

In addition, the revised Noise and Vibration Management Plan will include road closure and relevant property owner communication protocols for blasting activities within 500 metres of McClintocks Lane and the Milpose property.

## 5.6 Ecology

The DGR's for the Project identified biodiversity as a key issue for investigation and specifically require:

- assessment of measures taken to avoid impacts on biodiversity (refer to **Section 5.6.1**);
- accurate predictions of the proposed vegetation clearing (refer to **Section 5.6.7**);
- a detailed assessment of the potential impacts of the Project on:
  - any terrestrial and aquatic threatened species, populations, ecological communities or their habitats and groundwater dependent ecosystems (refer to **Section 5.6.7**);
  - regionally significant remnant vegetation or vegetation corridors (refer to **Sections 5.6.4** and **5.6.6**);
- an offset strategy to ensure that the Project will maintain or improve the terrestrial and aquatic biodiversity values of the region in the long term (refer to **Section 5.6.9**).

A comprehensive ecological assessment has been undertaken by Umwelt to assess the potential impacts of the Project and is provided in **Appendix 9**, with a summary of the main findings outlined below.

The approach to this assessment is to focus on the areas of additional disturbance associated with the Project relative to the existing and approved areas of disturbance within the Project Area (refer to **Figure 5.9**). All areas within the existing and approved disturbance areas have been subject to previous ecological assessment with relevant impacts provided for in previous approvals. As outlined in **Section 5.6.8**, NPM implement a range of ecological management and mitigation strategies on site in accordance with existing management plans and procedures.

### 5.6.1 Impact Avoidance

The potential impacts of the Project on the ecological values of the Project Area were recognised early in Project design. As outlined in **Section 2.4**, NPM has undertaken detailed concept and pre-feasibility studies as part of the Project's development. Minimising environmental and community impacts while maximising economic resource recovery have been major considerations in the evaluation of alternative project design options.

The process of undertaking an ecological assessment requires particular steps to identify the ecological features that require specific assessment, and to determine the level at which they are likely to be impacted. This is initially undertaken without consideration of any mitigation or offsetting measures, however, the preliminary impact assessment informs project design and, in this case, has led to the development of project avoidance measures undertaken specifically to protect, or reduce impact on, ecological matters.



Source: NPM (2013), Google Earth (2010)

0 0.5 1 2 km  
1:40 000

#### Legend

- Project Area
- Active Operational Area
- Proposed Disturbance Area
- Proposed Upgrade to McClintocks Lane
- Proposed Site Access Road

FIGURE 5.9

Proposed Disturbance Area



The proposed extension of mining areas will target ore bodies that are currently mined at NPM and ore bodies located in close proximity to these areas. Accordingly, the majority of the proposed mining areas are located in the existing and approved disturbance areas which avoid and minimise areas of additional disturbance associated with the Project.

NPM has revised the proposed TSF 3 and waste dump footprints (refer to **Figure 1.2**). The proposed TSF 3 and waste dump footprints are generally located in areas that have been previously disturbed, active operational areas and areas of approved disturbance, to the largest extent possible to minimise areas of additional disturbance associated with the Project.

In particular, the Project design refinements have resulted in a substantial reduction of impacts on Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands EEC listed under the EPBC Act and TSC Act, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Grassland critically endangered ecological community (CEEC) listed under the EPBC Act and the related TSC Act listed Endangered Ecological Communities (EEC) known as, White Box Yellow Box Blakely's Red Gum Woodland. Refinement of the Project design has resulted in the avoidance of the following impacts on ecological features:

- avoidance of approximately 57 hectares of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland EEC; and
- avoidance of approximately 486 hectares of Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC.

In addition to the substantial design refinement of TSF 3, NPM has also specifically designed and located other key project components to areas which will avoid or minimise impacts to the ecological features of the Project Area. This includes the location of waste dumps and the proposed mine access road, which have been situated to avoid ecological impacts as far practicable.

## 5.6.2 Regional Ecological Context

The Project Area is located within the northern extent of the NSW South Western Slopes Biogeographic Region (Bioregion). Bioregions are 'relatively large areas characterised by broad, landscape-scale natural features and environmental processes that influence the functions of entire ecosystems' (NPWS 2003).

The NSW South Western Slopes Bioregion comprises the lower inland slopes of the Great Dividing Range, with approximately 93 per cent (8,070,608 hectares) within NSW and the remaining 586,181 hectares within Victoria (NPWS 2003). It is characterised by a sub-humid climate, with a temperate climate occurring at higher elevations along the eastern boundary adjacent to the South-eastern Highlands Bioregion. The Project Area is within the Lower Slopes subregion which is characterised by undulating and hilly ranges and isolated peaks set in wide valleys at the apices of the Riverina alluvial flats.

The wide valleys of the region are dominated by extensively-cleared tracts of land utilised for broad-acre agriculture, which commenced in the region in the mid 1800's. Remnant vegetation is primarily located on the hilly ranges though also occurs, usually in linear strips, along drainage lines and roads within the cleared agricultural landscapes.

### 5.6.3 Ecological Survey Methodology

Prior to commencement of field surveys, a comprehensive desktop review of relevant literature and databases was undertaken. The review focused on threatened species, migratory species, Endangered Populations and TECs recorded previously or likely to occur within the Project Area. The aim of the desktop review was to develop a list of threatened and migratory species, Endangered Populations and TECs recorded previously within or in the vicinity of the Project Area or with potential to occur. The database searches included:

- EPBC Protected Matters Search Tool database;
- Atlas of NSW Wildlife Database records;
- BirdLife Australia Atlas Database; and
- Primary Industries Fishing and Aquaculture Records Viewer.

The field ecological surveys completed for the Project were completed over a wider study area which incorporated the Project Area and surrounds. This area was surveyed based on broadly defined project footprints that were refined through the development of the Project footprint (refer to **Section 5.6.1**).

#### 5.6.3.1 Flora

Vegetation survey and mapping was carried out across a broad survey area encompassing the Project Area and surrounds (refer to **Figure 5.10**). In particular, vegetation surveys aimed to identify threatened species, Endangered Populations, TECs and species of local or regional significance present or potentially occurring within the Project Area. The steps involved in the vegetation survey included:

- Aerial photograph interpretation (API). Aerial photographs were viewed prior to and after vegetation survey to identify spatial patterns in vegetation, land use and landscape features. These informed field survey design and implementation, ecological assessment and vegetation community mapping in the Project Area.
- Field survey site selection using stratification. Systematic survey sites were selected by considering a range of bio-physical attributes that were likely to influence or determine the type of vegetation communities present.
- Field survey and associated plant identification. Flora field surveys were carried out within the Project Area in winter and spring 2011, and in summer and autumn 2012. Survey methods included standard plot (quadrat) sampling; BioBanking plots/transects; semi-quantitative and qualitative rapid assessment points; meandering transects and field reconnaissance.

Further details on each of the flora survey methodologies are provided in **Appendix 9**.

#### 5.6.3.2 Fauna

Fauna surveys were carried out within the Project Area and surrounding lands (refer to **Figure 5.11**) to identify the fauna species and their habitats occurring, or considered to have the potential to occur in the Project Area, including threatened species, migratory species, endangered populations, and species of local or regional significance.

Fauna surveys across the surrounding lands were undertaken during winter 2011, spring 2011, summer 2011/12 and autumn 2012. Fauna surveys in autumn 2012 also included the Project Area.



Source: Project Area: NPM (2013), Cadastre: LPMA (2011), Aerial: Google Earth (2010)

Note: Some rapid assessment points are out of view at the scale of this image.

Quadrats not labelled on this figure are labelled in Ecology Assessment Figures

0 1.0 2.5 5.0km  
1:100 000

### Legend

- Project Area
- Wider Study Area
- Project Disturbance Area
- Autumn 2012 Walking Transects
- Autumn 2012 Driving Transects
- Spring 2011 Walking Transects and Targeted *Diuris tricolor* Survey
- Spring 2011 Driving Transects
- Summer 2011-2012 Walking Transects
- - - Summer 2011-2012 Driving Transects
- Autumn 2012 Floristic Quadrats
- Spring 2011 Floristic Quadrats
- Summer 2011-2012 Floristic Quadrats
- Winter 2011 Rapid Assessment Points (Qualitative)
- Spring 2011 Rapid Assessment Points (Qualitative)
- Summer 2011-2012 Rapid Assessment Points (Quantitative)

FIGURE 5.10

2011/12 Flora Survey Effort





Source: Project Area: NPM (2013), Cadastre: LPMA (2011), Aerial: Google Earth (2010)

0 1.0 2.5 5km  
Scale 1:100 000

### Legend

- Project Area
- Wider Study Area
- Project Disturbance Area
- Opportunistic Amphibian Driving Survey
- Anabat Echolocation Recorder
- Call Playback
- Habitat Assessment
- Diurnal Bird and Reptile Search
- Koala SAT and Habitat Tree Assessment
- ▲ Diurnal Bird Search
- ▲ Diurnal Reptile Search
- Targeted Winter Bird Survey

FIGURE 5.11

2011/12 Fauna Survey  
Effort Outside of  
Trapping Sites

Fauna survey effort was designed with consideration given to the relevant survey guidelines as detailed in **Appendix 9**.

Survey methods included:

- Trapping surveys. This included use of terrestrial Elliott A and Elliott B traps; arboreal Elliott B traps; terrestrial cage traps; terrestrial faunatech hair funnels; large faunatech style arboreal hair funnels; and faunatech two-bank harp traps.
- Area searches. Methods included spotlighting searches were undertaken both on foot and from a moving vehicle; diurnal searches targeting reptiles and amphibians; bird searches, including opportunistic searches; surveys targeting the regent honeyeater and swift parrot; koala searches; Anabat surveys; Nocturnal call playback sessions.
- Opportunistic surveys for indirect evidence of animal presence including evidence of presence included scats, feathers, nests, burrows, bones, tufts of hair and scratch marks on trees.
- Habitat assessment targeting potential habitat and resources for fauna species, particularly threatened fauna species.
- Hollow bearing tree surveys.
- SEPP 44 koala habitat assessment.

Further details on each of the fauna survey methodologies are provided in **Appendix 9**.

#### **5.6.4 Flora Results**

As outlined in **Section 5.6.2**, the vegetation within the Project Area and broader area has been heavily modified due to a history of clearing and disturbance for agricultural purposes. In terms of general diversity of flora species, the Project Area is representative of the surrounding area with plant species diversity considered moderate with a total of 277 species recorded during surveys, of which 214 (77 per cent) are native and 63 (23 per cent) are introduced species.

##### **5.6.4.1 Vegetation of the Project Area**

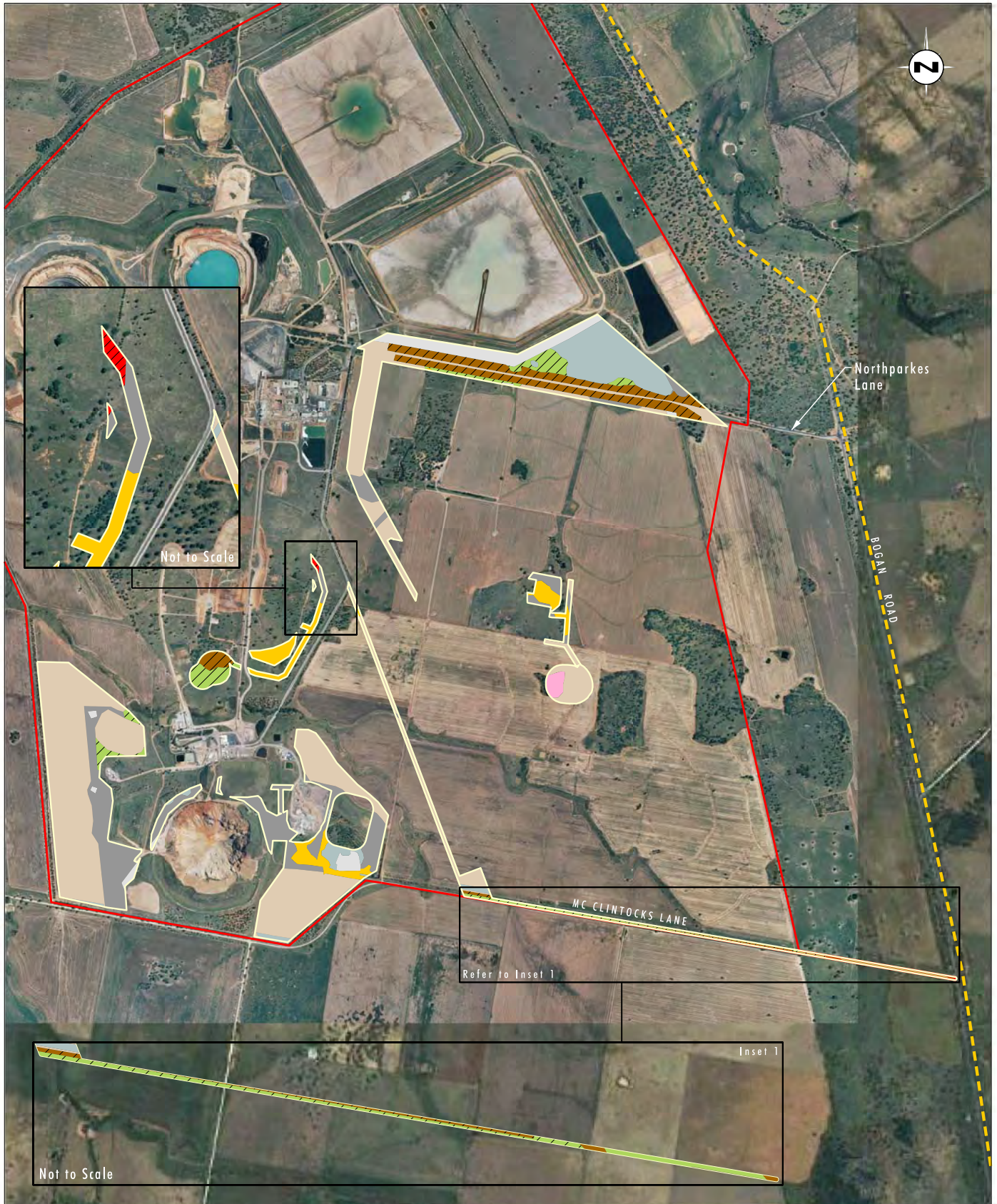
Surveys identified five vegetation communities and three types of disturbed or non-vegetated areas. As shown on **Figure 5.12**, the majority of the Project Area, including the proposed disturbance areas, is comprised of disturbed and non-vegetated areas including cultivated land, disturbed exotic grassland and plantation. The distribution of vegetation communities in the proposed disturbance areas are shown on **Figure 5.12**.

Where native vegetation occurs, the dominant communities identified in the proposed disturbance areas include:

- Grey Box Grassy Woodland;
- Grey Box Grassy Woodland-Derived Native Grassland; and
- Bimble Box – White Cypress Pine Woodland.

A number of small patches of planted native vegetation occur within the Project Area.





Source: Boundaries: NPM (2013), Aerial: Google Earth (2010)

0 0.5 1 1.5 km  
1:35 000

### Legend

- Project Area
- Wider Study Area
- Project Disturbance Area
- Bimble Box-White Cypress Pine Woodland
- Bimble Box-White Cypress Pine Woodland-Exotic Understorey
- Disturbed Land
- Exotic Grassland

- Grey Box Grassy Woodland (EEC - TSC Act/EEC - EPBC Act)
- Grey Box Grassy Woodland-DNG (EEC - TSC Act/EEC - EPBC Act)
- Plantation
- White Box-Yellow Box-Blakely's Red Gum Woodland (EEC - TSC Act/CEEC - EPBC Act)
- Cultivated Agricultural Land

**FIGURE 5.12**

**Vegetation Communities of the Project Disturbance Area**



Other vegetation communities identified of minor occurrence within the proposed disturbance areas included Bimble Box – White Cypress Pine Woodland – Exotic Understorey and White Box – Yellow Box – Blakely's Red Gum Woodland.

#### 5.6.4.2 Threatened Species and Endangered Populations

No threatened flora species were recorded in the Project Area during field surveys. Suitably timed and targeted surveys were undertaken across the surrounding lands for species identified previously as having the potential to occur within the Project Area.

One species, pine donkey orchid (*Diuris tricolor*), was recorded within the surrounding lands during targeted surveys in the north of the Project Area. The species was identified within areas of white cypress pine vegetation. This species has not been recorded within the proposed disturbance areas, however it is considered that potential habitat for this species occurs within the proposed disturbance areas, specifically in the areas of white cypress pine vegetation north of the existing Northparkes Lane.

No endangered populations listed under the TSC Act were recorded in the Project Area and none were identified as potentially occurring during the literature review and database searches.

#### 5.6.4.3 Threatened Ecological Communities

Two vegetation communities identified within the proposed disturbance area conform to the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grassland of South-eastern Australia EEC of the EPBC Act and also conform to the Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions EEC of the TSC Act. The two communities and their extent within the proposed disturbance area are:

- Grey Box Grassy Woodland: 23 hectares; and
- Grey Box Grassy Woodland – Derived Native Grassland: 15 hectares.

The vegetation community White Box – Yellow Box – Blakely's Red Gum Woodland identified within the Project Area conforms to the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC of the EPBC Act, and also conforms to the White Box - Yellow Box - Blakely's Red Gum Woodland EEC of the TSC Act. A total of 0.28 hectare of this community has been mapped in the proposed disturbance area.

The mapped extent of these communities within the proposed disturbance area is shown on **Figure 5.12**.

#### 5.6.4.4 Regionally Significant Vegetation

No rare, threatened or regionally significant flora species were recorded within the Wider Study Area or the proposed disturbance area.

## 5.6.5 Fauna Results

### 5.6.5.1 Fauna Habitat

Four general fauna habitat types occurred within the Project Area. Each of the four general habitat types has a range of characteristics which influence the habitat value, and the range of fauna species which are likely to be identified within each habitat type. The broad habitat types recorded within the Project Area comprised the following:

- Woodland habitat. The vegetation of the woodland areas generally comprised an open, low woodland overstorey and a scattered low understorey habitat area. Connectivity between woodland remnants within the Project Area and surrounds is poor.
- Grasslands. Canopy layer and shrub layers were generally absent from this community, although isolated paddock trees and areas of regenerating eucalypts and shrubs occurred. Most woody vegetation had previously been cleared for agricultural purposes. Grassland habitat areas provide little habitat value for most fauna species other than small terrestrial grassland species, macropods or granivorous birds.
- Farm dams. A number of moderate sized farm dams occurred scattered throughout the proposed disturbance area, most commonly occurring within grassland and disturbed habitat areas. Farm dam quality was variable ranging from low quality dams with no emergent or bank side vegetation to high quality dams with large areas of emergent and bank side vegetation.
- Disturbed habitats. Areas include cropped paddocks, roads and mining operations including subsidence areas, tailings dams and surface infrastructure areas. Disturbed habitat areas provide limited habitat value only to disturbance adaptable species which typically rely on natural habitats for most of their daily requirements.

Hollow bearing tree abundance varied across the Wider Study Area but overall, within the timbered vegetation, hollow abundance was relatively high. The hollow densities and hollow sizes varied across the vegetation communities. Grey Box Grassy Woodland contained the highest density of hollows of all three communities and was the only vegetation community found to contain very large hollows. Bimble Box White Cypress Pine Woodland was found to contain the lowest density of hollows overall.

White Box Yellow Box Blakely's Red Gum Woodland contained the highest density of very small hollows per hectare of the all three communities and also contained the highest number of hollows per hollow-bearing tree of the three communities.

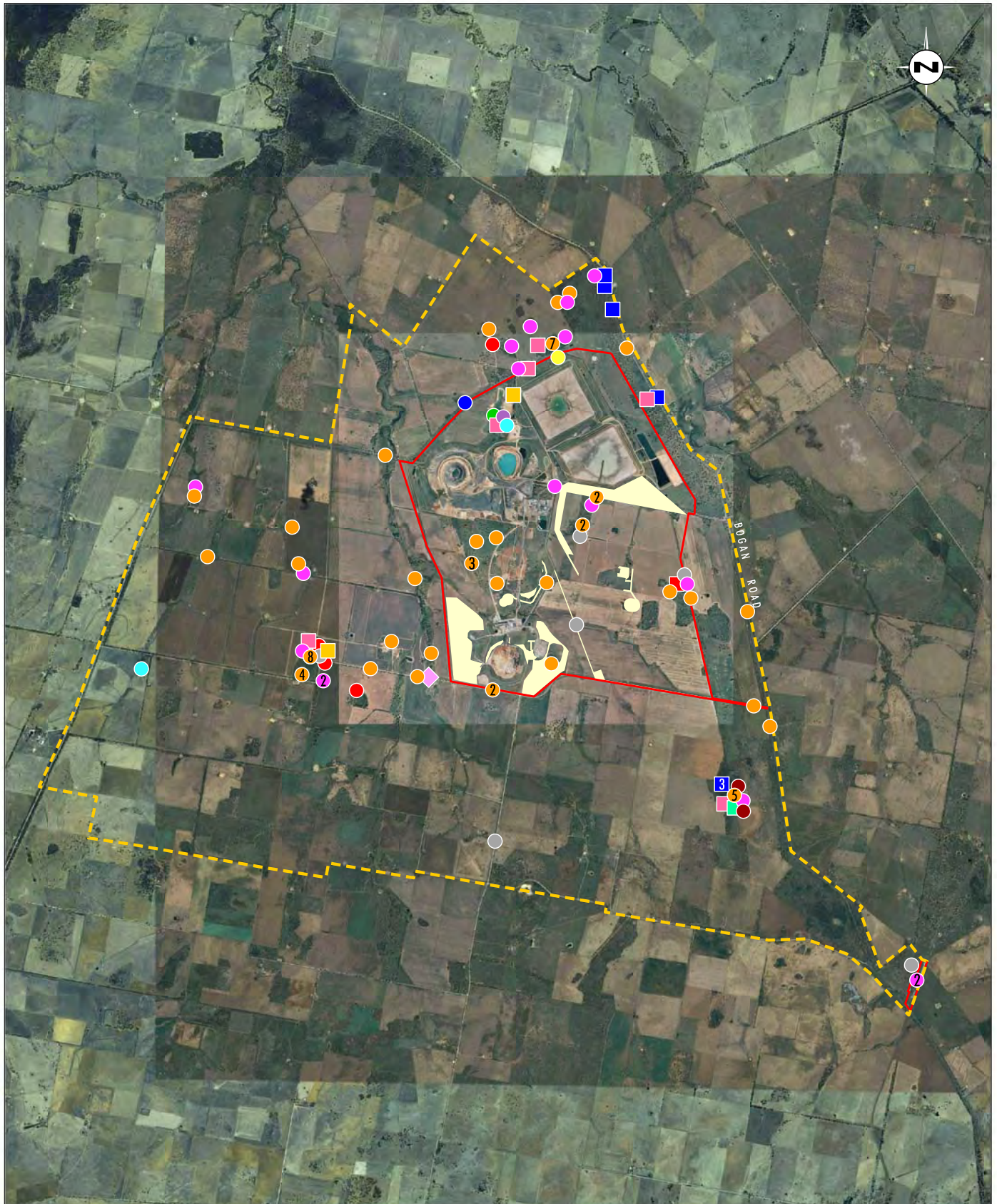
### 5.6.5.2 Terrestrial Species

In accordance with relevant OEH requirements, only records made during ecological surveys undertaken since 2008 (in the past five years) have been included in the list of threatened fauna species reported in **Appendix 9**. Details of fauna species identified within the Project are provided below.

#### Threatened Species

A total of 15 threatened fauna species were recorded within the Project Area and surrounds and comprised 1 amphibian, 12 birds and 2 micro-bat species (refer to **Figure 5.13**). Two threatened fauna species were recorded within the proposed disturbance area, the superb parrot (*Polytelis swainsonii*) and grey-crowned babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*) (refer to **Figure 5.13**). The superb parrot is listed as vulnerable under the TSC Act and the EPBC Act and the grey-crowned babbler (eastern subspecies) is listed as vulnerable under the TSC Act.





Source: Boundaries: NPM (2013), Aerial: Google Earth (2010)

Note: Number inside symbol indicates the number of times that species was recorded at that location

0 1.0 2.5 5.0km  
1:100 000

## Legend

Project Area  
Wider Study Area

Project Disturbance Area

### Threatened Species

Black falcon  
Brolga

Brown treecreeper  
Bush stone-curlew  
Eastern bentwing-bat  
Grey-crowned babbler  
Grey falcon  
Little eagle

Little pied bat  
Masked owl  
Painted honeyeater  
Sloane's froglet  
Spotted harrier  
Superb parrot

Swift parrot  
Migratory Species  
Rainbow bee-eater

FIGURE 5.13

Threatened and Migratory  
Fauna Locations

One species, the black falcon (*Falco subniger*) is currently listed as a proposed vulnerable species in a Preliminary Determination under TSC Act (dated 17 August 2012). This means that the NSW Scientific Committee has made a Preliminary Determination to support a proposal to list the black falcon as a vulnerable species under the TSC Act. For the purposes of this ecological assessment, the black falcon was assessed as a vulnerable species. A record of the black falcon was found within the Project Area but outside of the proposed disturbance area (refer to **Figure 5.13**).

### **Migratory Species**

No migratory fauna species were recorded within the Project Area. One species, the rainbow bee-eater (*Merops ornatus*), was recorded on two occasions within the wider study area during surveys (refer to **Figure 5.13**). Both of these records were from spring 2011 when this species typically migrates southward.

### **Non-threatened Species**

A total of 141 fauna species were recorded within the surrounding lands, comprising 12 frog species, 13 reptiles, 91 birds and 25 mammals. Details of these species are provided in **Appendix 9**.

Seven introduced fauna species (5 per cent of all fauna recorded) were recorded and comprised the common myna (*Acridotheres tristis*), common starling (*Sturnus vulgaris*), house mouse (*Mus musculus*), black rat (*Rattus rattus*), red fox (*Vulpes vulpes*), rabbit (*Oryctolagus cuniculus*) and hare (*Lepus capensis*).

### **Endangered Populations**

No endangered fauna populations (as listed under the TSC Act) were recorded within the Project Area and none are expected to occur.

### **Koala**

Two SEPP 44 Schedule two tree species were recorded within the Project Area being bumble box (*Eucalyptus populneus*) and white box (*Eucalyptus albens*). A combined total of 450 trees were searched throughout the surrounding lands including 60 within the Project Area.

No koalas were identified during walking or driving spotlight searches; no koalas responded to call playback sessions; no koala scats were recorded during targeted surveys; and no koalas were recorded during any other aspect of field surveys. No core koala habitat was identified as defined by SEPP 44 within the proposed disturbance area.

## **5.6.6 Regional Biodiversity Corridors**

No formal biodiversity corridors are known to have been mapped across the Project Area or in the surrounding area. Much of the land surrounding the Project Area has undergone substantial modification since European arrival through agricultural land use and limited remnant native vegetation occurs in isolated patches throughout the region. Goobang National Park to the east of the Project Area provides the only substantial corridor system in the region and provides movement paths to the north and south. TSRs provide limited potential connectivity within the landscape, with the TSR occurring directly to the east of the Project Area providing a potential link between habitats to the north and the south of the Project Area.



## 5.6.7 Ecological Impact Assessment

The potential impacts of the Project on the ecological values of the proposed disturbance area have been assessed in **Appendix 9**, with a summary of these findings outlined in the following sections. As outlined in **Section 5.6.1**, NPM has undertaken detailed concept and pre-feasibility studies that have refined the project design, resulting in the avoidance and minimisation of ecological impacts.

### 5.6.7.1 Vegetation Communities

The Project would result in the removal of vegetation, including:

- 52 hectares of native vegetation communities comprising approximately:
  - 23 hectares of Grey Box Grassy Woodland EEC (TSC and EPBC Act);
  - 15 hectares of Grey Box Grassy Woodland – derived native grassland (DNG) EEC (TSC and EPBC Act);
  - 0.28 hectare of White Box – Yellow Box – Blakely's Red Gum Woodland EEC (TSC Act)/CEEC (EPBC Act);
  - 12 hectares of Bimble Box – White Cypress Pine Woodland;
  - 1.7 hectares of Bimble Box – White Cypress Pine Woodland – Exotic Understorey;
- 187 hectares of disturbed, planted and non-vegetation areas comprising approximately:
  - 25 hectares of Plantation;
  - 123 hectares of Disturbed Land; and
  - 39 hectares of Exotic Grassland.

In summary, approximately 14 hectares of non-threatened native vegetation communities and approximately 38 hectares of mapped TECs would be removed from within the proposed disturbance area.

### 5.6.7.2 Fauna Habitat

The Project will result in the loss of approximately 116 hectares of fauna habitat within the proposed disturbance area. This comprises approximately 62 hectares of woodland habitat and approximately 54 hectares of grassland habitat. The remainder of the proposed disturbance area (approximately 123 hectares) comprises disturbed or cleared land which provides no fauna habitat value.

### 5.6.7.3 Threatened Flora/Fauna Species and Endangered Ecological Communities

An Assessment of Significance was completed for the relevant TECs and threatened flora and fauna species, either due to their recorded presence or the presence of potential habitat in the proposed disturbance area, and the potential for the species or TECs to be impacted (refer to **Appendix 9**).

In summary, the Assessment of Significance for the relevant TEC's and threatened species concluded that the Project is unlikely to result in a significant impact on the majority of listed TEC's and species that occur or have potential to occur within the proposed disturbance area (refer to **Appendix 9**). Importantly the Flora and Fauna Assessment (refer to **Appendix 9**) determined that the Project is not likely to have a significant impact on the Inland Grey Box and White Box TECs located within proposed disturbance area.

The Flora and Fauna Assessment (refer to **Appendix 9**) indicates that there may be a potential significant impact on two threatened species that may potentially occur within the proposed disturbance area, including the Pine donkey orchid (*Diuris tricolor*) and Sloanes froglet (*Crinia sloanei*), where these species may occur within the proposed disturbance area. Both of these species have been recorded in proximity to the Project Area, with potential habitat occurring within relatively defined areas within the proposed disturbance areas.

In the case of the Pine donkey orchid, the potential habitat for this species is limited to areas of white cypress pine vegetation located to the north of Northparkes Lane within the proposed disturbance area. The potential habitat for Sloanes froglet includes areas susceptible to inundation after prolonged wet weather outside of disturbed areas. In this regard, this habitat is taken to be within close proximity to drainage lines, and other areas of localised inundation within woodland and native grasslands areas within the proposed disturbance area.

As detailed in **Section 5.6.7**, NPM will undertake additional targeted survey for the Pine donkey orchid species within the proposed disturbance area in order to determine likelihood of presence to inform the development of specific impact mitigation and management measures relative to this species, which may be required as part of the Project.

#### **5.6.7.4 Threatened Aquatic Species and Threatened Ecological Communities**

No threatened aquatic flora or fauna species listed under the FM Act were recorded and no natural aquatic habitat occurs within the Project Area. As no suitable aquatic habitat areas occur within the Project Area for any of the threatened aquatic flora, aquatic fauna species or aquatic TEC's listed on the FM Act, further assessment under the FM Act is therefore not required.

#### **5.6.7.5 State Environmental Planning Policy 44 Koala Habitat**

The Project Area is not considered to form an area of 'core koala habitat' according the SEPP 44. Consequently, further assessment and preparation of a koala plan of management under SEPP 44 are not required.

#### **5.6.7.6 Groundwater Dependent Ecosystems**

None of the ecosystem types identified in the Groundwater Dependent Ecosystem (GDE) Policy (DLWC 2002) which depend on groundwater are present in the Project Area. Furthermore, no creeklines or streams that may be fed by groundwater flow through the Project Area (refer to **Section 5.7**). Areas of the vegetation community River Red Gum Woodland may potentially constitute GDEs. A very small area of River Red Gum Woodland (approximately 2.1 hectares) occurs in the Project Area, but outside of the proposed disturbance area, and a number of other areas along Bogan River outside of the Project Area. Due to the very small area of potential GDE occurring in the Project Area, and the limited predicted interactions with alluvial groundwater sources (refer to **Section 5.7**) the Project is unlikely to significantly impact any potential GDEs.



#### 5.6.7.7 Biodiversity Corridors

The Project Area is located outside of any identified regional or local biodiversity corridors, including those within reserves and/or TSRs within the area. An existing TSR is located immediately east of the Project Area, which provides a north south linkage for fauna movement. This will not be impacted by the Project.

#### 5.6.7.8 Environment Protection and Biodiversity Conservation Act 1999 Assessment

An assessment of Matters of National Environmental Significance (MNES) was undertaken for the Project. These matters are:

- Listed threatened species and ecological communities;
- Migratory species protected under international agreements;
- Ramsar wetlands of international importance;
- The Commonwealth marine environment;
- World Heritage properties;
- National Heritage places;
- Great Barrier Reef Marine Park; and
- Nuclear actions.

Relevant matters for the Project were consideration of impacts on threatened species, threatened ecological communities and migratory species protected under international agreements. The impact area for the MNES is larger than the impact area assessed under the EP&A Act as State approval already exists for certain areas. The impact area for MNES is referred to as the 'Referral Area' as detailed in **Appendix 9**.

An assessment of MNES was undertaken for the following:

- proposed removal of 46 hectares of Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC (please note that due to the majority of the proposed footprint for TSF 3 already approved as part of PA06\_0026, a larger area of impact was assessed for the purposes of the EPBC Act);
- proposed removal of 0.28 hectare of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC; and
- swift parrot and superb parrot.

No other MNES were recorded in the Referral Area and no significant impacts are expected upon any threatened or migratory species which have not been recorded in the Referral Area but for which potentially suitable habitat occurs.

The Project has been referred under the EPBC Act to DSEWPC and was declared a controlled action on 21 May 2013, and will be subject to assessment by preliminary documentation in accordance with DSEWPC requirements.

#### 5.6.7.9 Cumulative Impacts

The cumulative impacts likely to occur as a result of the Project are:

- loss of connectivity and increased fragmentation;
- loss of genetic biodiversity; and
- increased pressure on the remaining ecological resources due to competition from displaced individuals.

The Project would result in cumulative impacts on vegetation communities and fauna habitats in the local area and region. The cumulative loss of fauna habitat areas throughout the region, particularly those that provide dispersal, migration or movement pathways or stepping stone habitats may result in a reduced ability of species to move within the landscape of the region.

The Project can also be assumed to contribute to a cumulative loss of habitat areas and a reduced dispersal/migration/movement ability of some fauna species within the landscape.

The cumulative impact of the Project has been taken into consideration in the assessments of significance documented in **Appendix 9**. Threats to species listed under the TSC Act, FM Act and EPBC Act include those that are cumulative in nature, and the assessments undertaken implicitly consider the contribution of cumulative impacts on those species.

#### 5.6.8 Ecological Management Commitments

NPM has sought to avoid and minimise potential impacts on the ecological values of the proposed disturbance area throughout the project planning process (refer to **Section 5.6.1**). This has included avoidance and minimisation of areas of disturbance of key vegetation communities, particularly the White Box – Yellow Box – Blakely's Red Gum Woodland EEC and Grey Box Grassy Woodland EEC.

NPM commit to undertaking targeted surveys of potential habitat areas for Pine donkey orchid within the proposed disturbance areas in order to confirm presence or absence to inform the development of specific impact mitigation and management measures relative to this species, which may be required as part of the Project. The surveys will be completed by qualified ecologists during suitable conditions over one season prior to disturbance.

In addition to the specific commitments above, a range of management strategies will be used by NPM to limit impacts on native flora and fauna species in the Project Area. These key impact mitigation strategies will be detailed in a revised Flora and Fauna Management Plan (FFMP) (NPM 2008) which will be expanded to include areas to be impacted by the Project. This will include adaptive management, as required, if a previously not recorded or assessed threatened species is identified in the Project Area during operations.

Key impact mitigation strategies will include:

- feral animal and noxious weed control consistent with existing practices at the NPM;
- implementation of a nest box replacement program and salvage of habitat features (logs etc.) for the creation of habitat nearby;
- implementation of a tree felling procedure to limit impacts on hollow-dependent threatened species to be incorporated into pre-clearance surveys;

- establishment of an ecological monitoring program that focuses on nest box installation and also existing and proposed biodiversity offset areas; and
- ongoing monitoring and maintenance of any revegetation works and habitat enhancement activities.

Further detail on each of the mitigation strategies is provided in **Appendix 9**.

### 5.6.9 Biodiversity Offset Strategy

A Biodiversity Offset Strategy (BOS) is proposed to ensure the Project maintains or improves the biodiversity values of the region in the medium to long term. Through the Project design phase, NPM has modified the Project to extensively avoid and minimise ecological impacts (refer to **Section 5.6.1**).

In addition to the above avoidance measures, NPM commit to implementing a range of impact mitigation strategies have been included in the Project to mitigate the impact on ecological values (refer to **Section 5.6.8**). Impact avoidance, minimisation and mitigation strategies have resulted in the reduction of impacts on threatened and migratory species and EECs.

Notwithstanding the above avoidance and mitigation measures, NPM have developed a proposed BOS for the Project. A detailed assessment of the BOS is provided in **Appendix 9**, with an overview provided in this section.

The objectives of the BOS are to:

- provide for the maintenance and enhancement of biodiversity values of the region in the medium to long term;
- provide an offset that contains as many as possible of the threatened vegetation communities, endangered flora populations, threatened flora species and threatened fauna species impacted by the Project;
- provide an offset that is strategically located or in a regionally significant position;
- provide an offset in which an environmental gain can be made via appropriate management strategies;
- secure an offset in perpetuity;
- to develop a management strategy for the positive environmental management of the proposed offset site, but with appropriate consideration of the existing rural nature of the area;
- as a minimum provide an offset that has the same ecological value as the residual significant impacts of the Project on threatened vegetation communities, endangered flora populations, threatened flora species and threatened fauna species; and
- where possible provide an offset that exceed the ecological value of the residual significant impacts of the Project on threatened vegetation communities, endangered flora populations, threatened flora species and threatened fauna species.