland and low-quality woodland are restored, bird and reptile assemblages and their habitats will become more similar to assemblages/habitats in the medium-high quality woodland habitats.

13 habitat monitoring plots will be established across the Southern BA to monitor condition of woodland reference sites and grassland transformation sites. Their locations will be strategically and practically chosen to sample six accessible plots in woodland and grassland. Within Putty Road Offset there will be two woodland reference habitat monitoring plots. Six plots will be located in Central Hunter Grey Box Ironbark woodland and grassland communities.

Baseline surveys will be conducted during late spring/early summer 2014 and subsequent surveys will be biannual (see **Table 9**). **Table 10** outlines the survey methods for indicators of ecosystem condition.

Table 10 Survey methods for indicators of ecosystem condition

Survey Method	Details
Birds	
Habitat area searches	Habitat area searches will be conducted in accordance with Birdlife Australia Atlas search methodology (Birdlife Australia 2013) and EPBC Act bird survey guidelines (DEWHA 2010). This method involves searching a set area and recording data only from within the pre-defined search zone. A two ha area will be surveyed for 20 minutes at each of the designated monitoring sites by two observers.
Incidental and opportunistic records	Incidental and opportunistic surveys will include visual observations and calls, and suitable habitat areas will also be recorded when travelling to and between monitoring sites. All opportunistic sightings and their locations will be recorded. General notes and important habitat resources such as tree hollows, flowering trees and nests will be recorded incidentally and photographed, as will any notable bird activities such as specific forage behaviour or signs of breeding activity.
Reptiles	
Active searches	Reptiles will be surveyed at the monitoring sites by undertaking diurnal and nocturnal active searches in suitable habitat (SEWPaC 2011). Diurnal active searches will involve disturbing shrubs and tussock grasses, lifting bark, fallen logs, bush rock and scraping top soil and nocturnal searches will involve spotlighting for reptiles.
Funnel traps	Four funnel traps will be set at each monitoring location in grassland areas to capture medium to large-sized reptiles. All traps will be checked at least twice a day as they will not be shaded.
Habitat	
50x20m plot	Within a 50x20m plot, the number and species of canopy trees will be recorded. The proportion of trees with hollows (minimum entrance width of 5cm), mistletoe or flowers/fruit as well as any dead trees and the total length of fallen logs (minimum diameter 10cm and minimum length 0.5m) within the plot will also be recorded. Permanent photo reference points are to be established.
20x20m quadrat	Within a 20x20m quadrat, the % cover of litter, rock and bare ground will be estimated.

The monitoring programme will assess changes in habitat values within the Biodiversity Areas through time and relative to the benchmark values presented in the Biometrics Vegetation Types Database (OEH, 2013). These benchmark values relate to species richness and percent cover of native plants in the various vegetation layers as well as counts of tree hollows and the length of fallen timber. Additional habitat features will also be included in this monitoring programme to track canopy regeneration and health.

Field Methods

13 habitat monitoring plots will be established across the Southern BA according to the following breakdown:

Southern Biodiversity Area	Warkworth Sands Woodlands - 4 reference plots	
	Warkworth Sands Grasslands - 3 transformation plots	
	Central Hunter Grey Box Ironbark Woodland - 3 reference plots	
	Central Hunter Grey Box Ironbark Grassland - 3 transformation plots	
Total Habitat Monitoring (reference and transformation) Plots		13

The plot will be 50m x 20m and will be established such that the plot runs downslope. A 20m x 20m quadrat will be positioned within this larger plot and three 50m transects will run its length (**Figure 6**). Where possible, four marker pegs will be used to establish a permanent plot position. GPS coordinates are taken to ensure monitoring plots can be relocated over time.

The 50m x 20m plot will be used to record details of the over-storey (canopy) layer including species richness, canopy regeneration and canopy health. Specific habitat features, such as the abundance of tree hollows, flowers fruit, mistletoe and fallen logs will also be recorded at this scale

The 20m x 20m quadrat will be used to record details of the mid-storey and ground stratum structure including details of the % cover of native/exotic species for various plant groups (e.g. grasses, shrubs, other herbaceous plants). Additional habitat features such as rocks, litter and bare ground will also be recorded at this scale.

Three 50m transects will be used to assess the % foliage cover of the over-storey. These data will be collected at 10 points (i.e. at every 5m) along the length of the transects.

Further details of the field sampling methods, including a table summarising the variables (measurements) that will be recorded, their unit of measurement and the sampling unit are provided in **Appendix D**.

During the baseline surveys (2014) additional details on plant species composition will be recorded to inform mapping of the vegetation communities mapped in accordance with to the Biometrics Vegetation Types Database.

Figure 6 Habitat Monitoring Plot

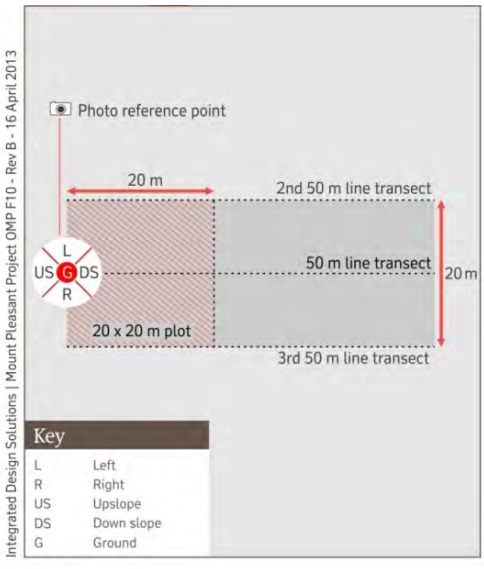


Photo Reference Points

A photo reference point also will be established and permanently marked within each habitat monitoring plot. Photo reference points will be established at the top of the middle 50m transect at each monitoring site. During each monitoring event, a series of photos will be taken from this point to provide a visual record of any changes in vegetation and habitat condition. Depending of the location of the monitoring plot, this might include:

- changes in vegetation structure (e.g. presence/ absence of canopy species, shrubs, tussock grasses);

- the presence/condition of special habitat features (e.g. rock outcrops, flowering/fruiting species); and
- changes in identified threatening processes (e.g. weed infestations, erosion).
- At each photo reference point, a minimum of five photos will be taken, in the following directions:
- downslope;
- upslope;
- across the slope – left (when facing downslope);
- across the slope – right (when facing downslope); and
- directly down.

The photo records will be displayed on the Biodiversity Offsets Portal such that monitoring photos can be viewed against another photo years. This will provide an ongoing and gradual visual record of changes in habitats as the management strategies are implemented as well as changes in existing threats and early warning of emerging threats at monitoring sites.

Soil analysis

Soil samples will be undertaken using standard soil sampling techniques with a core sampler within the monitoring quadrat. At least 12 cores will be taken at each site and bulked together. Soil analysis will consist of assessing the parameters, pH, EC, Available Ca, Mg, K, ammonia, sulphur, organic matter, exchangeable Na, Ca, Mg, K, H, Al, cation exchange capacity, available and extractable phosphorus, micronutrients (Zn, Mn, Fe, Cu, B), total carbon and nitrogen. Exchangeable Sodium Percentages are to be calculated as a measure of sodicity or dispersion.

Results of key parameters such as pH, electrical conductivity, organic matter, phosphorous, nitrate, Cation Exchange Capacity and Exchangeable Sodium Percentages are used as primary indicators of the suitability of the soil for native vegetation within the monitoring site.

Data Analysis and Interpretation

To assess the success of the management activities in meeting the Key Performance Indicators, data on bird and reptile assemblages, fauna habitats and Warkworth Sands Woodlands will be analysed against the predicted changes in these groups associated with implementation of the management strategies.

Univariate and multivariate techniques will be used to analyse and visualise patterns in the data and may include:

- Analysis of Variance (ANOVA): to test for changes in univariate data including species richness, abundance of specific habitat features, % cover vegetation structural layers;
- Distance-based permutational Analysis of Variance (Anderson, 2001; 2004) based on Bray-Curtis dissimilarities: to test for changes in multivariate data including fauna and plant community composition;
- Graphs and charts: to summarise patterns in univariate data and visualise changes in variables relative to the reference condition (medium-high quality woodland); and
- Non-metric Multidimensional scaling and SIMPER analyses: to summarise patterns in multivariate data, visualize changes in the data relative to the reference condition and assist in ecological interpretation of the results.

Analysis of the baseline data will assess difference in fauna assemblages, habitats and vegetation condition between grasslands and woodlands across the Biodiversity Areas. It is expected that in subsequent years, with the progressive improvement in vegetation condition, the ecological data analysis will eventually show a convergence of ecological variables to that of the medium-high quality woodland. This is expected to be a medium

to long-term upward trend that will reflect the regeneration of grassland areas to woodland and the development and availability of critical fauna habitat features such as hollows, ground debris and forage resources. By demonstrating this convergence through time, it will be inferred that the proposed conservation management strategies have been successful in restoring the lower quality vegetation and fauna habitats towards the reference condition.

5.3.2 Bird Assemblage Monitoring

Birds are typically abundant and widespread taxa whose populations are easily surveyed. Although they are relatively mobile, many species can show specialisation in their habitat requirements. Patterns in the distribution and abundance of bird assemblages can be indicative of biodiversity as a whole and of environmental change. Accordingly, bird assemblages will be monitored as indicators of general ecosystem condition.

Habitat area searches will be conducted in accordance with Birdlife Australia (formerly Birds Australia) Atlas search methodology (Birdlife Australia 2013) and EPBC Act bird survey guidelines (DEWHA 2010). This method involves searching a set area and recording data only from within the pre-defined search zone. A two ha area will be surveyed for 20 minutes by two observers at each of the habitat monitoring plots.

Incidental and opportunistic surveys will also be conducted where suitable habitat areas for the migratory woodland birds are observed when travelling to and between monitoring sites. All opportunistic sightings of these species and their locations will be recorded. General notes and important habitat resources such as tree hollows, flowering trees and nests will be recorded incidentally and photographed, as will any notable bird activities such as specific forage behaviour or signs of breeding activity.

5.4 Restoration assessments

Restoration assessment will be undertaken on a quarterly basis to provide regular feedback on the effectiveness of management strategies and to ensure early detection of emerging threats.

Restoration assessment will includes estimations of ground cover characteristics (total % cover, % cover native plants, herbage mass), weeds abundances, feral animal activity, observation of threatened species, special habitat features, flowering plants, infrastructure condition and rainfall data. This information will inform management decisions including:

- Weed control - new or significant changes to noxious weed infestations and control activities;
- Pest animal control - damage or presence of feral pest animal and control activities;
- Fire management - fire fuel hazard assessments and control activities;
- Bird survey locations – sites where threatened birds have been observed or where there are flowering trees will be re-visited during bird assemblage monitoring; and
- Infrastructure improvements - requirements for new infrastructure as well as maintenance or repair of existing infrastructure (roads/fences).

Field methods and a reporting template are provided in **Appendix E**.

6 Conclusion

The Putty Road Offset OMP is the framework document for an effective conservation and restoration of the Putty Road Offset. It documents:

- Objectives, Performance Criteria and Completion Criteria
- Conservation management strategies; and
- Monitoring programme, for the Putty Road Offset and surrounding Biodiversity Areas.

Table 11 identifies the key risks to the Putty Road Offset OMP, the contingency measures in place and the relevant section in the Putty Road Offset OMP that addresses this risk. The table identifies the key responsible person and the components of the monitoring programme aimed to observe the presence or impacts of the risk. This adaptive management approach to risk and contingency management is made effective by the monitoring programme, communication between relevant stakeholders and the implementation of conservation management strategies.

Table 11 Risk and Contingency Assessment Matrix

Risk	Description of risk	Contingency Measure	Reference in OMP	Key responsible person	Monitoring Programme
Weed Incursion	Vehicles spreading weeds	Establishment of containment zones. Weed hygiene.	Weed Control (Chapter 4.2) Table 8 Weed Control Methods	Coal & Allied UHWA All visitors to the Putty Road Offsets	
Pest Animals	High populations of pest animals restricting native plant regeneration or growth.	Annual control of pest animals and monitoring impacts.	Pest animal control (Chapter 4.4)	Coal & Allied Contractor	Monitoring (Chapter 5)
Fire	Wildfire entering the Putty Road Offsets.	Implementation of annual Bushfire Management Plan	Fire management (Chapter 4.5)	Coal & Allied RFS	
	Increases fire intensity due to higher fuel loads	Implementation of annual Bushfire Management Plan	Fire management (Chapter 4.5)	Coal & Allied RFS	Monitoring (Chapter 5)
	Fire ignition on Putty Road Offsets	Implementation of annual Bushfire Management Plan	Fire management (Chapter 4.5)	Coal & Allied RFS	
Herbicide Drift	Chemical spray drift.	Follow government regulations and only spray in variable weather conditions. Use alternative weed control measures where practical (e.g. Biological control)	Weed Control (Chapter 4.2)	Coal & Allied Weed control contractors	Monitoring (Chapter 5)
Vegetation Management	Removal or clearing of native vegetation, including dead timber and live plants.	Clearing of vegetation for essential infrastructure will adhere to relevant legislation.	Access and Infrastructure (Chapter 4.8)	Coal & Allied	Monitoring (Chapter 5)
Unauthorised Access	Access to Putty Road Offset from unauthorised personnel	Boundary fencing, locks on gates and signs at main entry points	Chapter 4.1 (Controlled Activities)	Coal & Allied	

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Appendix A EPBC 2009/5081

Australian Government
Department of the Environment

VARIATION TO CONDITIONS ATTACHED TO APPROVAL

Warkworth Mine Extension, Warkworth NSW (EPBC 2009/5081)

This decision to vary a condition of approval is made under section 143 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Approved action

Person to whom the approval is granted	Warkworth Mining Ltd **ABN: 42 001 385 842**
Approved action	The proposed action is to extend the existing Warkworth coal mine over an additional 705 hectares of land at Warkworth, NSW, including associated modifications to existing mine infrastructure. [see EPBC Act Referral 2009/5081].

Variation

Variation of conditions of approval	The variation is: Delete conditions 1-22 and appendix 1 and 2 attached to the approval dated 9 August 2012 and substitute conditions 1-22, and Attachment A, and definitions "Phase 1", "Phase 1 Offset" and "Phase 2" as specified below. All other definitions in the approval dated 9 August 2012 remain unchanged.
Date of effect	This variation has effect on the date the instrument is signed

Person authorised to make decision

name and position	Shane Gaddes Assistant Secretary Compliance & Enforcement Branch
Signature	S Gaddes
Date of decision	23 December 2013

Conditions attached to the approval

Offset Areas

1. To offset the impact on the foraging habitat for *Anthochaera phrygia* (regent honeyeater) and *Lathamus discolor* (swift parrot), the person taking the action must register a legally binding conservation mechanism over 94ha of land, as illustrated in the map at Attachment A as the **Phase 1 Offset**. The conservation mechanism must provide enduring protection for the **Phase 1 Offset** and must be registered within 12 months of the **Commencement of Construction** of **Phase 1** of the action. The person taking the action must notify the **department** in writing within 1 month of the registration of the conservation mechanism.

2. To offset the impacts on the foraging habitat of the regent honeyeater and swift parrot, the person taking the action must submit to the **Minister** for approval an *Offset Management Plan* (OMP) for the **Phase 1 Offset** identified in Attachment A by no later than 13 April 2014.

   The OMP must include, but not be limited to the following:

   a. a textual description and map to clearly define the location and boundaries of all of the offset areas. This must be accompanied with the **offset attributes** and a **shapefile**
   b. details of management actions to protect and enhance the extent and condition of habitat values of the offset areas including but not limited to rehabilitation, weed control, fire management, erosion and sediment control, management of livestock and restrictions on access to habitat for the regent honeyeater and swift parrot
   c. the timing, responsibilities and performance criteria for management actions
   d. a monitoring plan including the undertaking of ecological surveys by a qualified ecologist to assess the success of the management actions against identified milestones and objectives
   e. a process to report, to the **department**, the management actions undertaken in the offset areas and the outcome of those actions, including identifying any need for improved management
   f. a description of the potential risks to successful management and rehabilitation in the offset areas, and a description of the contingency measures that would be implemented to mitigate these risks
   g. details of parties responsible for management, monitoring and implementing the plan, including their position or status as a separate contractor.

   The approved OMP must be implemented.

   Note: Offset areas can accommodate offset requirements for more than one species habitat within the one area, if a qualified ecologist verifies that suitable habitat is present and includes specific habitat requirements for the relevant species.

3. At least 12 months prior to **Commencement of Construction** of **Phase 2** of the action, the person taking the action must submit to the **Minister**, for approval, details of areas to offset the impact on the foraging habitat of the regent honeyeater and swift parrot. The offset areas must be at least equivalent in area and habitat value to the offsets previously approved under this approval at 9 August 2012 (that is at least 2,532ha of suitable habitat for the regent honeyeater and swift parrot) (**Phase 2 Offset**).

4. To offset the impact on the foraging habitat of the regent honeyeater and swift parrot, the person taking the action must register a legally binding conservation mechanism within 2 years of the date of approval of the **Phase 2 Offset**. The person taking the action must notify the **department** in writing within 1 month of the registration of the conservation mechanism.

5. The approved OMP, as described in condition 2, must be revised by the person taking the action to include, but not be limited to, those activities as described in condition 2a-g for the **Phase 2 Offset**. The revised OMP must be submitted for approval by the **Minister** within 12 months of the approval of the **Phase 2 Offset**. The revised approved OMP must be implemented.

Re-establishment of Woodland in Biodiversity Management and Offset Areas

6. Within 12 months of the **Commencement of Construction** of **Phase 1**, the person taking the action must submit to the **Minister** for approval a *Re-establishment Plan* (REP) for the **Phase 1 Offset** area. The REP must include, but not be limited to the following:
   a. details of the areas to be re-established (re-establishment areas) including location and maps;
   b. documentation including mapping of current environmental values relevant to MNES of the re-establishment areas
   c. where revegetation through planting seedlings and/or seeds is intended, details of appropriate species and ratios of species relevant to historically occurring listed migratory and listed threatened species' habitat
   d. the source and provenance of the seeds and/or seedlings which will be used
   e. measures to address threats to MNES including but not limited to grazing pressure and damage by livestock and adverse impacts from feral animals and weeds
   f. measures to provide fire management regimes appropriate for the MNES
   g. measures to manage the MNES in accordance with the recommendations of the approved recovery plan for the migratory and threatened species
   h. monitoring measures including ecological surveys to measure the establishment and ongoing success of the revegetation based on a comparison with high quality habitat for the MNES
   i. performance measures and reporting requirements against identified objectives, including trigger levels for contingency measures to be taken to ensure performance measures and objectives are met
   j. identify persons responsible and arrangements for implementing the REP and for reporting on performance.

   The approved REP must be implemented.
7. The approved REP, as described in condition 6, must be revised by the person taking the action to include at least those activities as described in conditions 6a-j for the **Phase 2 Offset**. The revised REP must be submitted for approval by the **Minister** within 12 months of the **Commencement of Construction** of **Phase 2** of the action. The approved revised REP must be implemented.

Other Matters of National Environmental Significance

8. As a precautionary approach, the person taking the action must within 6 months of the date of this approval, or such other timeframe as specified in writing by the **Minister**, provide to the **Minister** any NSW Government approved water management plans which apply to the approved action.
9. The person taking the action must within 6 months of the date of this approval, or such other timeframe as specified by the **Minister**, provide to the **Minister** a report on:
   a. any updated modelling of surface and groundwater impacts that have been undertaken in preparing the water management plans
   b. how the water management plans have addressed groundwater and surface water impacts on nationally listed threatened species and ecological communities
10. If, after receiving the water management plans described in condition 8 and the report in condition 9, the **Minister** is not satisfied the water management plans adequately address impacts on listed threatened species and ecological communities, the **Minister** may require in writing that the person taking the action provide additional information within a specified timeframe.

Mine Site Rehabilitation

11. The person taking the action must, within 12 months of the **Commencement of Construction** of **Phase 1**, and within 12 months of the **Commencement of Construction** of **Phase 2**, submit to the **Minister** for approval a *Mine Site Rehabilitation Plan* (MSRP) for the progressive rehabilitation and revegetation of no less than 32ha woodland of mined areas for **Phase 1** and 2,303ha of woodland habitat on mined areas for **Phase 2**. The

MSRP must include, at a minimum, the following information:

a. the desired outcomes/objectives of implementing the MSRP
b. details of the vegetation communities to be rehabilitated and the timing of progressive rehabilitation
c. a process to progressively report to the **department** the rehabilitation management actions undertaken and the outcome of those actions, and the mechanisms to be used to identify the need for improved management
d. a description of the potential risks to successful management and rehabilitation on the project site, and a description of the contingency measures that would be implemented to mitigate these risks
e. details of parties responsible for reviewing and implementing the plan
f. details of long term management and protection of the mine site

The approved MSRP must be implemented.

12. The person taking the action must submit to the **Minister** for approval a *Mine Closure Plan* (MCP) at least 6 months prior to the closure of the mine. The approved MCP must be implemented.

Note: The person taking the action may develop a single mine rehabilitation plan to align with the requirements of this approval and those of the NSW Government.

Survey Data

13. All survey data collected for the project must be collected and recorded so as to conform to data standards notified from time to time by the **department**. When requested by the **department**, the person taking the action must provide to the **department** all species and ecological survey data and related survey information from ecological surveys undertaken for MNES. This survey data must be provided within 30 business days of request, or in a timeframe agreed to by the **department** in writing. The **department** may use the survey data for other purposes.

Reporting and Auditing

14. Within 14 days after the **Commencement of Construction** of **Phases 1 and 2**, the person taking the action must advise the **department** in writing of the actual date of **Commencement of Construction**.

15. Within 3 months of every 12 month anniversary of the **Commencement of Construction** of **Phase 1**, the person taking the action must publish a report (the Compliance Report) on their website addressing compliance with each of the conditions of this approval, including implementation of any plans as specified in the conditions. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the **department** at the same time as the Compliance Report is published. The person taking the action must also notify any non-compliance with this approval to the **department** in writing within 2 business days of becoming aware of the non-compliance. The person taking the action must continue to annually publish the Compliance Report until such time as agreed in writing by the **Minister**.

16. Upon the direction of the **Minister**, the person taking the action must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the **Minister**. The independent auditor must be approved by the **Minister** prior to the commencement of the audit. Audit criteria must be agreed to by the **Minister** and the audit report must address the criteria to the satisfaction of the **Minister**.

17. Where the conditions require the person taking the action to submit a plan for the **Minister**'s approval, the person taking the action must maintain a register recording:

a. the date on which each plan was approved by the **Minister**
b. if a plan has not been approved by the **Minister**, the date on which it was, or is expected to be, submitted to the **Minister**.
c. the dates on which reports on the outcomes of reviews have been approved by the **Minister**

d. the dates on which the subsequent reviews are due

The register must be submitted to the **department** at the time as the Compliance Report, as described at condition 15.

18. If the person taking the action wishes to carry out any activity otherwise than in accordance with the plans, as specified in the conditions, the person taking the action must submit to the **department** for the **Minister**'s written approval a revised version of that plan. The varied activity shall not commence until the **Minister** has approved the revised plan in writing. If the **Minister** approves the revised plan that plan must be implemented in place of the plan originally approved.

19. If the **Minister** believes that it is necessary or convenient for the better protection of listed threatened species and communities or listed migratory species to do so, the **Minister** may require that the person taking the action make specified revisions to a management plan specified in the conditions and submit the revised plan for the **Minister**'s written approval. The revised approved plan must be implemented. Unless the **Minister** has approved the revised plan the person taking the action must continue to implement the originally approved plan, as specified in the conditions.

20. If, at any time after 5 years from the date of this approval, the person taking the action has not substantially commenced the action, then the person taking the action must not substantially commence the action without the written agreement of the **Minister**.

21. The person taking the action must maintain accurate records substantiating all activities and outcomes associated with or relevant to the above conditions of approval, including measures taken to implement the management plans required by this approval, and make them available upon request to the **department**. Such records may be subject to audit by the **department** or an independent auditor appointed and/or approved by the **department**, and used to verify compliance with the conditions of approval. Summaries of audits will be posted on the **department**'s website. The results of audits may also be publicised through the general media.

Publication of plans

22. Unless otherwise agreed to in writing by the **Minister**, the person taking the action must publish all plans referred to in these conditions of approval on their website. Each plan must be published on the website within 1 month of being approved. The person taking the action must notify the **department** within 5 business days of publishing the plan on their website and the plan must remain on the website for the period this approval has effect.

Definitions

Phase 1 – of the approved action involves disturbance, under the proposed Warkworth Mine Modification 6 (350m extension to the West Pit), of approximately 31ha (see Attachment A), approximately 30ha of which is vegetated and 1ha is a dam.

Phase 1 Offset – The area of land marked in Attachment A as the **Phase 1 Offset**.

Phase 2 Offset – The area of land approved as an offset for Phase 2 of the action in accordance with condition 3.

Phase 2 – of the approved action involves the disturbance of the balance of approximately 674ha of the total 705ha approved under EPBC 2009/5081 on 9 August 2012, and as shown in Attachment A.

Appendix B Rapid Condition Assessment

The 'Save the Bush Toolkit' provides a rapid assessment technique which identifies the presence or absence of key habitat components and threatening processes. It is not applicable to all types of native vegetation (eg. Native grasslands, wetlands or pastures) but is a quick and reliable way to determine the condition of bushland and woodland communities.

It requires answering true or false to a series of questions and a tally of the "True" scores will tell you how healthy it is. Where answers are false, improved management in these areas may be required. Sites scoring 16 - 20 "trues" are generally considered to be areas of healthy vegetation that are sustainable under current management. Sites scoring 10 - 15 "trues" are generally considered to be areas of moderately disturbed bushland that have key elements missing and needs improved management. Scores lower than 10 are highly disturbed and have many key elements missing. They are generally unsustainable under the current management and require improved management.

Remnant attribute	Site
Low grazing intensity - never farmed	True
Tree and shrub regeneration present (<2m)	True
Infrequent fire regime (<5year intervals)	True
Healthy mature trees (no dieback)	False
Little to no evidence of rabbits	True
Little to no evidence of foxes/cats	True
Low abundance of weeds (most remnants contain some weeds)	True
No evidence of firewood collection	False
No obvious signs of erosion or salinity	True
Not susceptible to fertiliser application, herbicide or pesticide drift	True
Less than 20% trees with Mistletoe (NB some mistletoe is healthy)	True
Few tracks, trails or fence lines	True
Presence of native shrubs	True
Presence of large, old growth trees with hollows	True
Dead timber is left standing	True
Fallen timber and logs are left on the ground	True
Abundance of native ground flora	True
Presence of litter, cryptogams, cracks and rocks	True
Remnant is large (> 5ha is optimum)	True
Connected to or in close proximity to other remnant vegetation	True
Total No. True answers (x/20)	18/20

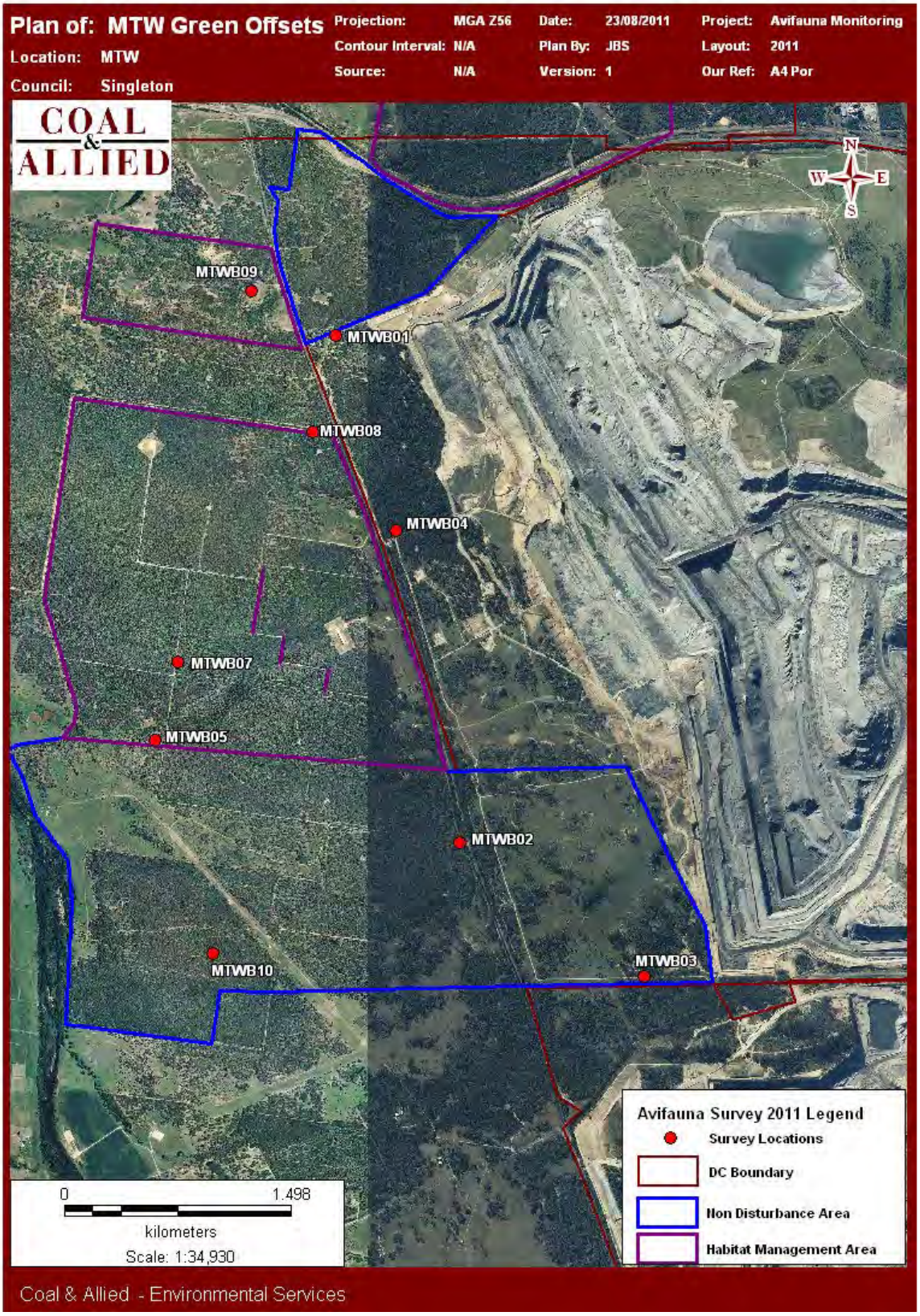
Appendix C MTW Bird Monitoring Results: July 2011

Sites MTWB 01–10 (Figure 1) as in 2008 surveys (Debus 2008, 2009). Survey area = 4 ha around survey point. Numbers are no. of individuals recorded on site during survey (maximum per site out of four replicate counts); O = off-site during counts or on/near site outside count times; F = feeding sign only (chewed *Allocasuarina* cones). Bold = threatened species (NSW *Threatened Species Conservation Act*). *New species for MTW; ** species known for MTW but not previously recorded in winter (June 2009).

Species	Site									Total
	1	**2**	**3**	**4**	**5**	**7**	**8**	**9**	**10**	
Australian Wood Duck			3					2		5
Pacific Black Duck								2		2
Common Bronzewing		2				O	1			3
**Crested Pigeon			1							1
Bar-shouldered Dove							1			1
*Wonga Pigeon							1			1
White-faced Heron			1		1	O				2
Wedge-tailed Eagle	2	1		1			1	1		6
Glossy Black-Cockatoo	F						4			4
Sulphur-crested Cockatoo					O					
Little Lorikeet		4								4
Australian King-Parrot					1					1
**Crimson Rosella							2			2
Eastern Rosella	2		3							5
Red-rumped Parrot		O								
Fan-tailed Cuckoo								1	1	2
Laughing Kookaburra	1		2	3	2		2	2		12
White-throated Treecreeper					1	3				4
Brown Treecreeper		1								1
Satin Bowerbird		O								
Superb Fairy-wren	7	2	2	2	4		6	6		29
Variegated Fairy-wren	4				5		2			11
White-browed Scrubwren								1		1
Speckled Warbler	2	5	2	3	5	4	3	6	2	32
Weebill	9	9	5	19	13	6	13	10	8	92
*Brown Gerygone							1			1
Yellow Thornbill	5	2	2	5	5	3	4	8	7	41
Yellow-rumped Thornbill								5	6	11
Buff-rumped Thornbill	2	5		2	8	7	4	4	7	39
Brown Thornbill	1						2	1		4
Spotted Pardalote			2	2	1	1	2	3	2	13
Striated Pardalote	1		1	1			2			5
Eastern Spinebill	3						4	4		11
**Lewin's Honeyeater								1		1
Yellow-faced Honeyeater	10	10		1	2	1	12	3	1	40

Species	Site									Total
	1	**2**	**3**	**4**	**5**	**7**	**8**	**9**	**10**	
White-eared Honeyeater				1	5	3	4	2	1	16
White-plumed Honeyeater	1	4	2							7
Noisy Miner	9	15	20				2	3		49
Red Wattlebird							5			5
**Scarlet Honeyeater	1		1			1	1			4
*White-cheeked Honeyeater								2		2
Brown-headed Honeyeater		20	12		8		10	3	5	58
**Noisy Friarbird			2	1						3
Striped Honeyeater	1		2	3			1		1	8
Grey-crowned Babbler		O	8					O		8
**Varied Sittella				8			3	3	6	20
Black-faced Cuckoo-shrike	1			2	1	1			2	7
*Crested Shrike-tit				1						1
Golden Whistler	1	1		2	1	3	1	2	4	15
**Rufous Whistler			1							1
Grey Shrike-thrush	1	2	1	2	1	1	2	3	1	14
Dusky Woodswallow			O							
Grey Butcherbird		1	2	1		1	1	1		7
Pied Butcherbird	2		1	1	1		1			6
Australian Magpie		1	2	2	1	1	4	2	5	18
**Pied Currawong	1			3	1	1	2	1	1	10
Grey Fantail	2	4	1	2	2	2	2	4	3	22
Willie Wagtail		1	1						1	3
Australian Raven	2	5	4	7	2	3	2	2	5	32
Restless Flycatcher		O			O					
Magpie-lark	1		2					1		4
White-winged Chough	15	6		20	15		15		15	86
Jacky Winter		1						2		3
*Scarlet Robin				1	2	1		1	2	7
Red-capped Robin		1			1	2			3	7
Rose Robin	1		1		2	1	1	2	1	9
Hooded Robin		O								
Eastern Yellow Robin	1	2		1			1	3	2	10
Silvereye	2					2	2	8		14
Welcome Swallow			3					1		4
Mistletoebird	1	2	1	2			1	1		8
Double-barred Finch								2		2
Red-browed Finch	4	4			2		2	10		22
Diamond Firetail		1								1
Total species	32	32	31	28	29	23	40	40	25	870
Grand total: 74 species										

Figure 1: MTW Avifauna Monitoring Locations



Appendix D Habitat Monitoring – Field Methods

Details of the field methods for Habitat Monitoring are provided below and a summary of the key variables that will be extracted from this data for analysis is provided in **Table 1**.

- **50x20m plot**

Over-storey composition and species richness: Systematically cover the entire 50x20m plot identifying all over-storey species (tallest woody stratum >1m).

Over-storey regeneration: When identifying over-storey species, also record stem diameter class (0-10cm, 10-20cm or >20cm) for each tree.

Additional habitat features: When identifying over-storey species, note the presence of tree hollows (minimum entrance width of 5cm), mistletoe or flowers/fruit on each tree and any dead trees. Also record the length of fallen logs (minimum diameter 10cm and minimum length 0.5m) within the plot.

- **20x20m quadrat**

Community species richness: Systematically cover the entire 20x20m quadrat counting all native species in the mid-storey (all vegetation between the over-storey and >1m including tall shrubs, under-storey trees and tree regeneration) and all native species in the ground stratum noting native grasses (plants belonging to the Family Poaceae), native shrubs (woody vegetation <1m), other native species (other native non-woody vegetation in ground stratum e.g. forbs, herbs, lilies, rushes, sedges) and exotic species. Note: during the baseline 2014 surveys also identify and record all species.

Community structure: Divide the 20x20m quadrat into four 10x10m quarters and estimate the % cover of native species in each stratum (mid-storey, ground stratum (grasses), ground-stratum (shrubs), ground stratum (other) and exotics) within each quarter. Average the four estimates to obtain an average % cover for each stratum in the 20x20m quadrat.

Additional habitat features: Within each quarter of the quadrat, also estimate % cover of litter, rock and bare ground. Average the four estimates to obtain an average % cover for each habitat feature in the 20x20m quadrat.

- **50m transect**

Community structure: At 10 points along each of the three 50m transects (every 5m) estimate % foliage cover directly overhead (over-storey) using reference images provided in the BioMetric 3.1 Operational Manual (Department of Environment, Climate Change and Water, NSW, 2011). Average the estimates to obtain an average % foliage cover for the plot.

Table 1 Key criteria, performance indicator and attributes used to monitor changes in the vegetation/habitat condition

Criteria	Key Performance Indicator	Attribute	Measurement units	Sampling units
Species richness	Vegetation that contains a diversity and density of species comparable to local remnant vegetation			
		Native over-storey	No. species/sampling unit	50x20m plot
		Native mid-storey	No. species/sampling unit	20x20m quadrat
		Native ground stratum (grasses)	No. species/sampling unit	20x20m quadrat
		Native ground stratum (shrubs)	No. species/sampling unit	20x20m quadrat
		Native ground stratum (other)	No. species/sampling unit	20x20m quadrat
		Exotic ground stratum	No. species/sampling unit	20x20m quadrat
		Total Native	No. species/sampling unit	20x20m quadrat for mid-storey and ground strata, 50x20m plot for over-storey
Community structure	Vegetation that is comprised of a range of growth forms comparable to that of local remnant vegetation			
		Native over-storey	% cover	3x50m transects
		Native mid-storey	% cover	20x20m quadrat
		Native ground stratum (grasses)	% cover	20x20m quadrat
		Native ground stratum (shrubs)	% cover	20x20m quadrat
		Native ground stratum (other)	% cover	20x20m quadrat
		Exotic	% cover	20x20m quadrat
Over-storey regeneration/health	Vegetation is maturing and/or natural recruitment is occurring at rate similar to those of the local remnant vegetation			
		Over-storey species regeneration	No. species	50x20m plot
		Over-storey species stem diameter class (0-10cm)	No./sampling unit	50x20m plot

Criteria	Key Performance Indicator	Attribute	Measurement units	Sampling units
		Over-storey species stem diameter class (10-20cm)	No./sampling unit	50x20m plot
		Over-storey species stem diameter class (>20)	No./sampling unit	50x20m plot
Additional habitat features	Vegetation is developing in structure and complexity comparable to that of the local remnant vegetation			
		Litter	% cover	20x20m quadrat
		Rock	% cover	20x20m quadrat
		Bare ground	% cover	20x20m quadrat
		Log	length	50x20m plot
		Tree hollows	number	50x20m plot
		Dead trees	(% tree population)	50x20m plot
		Mistletoe	(% tree population)	50x20m plot
		Flower/fruit	(% tree population)	50x20m plot
Soil	Soil properties are suitable for the re-establishment and restoration of vegetation community			
		pH	pH (5.8 – 7.3)	20x20m quadrat
		EC	< dS/cm (<0.150)	20x20m quadrat
		Organic matter	%(>4.5)	20x20m quadrat
		Phosphorous	ppm(50)	20x20m quadrat
		Nitrate	ppm(>12.5)	20x20m quadrat
		CEC	Cmol+/kg(>14)	20x20m quadrat
		ESP	% (<5)	20x20m quadrat

Appendix E Restoration Assessment

Field Methods

The restoration assessments will be undertaken by Coal & Allied to monitor basic elements of the restoration and threat abatement.

Restoration assessment once every 3 months, climatic information from the local weather station is to be recorded.

To rapidly assess the ground cover and herbage mass the following quadrat sampling method will be used for restoration assessment.

For each assessment, record the: date and location. Using a wooden or metal square (quadrat) of at least 0.5m x 0.5m internal dimensions, undertake the following steps:

a) Walk at random path within each area to be assessed and throw the quadrat a short distance.

b) For each throw look only at the area within the quadrat and assess and record the following:

A = the percentage of total ground cover (living and dead);

B = the percentage cover of live native plants;

C = the percentage cover of live non-native plants; and

D = measure height of ground cover using Meat and Livestock Australia Pasture Ruler to estimate herbage mass.

c) Take at least 10 random samples for each assessment area (paddock).

d) Calculate the percentage of the assessment area covered by vegetation (living or dead): Sum of A / Number of samples.

e) Calculate the percentage of the living vegetation that is live native groundcover by: (Sum of B x 100) / (Sum of B + Sum of C).

f) Calculate average mass by: Sum of D / Number of samples.

This quadrat data will be provided in quarterly reports along with the following information:

- presence of weeds;
- feral animal activity any livestock health or other management issues; and
- climatic condition data; and
- infrastructure and other management issues.

The following is the reporting template for restoration assessments.

Restoration Assessment Template

Site Details

Offset Area	*Putty Road Offset*	
Biodiversity Area	*Southern*	
Management Unit ID		
Latitude*		*or map attached
Longitude*		
Natural tree regeneration present (Yes/No)		
Ground cover regeneration present (Yes/No)		

Climatic Details

	Jan	Feb	Mar
Monthly Rainfall			
Maximum temp			
Min temp			
Condition			

Other management issues

Ground cover Assessment **Quadrat number (minimum 10)**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
% total ground cover (living and dead)															
% cover live native plants															
% cover live non-native plants															
height of ground cover/herbage mass															
weeds present (1) or absent (0)															
feral animal activity present (1) or absent (0)															

Other observations/comments (e.g. weed species, type of feral animal evidence (diggings, scats, live/dead animal sighting etc), revegetation, flowering trees etc)

Summary

% vegetation cover	#####
% live native ground cover	#####
average herbage mass	#####
% quadrats with weeds	#####
% quadrats with feral animal activity	#####