Management Plan

Biodiversity Offset

Risk Statement: High

This document will be reviewed on a one yearly basis, unless a process change occurs earlier than this period. This Management Plan has been developed to comply with Condition 29 of NSW Development Consent (DC11_0060) and to comply with the Northparkes Mines Step Change Project Preliminary Documentation as conditioned under the Commonwealth Project Approval (EPBC 2013/6788).

Doc No.	Version No.	Next Review Date	Owner
PLN-0065	7.04	13/03/2024	Superintendent - Environment & Farms

Revision Summary

First Issue	Issue Date	Implementation Requirements	Approved By
1	30 Nov 14	Biodiversity Management Plan prepared by Umwelt for compliance with NSW Project Condition (PA11_0060)	Environment and Farms Superintendent

Version No.	Revision Date	Summary of Revision Details	Approved By
2	22 Sep 15	Biodiversity Management Plan updated to: • Incorporate comments received from the Department of Planning and Environment • Reformatted into Northparkes document style • Renamed Biodiversity Offset Management Plan (BOMP) rather than Biodiversity Management Plan (BMP) • Removed references to Pine Donkey Orchid management from main document and included in Appendix 3 – Species Management Plan for the Pine Donkey Orchid	Environment & Farms Superintendent
3	26 Jul 16	BOMP updated to include comments from OEH. Reformatted document into new Northparkes template.	PSE Manager
4	28 Oct 16	BOMP updated to include comments from OEH, following meeting with OEH on 19 October 2016.	Environment & Farms Superintendent
5	24 Nov 16	BOMP updated following response from OEH	Environment & Farms Superintendent
6	25 Feb 20	Updated to new DCS	M Row
7	23 Jun 20	Review following submission of Annual Review. Changes made to management strategy timeframes as a result of a delayed registration of the Voluntary Conservation Agreement.	Environment & Farms Superintendent
7	2 Sep 20	Approved by Department of Planning, Industry & Environment	
7.01	Jun 21	Annual review	C Higgins
7.02	Aug 22	Annual review – no change - update logo	D Shaw
7.03	Dec 23	Annual Review – changes to observed pest animals	M Thomas
7.04	Mar 24	Update to Evolution	D Shaw

Consultation Required	Public Copy Locations
Not Applicable	Northparkes Website

Associated Documents to be Reviewed
Not Applicable

Table of Contents

1. OVERVIEW

1.1 Background

Northparkes Mining Services Pty Ltd is the manager of the Northparkes Joint Venture, an unincorporated joint venture between Evolution Mining (Northparkes) Pty Ltd (80%); Sumitomo Metal Mining Oceania Pty Ltd (13.3%) and SC Mineral Resources (6.7%). Northparkes is a copper-gold operation in Goonumbla, situated 27 kilometres north-west of the town of Parkes.

Construction of the ore processing plant and associated facilities began in 1993. Open cut mining commenced on the E22 and E27 ore bodies in late 1993. Development of the E26 lift 1 block cave underground mine began in 1994, with full scale production commencing in 1997.

1.1.1 Mining Context

Operations at Northparkes primarily comprises underground mining from multiple ore sources that feed a processing plant with a capacity of 6.5 million tonnes per annum (Mtpa). The underground mine is accessed via a decline ramp from the surface for people and materials with ore transported to the surface via inclined conveyors and a hoisting shaft, with a nominal capacity of 7.2 Mtpa. Northparkes utilises low cost block and sub-level cave mining and exploits industry leading technology, such as semi-autonomous loaders and various cave monitoring systems.

The ore processing operation consists of four stages: crushing, grinding, flotation and thickening / filtering. In addition to producing concentrate, the ore processing team also manages tailings disposal. The concentrator was constructed in two modules. Each module consists of its own grinding circuit with a single flotation circuit, concentrate thickener and filter. After extracting the copper and gold bearing minerals, the tailings are combined in a single tailings thickener before being deposited in the active tailings storage facility.

Northparkes' copper concentrate is transported to a rail siding at Goonumbla where it is then transported by rail to Port Kembla, for shipping to overseas customers.

1.1.2 Biodiversity Offset

The Northparkes Mines (Northparkes) Biodiversity Offset Management Plan (BOMP) has been prepared to guide the ongoing management of the Kokoda Offset Site for biodiversity conservation and enhancement purposes. The Kokoda Offset Site has been established as a biodiversity offset for the ecological impacts of the Northparkes Mines Step Change Project (the Project). The 350 hectare Kokoda Offset Site is located in the Mandagery locality of the Central West Slopes of NSW (refer to Figure 1), approximately 52 kilometres south-east of the Project Area. In addition the BOMP incorporates the existing approved biodiversity offset management plans for the existing Limestone National Forest Offset (refer to Appendix 1) and Estcourt Tailings Storage Facility Offset (refer to Appendix 2) as established in accordance with the previous project approval (PA06_0026 as modified) at Northparkes.

The BOMP has been prepared in accordance with the NSW Development Consent (DC11_0060) requirements and Commonwealth Project Approval (EPBC 2013/6788) requirements issued for the Project and provides a framework for the implementation of ecological management actions, regeneration strategies, controls and monitoring programs for the Kokoda Offset Site.

2. SCOPE

This document applies to all activities undertaken by Northparkes including mining and exploration activities, processing of copper / gold ore resources, project development, maintenance activities, mine closure, logistics, associated service and support functions, bore fields, farming operations and products.

3. OBJECTIVES

The objective of the BOMP is to facilitate the long term conservation and enhancement of the ecological values of the Kokoda Offset Site. The BOMP broadly focuses on managing woodland for conservation and assisting derived native grassland (DNG) areas to return to woodland form of key targeted vegetation communities.

The specific objectives of the BOMP are to:

- Identify and describe the area of land that will be required to be managed in accordance with this BOMP;
- Provide clear and concise instructions for the management of the Kokoda Offset Site in accordance with the biodiversity management plan objectives;
- Provide a working schedule for the implementation of BOMP activities, including:
    - Manage remnant vegetation and fauna habitat;
    - Restore the DNG component of the Grey Box Grassy Woodland EEC to woodland community;
    - Intergrate the implementation of the biodiversity offset strategies to the greatest extent practicable with the rehabilitation of the site (where relevant); and
    - Manage and maintain the populations of Pine Donkey Orchid located to the North of the project area (near Avadale Road) and near E48 subsidence zone.
- Describe monitoring, performance evaluation and reporting procedures that are informative, practical and achievable.

4. RESPONSIBILITIES

General role responsibilities are outlined in the Health, Safety and Environment Responsibilities and Accountabilities Procedure (PRO-0080). Personnel carrying out work under this document must be familiar with and comply with it in full. The following persons have specific responsibility:

Table 1: Responsibilities

Role	Responsibility
All Personnel	– ensure staff and contractors accessing the Kokoda Offset Site are informed and trained where relevant in relation to controls on activities within the Offset Sites; – receive training regarding controls on activities within the Kokoda Offset Site; – observe boundaries of the Kokoda Offset Site when undertaking work on site; and – undertake activities in the Kokoda Offset Site in line with directions from the Operations Manager and People, Safety and Environment Manager.
Environment and Farm Superintendent	– report unauthorised access by stock or vehicles to the Kokoda; and – report on any fencing or track maintenance works required to prevent stock access to the Kokoda Offset Site.
PSE Manager	– co-ordinate the day to day implementation of the BOMP, including the implementation of all management activities; – undertake biannual inspections of the Kokoda Offset Site; – analyse and collate documentation for inclusion in the Annual Review; – assess the effectiveness of the management strategies and instigate the adaptive management process as required; – ensure all internal and external reporting requirements are met; – ensure that all relevant records are effectively maintained on site; – periodically review progress against targets and performance indicators; – review this management plan on a three yearly basis – ensure that personnel involved in the carrying out and monitoring of the BOMP activities and values are appropriately qualified, licensed and experienced to undertake the task; – manage/control access to the Kokoda Offset Site;

Role	Responsibility
Managing Director	– ensure that sufficient time and resources are allocated to allow for the implementation of biodiversity management and monitoring strategies as outlined in the BOMP; – authorise internal and external reporting requirements as well as subsequent revisions of this BOMP; and – oversee implementation of the BOMP to ensure compliance with approval requirements.

5. DEFINITIONS

Table 2: Definitions

Key Word	Definition
BOMP	Biodiversity Offset Management Plan
CEEC	Critically Endangered Ecological Community
DNG	Derived Native Grassland
DoE	Commonwealth Department of the Environment
EEC	Endangered Ecological Community
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
ha	Hectares
LFA	Landscape Function Analysis
OEH	NSW Office of Environment and Heritage
DPE (the Department)	NSW Department of Planning, Industry and Environment
TEC	Threatened Ecological Community
BC Act	Biodiversity Conservation Act 2016 (NSW)

6. DESCRIPTION OF THE KOKODA OFFSET SITE

The following sections provide a summary of the characteristics and biodiversity values of the Kokoda Offset Site as relevant to this BOMP. Further description of the baseline condition and environment of the Kokoda Offset is provided in the Environmental Assessment and the Preliminary Documentation (Umwelt 2013a and 2013b). In addition, a description of the Limestone National Forest and Estcourt Offset area are provided in Appendix 1 and Appendix 2, respectively.

6.1 Location

The Kokoda Offset Site is strategically located along a north-south potential corridor of remnant woodland and forest vegetation that runs along ridges and hills from north of Eugowra in the south, to east of Narromine in the north. The north-south potential corridor includes Goobang National Park, the largest conserved remnant of woodland and forest vegetation in the Central West region of NSW.

The Kokoda Offset Site is located approximately 12 kilometres north-west of Nangar National Park, approximately 8 kilometres south of Goobang National Park, approximately 12 kilometres west of Mandagery State Forest, approximately 17 kilometres east of Cookamidgera State Forest, and approximately 20 kilometres east of Back Yamma State Forest (refer to Figure 1).

The Kokoda Offset Site comprises lower fertility soils in the northern sections, predominately cleared for grazing, and dense woodland covered slopes and ridge lines in the south of the property. Sheep and cattle grazing has been undertaken across the entire property since ecological surveys began in 2013 and is likely to have been the predominant land use for many years. Northparkes removed all stock from the Kokoda Offset Site in early 2015, following purchase of the property.

To the north of the Kokoda Offset Site, the predominant land use is agriculture, primarily cropping but also grazing. This agricultural area is largely confined to the lower and flatter areas, occurring between Goobang National Park and the southern portion of the Kokoda Offset Site.

6.2 Land tenure and conservation mechanism

The Kokoda property was purchased and secured under a Voluntary Conservation Agreement (VCA) to ensure, in perpetuity, the long-term conservation and enhancement of the offset values. Following the final sign off by the Chief Executive in February 2018, Northparkes commenced undertaking management actions in accordance with the relevant permissions and guidelines of the agreement.

6.3 Key ecological values

The Kokoda Offset Site provides conservation of 109 hectares of Grey Box Grassy Woodland EEC (including 96 hectares of DNG that will be returned to woodland form), 2.2 hectares of White Box – Yellow Box – Blakely's Red Gum Woodland EEC/CEEC, known habitat areas for the grey-crowned babbler, little lorikeet and eastern bentwing-bat and potential habitat for a number of threatened fauna species. Further details of the ecological values of the Kokoda Offset Site are provided in the following sections.

6.3.1 Vegetation communities and Threatened Ecological Communities

A total of 11 vegetation communities have been recorded in the Kokoda Offset Site, three of which are Threatened Ecological Communities (TECs). Figure 2 shows the location of the vegetation communities recorded on the Kokoda Offset Site. These vegetation communities are also listed in Table 3 below.

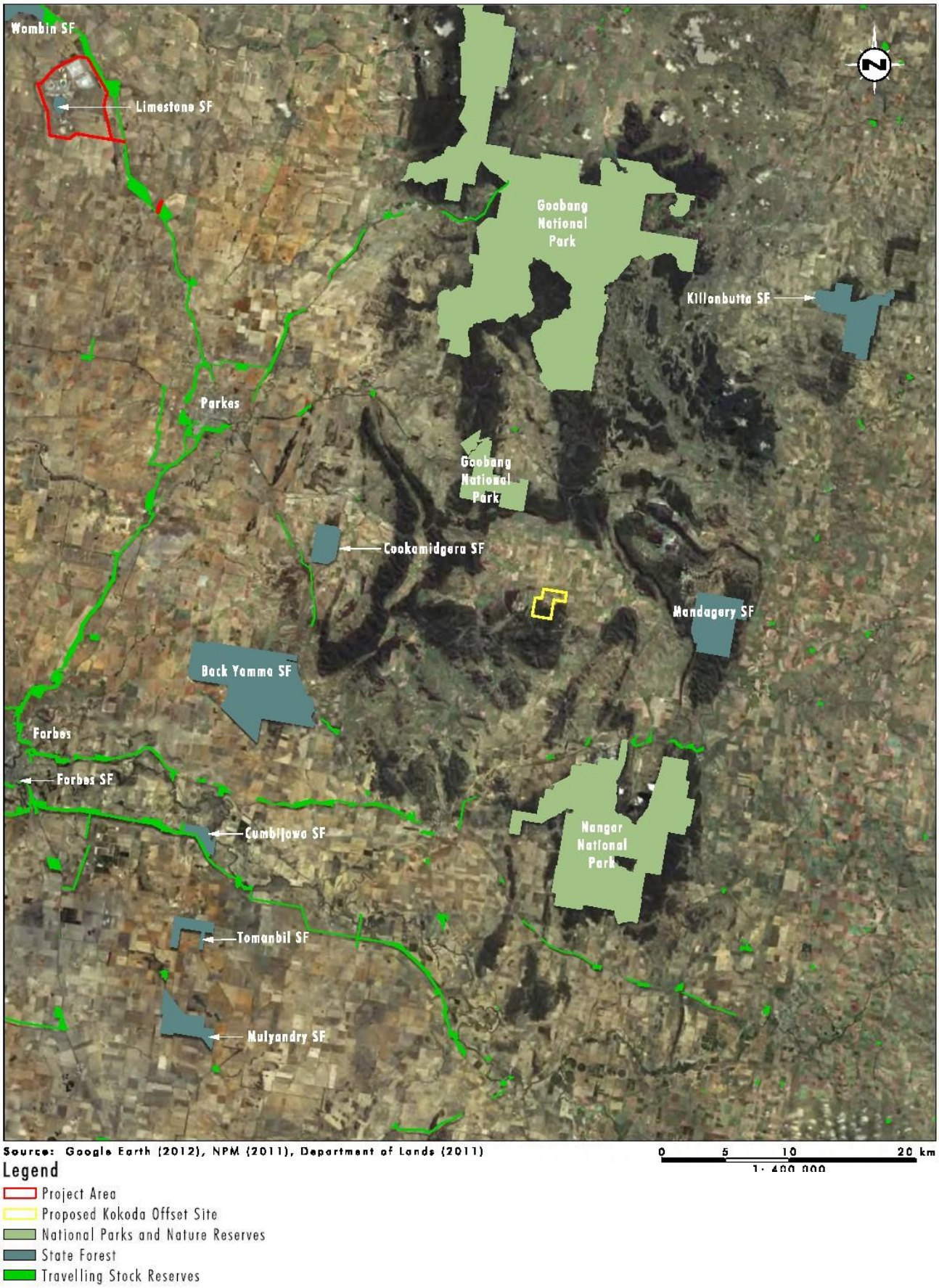

Figure 1: Location of Kokoda Biodiversity Offset

Table 3: Vegetation communities of the Kokoda Offset Site

Vegetation Community	BC Act Status	EPBC Act Status	Vegetation within Kokoda Offset Site (ha)
Grey Box Grassy Woodland	EEC	EEC	13
Grey Box Grassy DNG	EEC	EEC	96
White Box Grassy Woodland	EEC	CEEC	2.2
Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Forest			150
Rocky Rise Shrubby Woodland			26
Grey Box – Ironbark Woodland			25
Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine DNG			15
Dwyer's Red Gum Creekline Woodland			9.4
Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Woodland Low Quality			8.6
Mugga Ironbark Woodland			1.9
Farm Tracks and Dams – Disturbed Land			2.5
Total			350[1]

1 = Rounding of totals applied (numbers less than 1 – 2 decimal places, numbers between 1 and 10 – 1 decimal place, and greater than 10 - no decimal places)
CEEC = Critically Endangered Ecological Community
EEC = Endangered Ecological Community
EPBC Act = Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
BC Act = NSW *Biodiversity Conservation Act 2016*
DNG = Derived Native Grassland
ha = Hectares

The 13 hectares of Grey Box Grassy Woodland and 96 hectares of Grey Box DNG on the Kokoda Offset Site conforms to the BC Act listed *Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions* EEC and the EPBC Act listed *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia* EEC.

The 2.2 hectares of White Box Grassy Woodland on the Kokoda Offset Site conforms to the BC Act listed White Box – Yellow Box – Blakely's Red Gum Woodland EEC and the EPBC Act listed White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.

The 96 hectares of Grey Box Grassy Woodland DNG and 15 hectares of Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine DNG within the Kokoda Offset Site will be managed back to woodland form. The recovery potential of these areas was assessed resulting in the delineation of six vegetation management areas (refer to Figure 2). These management areas identify those parts of the DNG predicted to respond well to assisted natural regeneration strategies and those predicted to potentially require active management. Further detail on these vegetation management areas is included in Section 9.7.

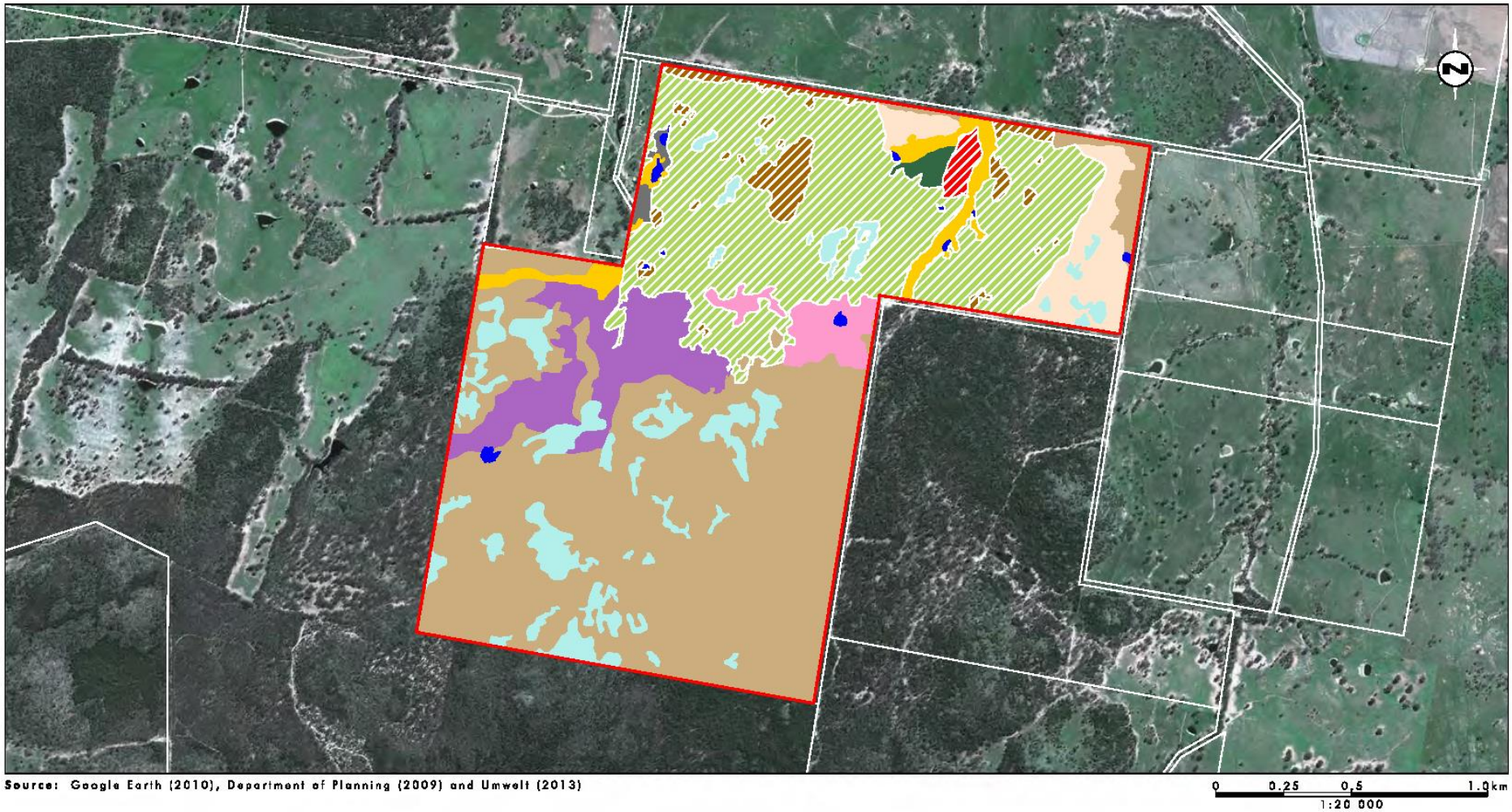

Figure 2: Vegetation communities

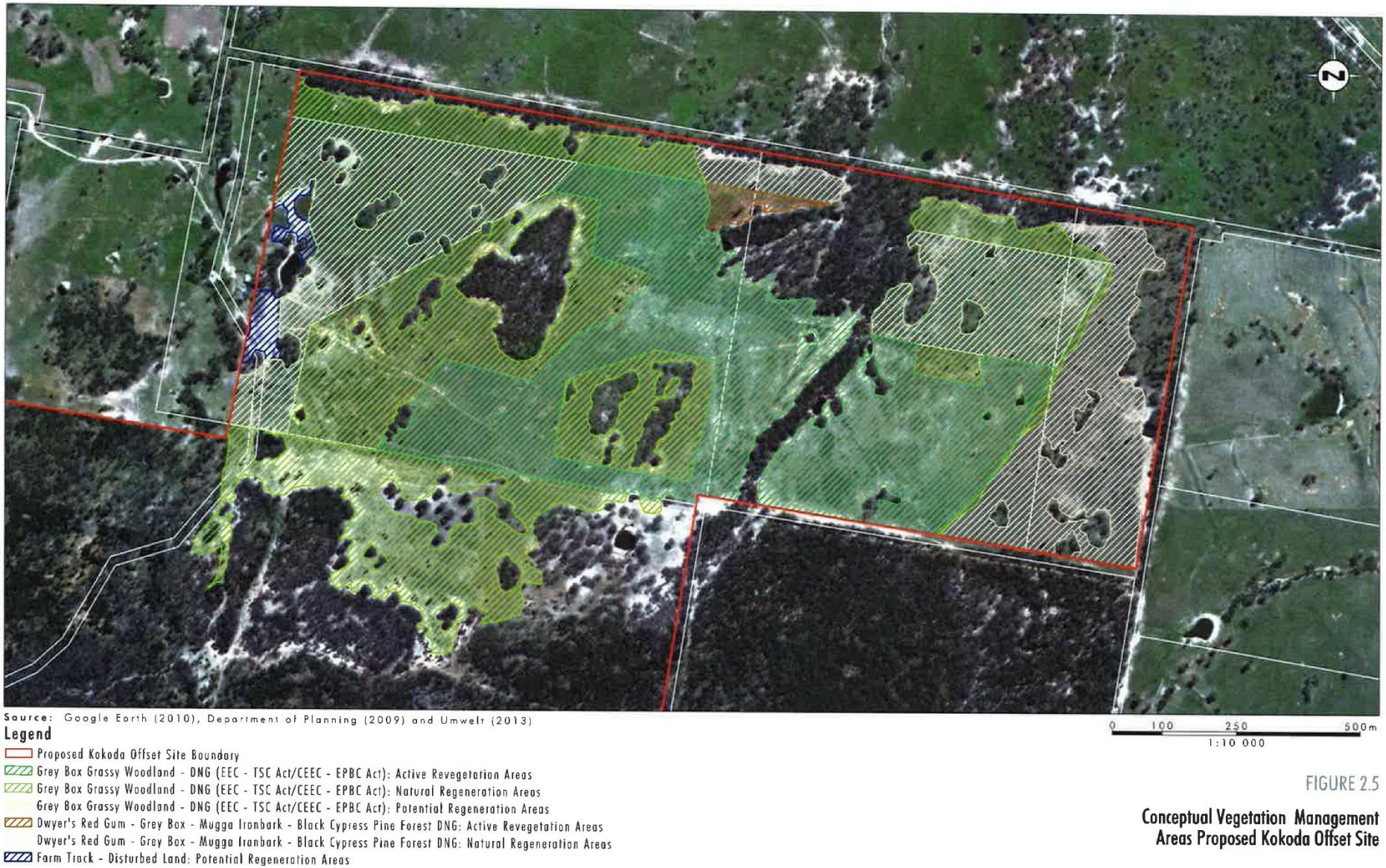

Figure 3: Conceptual vegetation management area with Landscape Function Analysis monitoring locations

6.3.2 Baseline Threatened Species

No threatened flora species were recorded in the Kokoda Offset Site during baseline surveys.

Twelve threatened fauna species were recorded in the Kokoda Offset Site and are listed in Table 4 below and shown on Figure 4.

Table 4: Threatened fauna species recorded within the Kokoda offset site

Common Name	Scientific Name	Status		No. of individuals/ locations
		BC Act	EPBC Act	
Glossy black-cockatoo	*Calyptorhynchus lathami*	V		2/1
Superb parrot	*Polytelis swainsonii*	V	V	162/23
Little lorikeet	*Glossopsitta pusilla*	V		25/2
Brown treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V		18/10
Speckled warbler	*Chthonicola saggitatus*	V		13/9
Hooded robin (south-eastern form)	*Melanodryas cucullata cucullata*	V		1/1
Grey-crowned babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V		95/20
Varied sittella	*Daphoenositta chrysoptera*	V		2/2
Diamond firetail	*Stagonopleura guttata*	V		8/3
Eastern bentwing-bat	*Miniopterus schreibersii oceanensis*	V		-/2
Little pied bat	*Chalinolobus picatus*	V		-/2
Yellow-bellied sheathtail-bat	*Saccolaimus flaviventris*	V		-/2

V = Vulnerable Species
BC Act = *Biodiversity Conservation Act 2016*
EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*

The grey-crowned babbler, brown treecreeper and the superb parrot were the most commonly recorded threatened fauna species across the Kokoda Offset Site. The grey-crowned babbler and the brown treecreeper are both sedentary birds and will utilise the site across all seasons whereas the superb parrot is a seasonally nomadic species which will largely utilise the Kokoda Offset Site for foraging during spring and summer. Given the array of varied habitats within the site, there is a high potential that other threatened fauna species may occur within the Kokoda Offset Site.

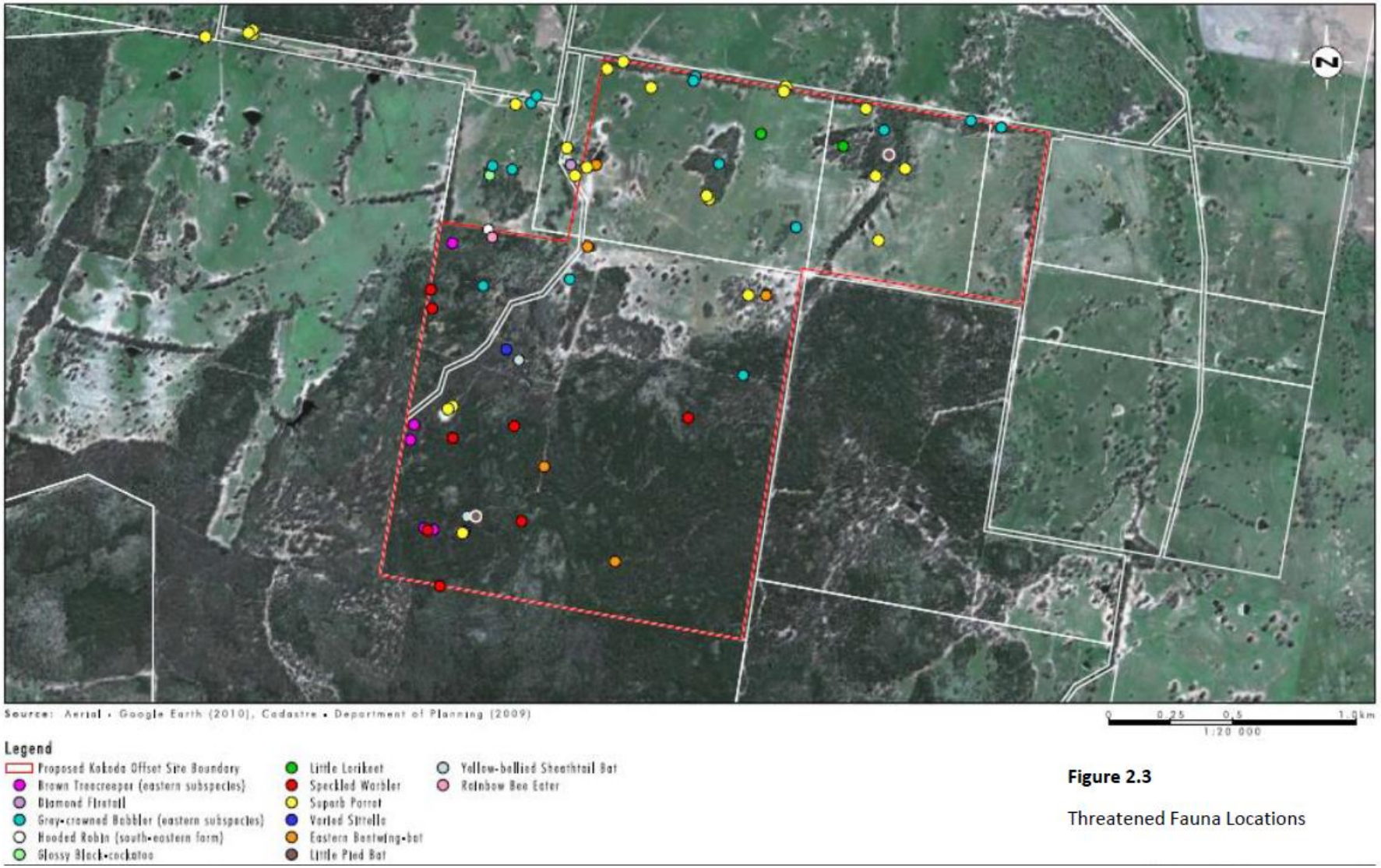

Figure 4: Threatened fauna locations

6.4 Management Zone Stratification

The Kokoda Offset Site has been stratified into seven management zones based primarily on the condition of the vegetation communities and their recovery potential. Table 5 below provides a summary of the management zones identified within the Kokoda Offset Site.

Table 5: Management Zones at the Kokoda Offset Site

Management Zone	Vegetation Type	Objective	Total Area
1	Grey Box Grassy Woodland – DNG – Active Revegetation	Restore to woodland	36.3
2	Grey Box Grassy Woodland – DNG – Potential Regeneration	Restore to woodland	21.3
3	Grey Box Grassy Woodland – DNG – Natural Regeneration	Restore to woodland	38.4
4	Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine DNG Active Regeneration	Restore to woodland	1
5	Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine DNG Natural Regeneration	Restore to woodland	13.8
6	Disturbed – Potential Regeneration	Restore to woodland	1.3
7	All Remnant Woodland and Forest	Conserve and maintain	238
		Total	**350**

Management zones 1 to 5 are all DNG communities that occur on the lower slopes in the northern section of the property. These areas will each receive varying levels of management, however the long term goal for each of these zones, plus zone 6, is to return them to their former woodland community structure.

7. BIODIVERSITY MANAGEMENT TARGETS

Biodiversity management targets form the basis of the BOMP. The proposed management and improvement strategies (Section 9) will enable the biodiversity management targets and conditions of the approval to be met. Specific performance indicators and completion criteria (Section 9) will be used to track the success of the BOMP in reaching these targets.

The short term (3 year) biodiversity management targets for the management of the Kokoda Offset Site are to:

- establish signage throughout the Kokoda Offset Site;
- remove stock-grazing activities from the Kokoda Offset Site by maintenance of fencing as required;
- establish a monitoring program to assess the success of ongoing management and improvement strategies, in particular focusing on the regeneration potential of Grey Box Grassy Woodland DNG areas; and
- commence establishment of Grey Box Grassy Woodland in areas of DNG through assisted natural regeneration principles;
- include a range of flora species from each vegetation strata represented in the target community (such as trees, shrubs, and ground cover forbs and grasses), even if only as seedlings/juvenile plants initially, as determined through monitoring of selected reference sites in the target community within the Kokoda Offset Site;
- contain a flora species assemblage trending towards the target communities (i.e. Grey Box Grassy Woodland EEC or Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Forest) as determined through monitoring of selected reference sites in the target community within the Kokoda Offset Site;
- support no more than 20 per cent foliage cover of perennial weed species (as a total of all strata, based on monitoring plot data); and

- support no more than 20 per cent bare ground as part of the ground layer.
- effectively manage weed and pest species;
- implement weed monitoring at to assess if weed species are out competing native species once grazing pressure has been removed. Adaptive management practices will be adopted to control weed species as necessary;
- from year two onwards, initiate active revegetation methods to establish Grey Box Grassy Woodland in areas of low recovery potential DNG as required through the results of monitoring in years 1 and 2;
- manage the remnant woodland areas to maintain similar or increasing flora and fauna species diversity;
- establish an appropriate long-term conservation mechanism; and
- demonstrate that accurate records are being maintained substantiating all activities and monitoring associated with the BOMP.

The preliminary medium term (6, 10 and 15 years) biodiversity management targets for the Kokoda Offset Site are to:

- effectively monitor, control and reduce weed and pest species populations;
- monitor and document collective trend towards an increase in native flora and fauna species diversity;
- monitor and document DNG areas trending toward woodland communities, containing natives species commensurate with those of the target woodland communities

The preliminary long term (i.e. 20 years) biodiversity management targets for the Kokoda Offset Site are to:

- effectively control and reduce weed and pest species populations;
- improve the overall native flora and fauna species diversity compared to conditions during baseline assessments;
- improve the habitat value of the remnant woodland communities in the Kokoda Offset Site compared to conditions during baseline assessments;
- successfully establish an additional 96 hectares of Grey Box Grassy Woodland EEC in areas of existing DNG and demonstrate that the regenerated communities are representative of local reference sites in remnant Grey Box Grassy Woodland EEC.
- regenerate/revegetate management areas contain a minimum of 50 per cent of the native flora species diversity recorded from reference sites in the target community within the Kokoda Offset Site;
- regenerate/revegetate management areas support a vegetation structure that is similar to that recorded for reference sites in the target community within the Kokoda Offset Site;
- demonstrate that second generation trees are present within regeneration/revegetation areas;
- identify that more than 75 per cent of trees are healthy and growing as indicated by long term monitoring;
- ensure that weed species do not dominate any vegetation stratum (i.e. weed species comprise less than 10 per cent of any vegetation stratum);
- ongoing monitoring of soil stability, including implementation of erosion and sediment controls to management significant erosions concerns, as required; and
- regenerate/revegetate areas linked to existing woodland remnants to establish vegetation corridors within the broader landscape and manage excessive edge effects.

8. OFFSET MONITORING PROGRAM

The Kokoda Offset Site will be subject to an ongoing monitoring program to measure the success of management and restoration strategies in meeting the approval conditions (Section 8) and performance indicators as set out in Section 9 in a timely manner. The monitoring program will incorporate annual systematic monitoring as well as biannual (twice yearly) inspections.

8.1 Monitoring Objectives

The objectives of the Kokoda Offset Site monitoring program will be to:

- identify any potential loss of biodiversity values over the entire Kokoda Offset Site;
- document the ecological characteristics of remnant woodland vegetation to establish a baseline for developing accurate closure criteria for the regeneration of DNG;
- assess the recovery of DNG areas;
- assess and map the presence of threats such as significant populations of pest fauna species or weed infestations; and
- identify the need for additional or corrective management measures to achieve the performance indicators and completion criteria.

8.2 Monitoring Timing and Schedules

Ecological monitoring will be annual for the first five years (however DNG monitoring will also be undertaken at six months – see Section 8), then every three years for the following 15 years. The first ecological monitoring survey will be completed within six months of the implementation of the BOMP, and subsequent monitoring events should occur in the same season. It is recommended that the ecological monitoring surveys be undertaken in spring or autumn as there tends to be a lower diversity of species detectable in the more extreme weather conditions of winter and summer seasons (except where specific seasons are required for targeted bird surveys).

8.3 Ecological Monitoring Techniques

The monitoring program incorporates techniques that:

a) are relatively simple to measure, can be replicated with limited subjectivity, and are reproducible;

b) adopt the SMART principles (specific, measurable, achievable, realistic and timely);

c) are targeted towards recording information that provides a good indication of the status of the biodiversity values of the Kokoda Offset Site;

d) allow for floristic composition and structure to be monitored over time using basic statistical analysis;

e) allow for comparison to reference (control) sites; and

f) are cost effective.

8.3.1 Vegetation monitoring

The ecological monitoring program for the Kokoda Offset Site will include a combination of condition assessments, floristic sampling, sapling survivorship counts and stratified quadrat sampling. Revegetation areas will be monitored by sapling survivorship counts of planted tubestock and condition assessments of surviving tubestock. Regeneration areas (DNG areas where grazing pressure from domestic stock has been removed) will be monitored via stratified and permanent quadrats. Floristic assessments will be undertaken using representative plots and standard botanical survey approaches (e.g. cover-abundance measures) to assess the floristic recovery of the DNG in comparison to the floristic composition of reference sites.

Stratified quadrats will be established in appropriate target communities within the Kokoda Offset Site. The aim of this is to provide reference sites to measure regeneration/ revegetation success against. In the event that regeneration/revegetation sites are unsuccessful in trending towards the ecological values of the reference sites, adaptive management will be undertaken, as required. This may include modifying management actions, or supplementing management actions with new or additional techniques to promote the recovery of regeneration/revegetation sites towards the values of reference sites.

Sections 9.6 (weed management) and 9.7 (regeneration of derived native grasslands) detail the individual vegetation monitoring requirements of the Kokoda Offset Site.

8.3.2 Landscape function analysis monitoring

Monitoring will include Landscape Function Analysis (LFA) techniques to assess the soil structure, stability and nutrient cycling within the DNG recovery areas. LFA is a standardised monitoring procedure that uses rapidly acquired field-assessed indicators to assess the biogeochemical functioning of landscapes (Tongway and Hindley 2004). LFA is based mainly on processes involved in surface hydrology: rainfall, infiltration, runoff, erosion, plant growth and nutrient cycling. The standard LFA methods as described by Tongway and Hindley (2004) will be followed for the survey.

A minimum of eleven LFA sites will be sampled within DNG recovery areas, five within Grey Box – Grassy Woodland EEC, three in Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Forest, one in Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Forest low quality, one in White Box Grassy Woodland CEEC and one in Grey-Box – Ironbark woodland non EEC. Suitable reference sites in remnant woodland of the target community within the Kokoda Offset Site will also be sampled. Reference sites will include a minimum of three in Grey Box – Grassy Woodland EEC and three in Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Forest.

8.3.3 Threatened bird monitoring

Threatened bird monitoring will be undertaken at the Kokoda Offset Site, focussing on key threatened species. The monitoring program will comprise of bird surveys of existing woodland and recovering DNG areas focusing on the presence of the threatened the grey-crowned babbler, superb parrot, swift parrot and regent honeyeater. Threatened bird monitoring will cover both the existing remnant vegetation areas as well as the recovering DNG areas, once there has been reasonable growth of canopy species (new sites will therefore be added as regeneration/revegetation areas progress). Bird monitoring will be undertaken during winter for the regent honeyeater and swift parrot (during periods when eucalypt trees are flowering) and during early spring for the superb parrot when it is most likely to be utilising the Kokoda Offset Site during local seasonal movements.

Section 9.8 details individual threatened bird monitoring requirements for the Kokoda Offset Site.

8.4 Biannual Inspections

Inspections will be undertaken biannually (twice yearly) by Northparkes environment team. During these inspections, a broad assessment of the site condition will be made and management strategies will be adapted accordingly if required.

During these inspections no systematic sampling will be undertaken, rather a broad assessment of the site condition will be made from a drive-over of the site. The inspections will aim to identify any visually obvious management concerns that require immediate attention such as new infestations of invasive weeds/pest fauna or track and fence condition. The general progress of regeneration and revegetation efforts will also be assessed during these inspections.
Key Components of Biannual Inspections:

- observe and document any weed and pest fauna infestations requiring management;
- assess the success of completed weed and pest management actions;
- assess the condition of fences, gates and access tracks, identifying areas requiring maintenance;
- document any areas of erosion, sedimentation or salinity requiring management;
- assess the progress of natural regeneration within the DNG areas; and
- inspect the condition of other infrastructure in the Kokoda Offset Site such as sheds, homesteads etc.

9. MANAGEMENT STRATEGIES, MONITORING ACTIONS, PERFORMANCE AND COMPLETION CRITERIA

The ability to report on the success of management actions relies on frequent and systematic monitoring of the Kokoda Offset Site. The monitoring program will incorporate annual comprehensive and systematic monitoring as well as biannual (twice yearly) inspections.
Ecological monitoring will be annual for the first 5 years, then every 3 years for the following 15 years. The first ecological monitoring survey will be completed within 6 months of the implementation of the BOMP, and subsequent monitoring events should occur in the same season. It is recommended that the ecological monitoring surveys be undertaken in spring or autumn as there tends to be a lower diversity of species detectable in the more extreme weather conditions of winter and summer seasons (except where specific seasons are required for targeted bird surveys).

Inspections will be undertaken biannually (twice yearly) by Northparkes environment team. During these inspections, a broad assessment of the site condition will be made, and management strategies will be adapted accordingly if required. During these inspections no systematic sampling will be undertaken; rather a broad assessment of the site condition will be made from a drive-over of the site. The inspections will aim to identify any visually obvious management concerns that require immediate attention such as new infestations of invasive weeds/pest fauna or track and fence condition.

The following management and improvement strategies have been developed for the Kokoda Offset Site to ensure that the BOMP objectives and targets are met. The strategies integrate findings and recommendations from the Northparkes Mines Step Change Project Environmental Assessment, the Preliminary Documentation report (Umwelt 2013a and 2013b) and the Northparkes Step Change Project Response to Submissions Addendum Report (Umwelt 2013c).

9.1 Access Management and Exclusion of Stock

9.1.1 Management actions

All domestic stock were removed from the Kokoda Offset Site in early 2015, within a month of the property being purchased by Northparkes.

9.1.2 Performance and completion criteria

Performance criteria and completion criteria for the access management and stock exclusion are provided in Table 6.

Table 6: Access management and exclusion of stock performance criteria and completion criteria

Action	Performance criteria	Completion criteria
Exclude stock	All stock excluded by 30 June 2015, or earlier.	Completed.

9.2 Fencing and Signage

Fencing will be used to demarcate the boundaries of the Kokoda Offset Site to exclude stock, as well as to protect from unauthorised access and disturbance. Fences will be suitably signposted to identify the purpose of the Kokoda Offset Site. Fences will be maintained to prevent stock access to the offset area.

9.2.1 Management actions

Boundary Fencing

Any new fencing (other than the boundary fences with adjoining neighbours) used within, or on the boundary of, the Kokoda Offset Site will use plain (i.e. non-barbed) wire on the upper strands, and as little barbed wire generally as possible to minimise the impact on native fauna species. As part of the ongoing monitoring program, if a restricted level of barbed wire on fencing is shown to fail to exclude stock, additional measures that pose minimal impact to native fauna will be investigated and implemented.

Removal of Redundant Fences

Where possible, redundant internal fences will be removed to allow free movement of fauna throughout the Kokoda Offset Site. Any such works would be appropriately assessed to ensure there is no adverse effect on existing vegetation and habitats.

Signage

Signs on access gates and strategic locations on boundary fencing have been erected. The signs will explain that the land is managed for conservation values and that there is restricted access to people, livestock and activities within the area.

9.2.2 Monitoring requirements

Maintenance of Fences

Boundary fence inspections will be undertaken as part of the biannual inspections by the Northparkes environment team to ensure that neighbouring stock are not able to enter the Kokoda Offset Site.

9.2.1 Performance and completion criteria

Performance and completion criteria for the fencing and signage are provided in Table 7. Trigger points for adaptive management of the fencing and signage are provided in Table 8.

Table 7: Fencing and signage performance and completion criteria

Action	Performance criteria	Completion criteria
Twice yearly boundary fence inspections by Northparkes environmental advisors	Completed twice per year	Ongoing and results included in annual reporting.
Signage inspection by Northparkes environment team	Completed twice per year	Ongoing and results included in annual reporting.

Table 8: Fencing and signage trigger points for adaptive management

Action	Trigger Point for Adaptive Management	Adaptive Management
Boundary fence inspections	Failure of fence allows humans or grazers to enter the site	Repairs undertaken as required
Signage inspection	Signage removed or damaged	Repair or replace signs

All adaptive management actions undertaken are to be documented.

9.3 Offset site in-perpetuity conservation

9.3.1 Management actions

The Kokoda Offset Site will be secured for in-perpetuity conservation. Northparkes has purchased the Kokoda Offset Site is currently undertaking the process of securing a Voluntary Conservation Agreement (VCA) across the Kokoda Offset Site.

9.3.2 Performance and completion criteria

Performance and completion criteria for the offset site in perpetuity are provided in Table 9.

Table 9: Offset site in-perpetuity conservation performance and completion criteria

Action	Performance criteria	Completion criteria
Purchase Kokoda Offset Site	Completed. Purchased in 2015	Completed
Establish an in perpetuity conservation mechanism across the Kokoda Offset Site	Completed on 12 June 2018	Completed

9.4 Track Maintenance

9.4.1 Management actions

Routine maintenance of tracks within the Kokoda Offset Site will be undertaken as required to make navigation through the property easier when implementing on-ground management and monitoring activities. The tracks also need to be well maintained for firefighting access if required.

9.4.2 Monitoring requirements

The condition of tracks will be assessed during biannual (twice yearly) inspections, with maintenance works undertaken as necessary.

9.4.3 Performance and completion criteria

Performance and completion criteria for the maintenance of tracks throughout the Kokoda Offset Site are provided in Table 10. Trigger points for adaptive management of the track inspections are provided in Table 11.

Table 10: Track maintenance performance and completion criteria

Action	Performance criteria	Completion criteria
Inspections of all tracks by Northparkes environment team	To be completed twice per year	Ongoing

Table 11: Track maintenance trigger points for adaptive management

Action	Trigger Point for Adaptive Management	Adaptive Management
Inspections of all tracks twice per year by Northparkes environmental advisors	Tracks blocked by fallen trees, excessively eroding or overgrown, preventing safe driving access	Repairs undertaken as required

9.5 Pest and Kangaroo Management

9.5.1 Management actions

Known feral fauna that have been recorded within the Kokoda Offset Site are fox (*Vulpes vulpes*), rabbit (*Oryctolagus cuniculus*), brown hare (*Lepus capensis*), goat (*Capra hircus*), fallow deer (*Dama dama*) and pigs (*Sus scrofa*). These species may impact on the native fauna species through predation and competition for resources such as food, shelter, and breeding sites. Feral animals can also have a detrimental effect on regenerating areas as well as soil stability.

Pest management will comprise baiting control programs for foxes, rabbits and pigs, on an as needed basis as determined through monitoring. Where other pest species, such as cats, goats, deer etc., are identified, their numbers will be monitored and control measures appropriate for the species will be included in the pest control program as needed. If monitoring identifies that pest species require control, pest management actions will be implemented in consultation with close neighbours, where possible.

9.5.2 Monitoring requirements

Feral animals (or their sign) will be opportunistically recorded during qualitative bi-annual inspections of the Kokoda Offset Site. If these records indicate the presence of a significant population of feral animals, appropriate adaptive management will be implemented. Bi-annual inspections commenced in April 2015. Data collected from this survey event will be used as the baseline data for ongoing feral animal monitoring.

Kangaroo monitoring will also be undertaken bi-annually within the regenerating woodland area. Monitoring is intended to give an indication of relative presence of kangaroo populations within the regenerating area over time. If a significant increase in the kangaroo population is recorded over two consecutive monitoring periods adaptive management will be investigated. Kangaroo monitoring will commence in 2017, at which point a suitable, repeatable survey methodology will be developed and documented in the Annual Review. All adaptive management actions undertaken are to be documented in the Annual Review.

All adaptive management actions undertaken are to be documented in the Annual Review.

9.5.3 Performance and completion criteria

Performance and completion criteria for pest management are provided in Table 12. Trigger points for adaptive management of the pest controls are provided in Table 13.

Table 12: Pest management criteria and completion criteria

Action	Performance criteria	Completion criteria
Annual opportunistic monitoring of feral animal presence during annual ecological monitoring surveys	Completed annually for the first 5 years then 3 yearly	Ongoing
Six monthly opportunistic monitoring of feral animal presence during site inspections by Northparkes environment officers	Completed every 6 months	Ongoing

Table 13: Pest control trigger points for adaptive management

Action	Trigger Point for Adaptive Management	Adaptive Management
Annual or 6 monthly surveys of the Kokoda Offset Site	Feral fauna species or signs of their presence are identified during 2 or more surveys. Or any feral species is identified during a single survey at a level (species specific) that may be impacting on biodiversity values of the Kokoda Offset Site.	Species specific management program will be developed and implemented. In the event that a species management program may increase the numbers of another pest species (e.g. fox control leading to an increase in cat numbers), both species will be targeted in the management program.

9.6 Weed Management

9.6.1 Management action

Introduced species recorded in the Kokoda Offset Site that are considered environmental weeds include Capeweed (*Arctotheca calendula*), Paterson's curse (*Echium plantagineum*), black-berry nightshade (*Solanum nigrum*), tree-of-heaven (*Ailanthus altissima*) and blackberry (*Rubus fruticosus* sp. agg.). Blackberry (*Rubus fruticosus* sp. agg.) is the only noxious weed species recorded on the Kokoda Offset Site listed in the Cabonne Local Government Area control area.

9.6.2 Monitoring requirements

Weeds will be opportunistically recorded during qualitative bi-annual inspections of the Kokoda Offset Site. If the opportunistic records indicate the presence of a significant population of weed species, appropriate adaptive management will be implemented. Bi-annual inspections commenced in April 2015. Data collected during this survey event will form the baseline data for ongoing weed monitoring. The weed control program aims to eradicate Blackberry and Tree of Heaven from thepreviously mapped locations on the property.

9.6.3 Performance and completion criteria

Performance and completion criteria for weed management are provided in Table 14. Trigger points for adaptive management of the weed controls are provided in Table 15.

Table 14: Weed management performance and completion criteria

Action	Performance criteria year 1	Performance criteria years 2 onwards	Completion criteria
Baseline weed inspection	Competed	NA	Completed
Initial weed control program	Completed	NA	Completed
Six monthly ecological monitoring of mapped weeds by Northparkes environment team	Completed twice per year	Completed twice per year	Ongoing
Weed management as required by monitoring	Undertaken as identified by monitoring	Undertaken as identified by monitoring	Ongoing

Table 15: Weed control trigger points for adaptive management

Action	Trigger Point for Adaptive Management	Adaptive Management
Annual ecological monitoring or 6 monthly surveys	Continued presence of weed plants at next survey period after treatment (e.g. 6 months after spraying).	The species specific management controls will be reviewed. The frequency of the controls may be increased or alternative control measures may be implemented
	Weed plants are identified in areas where they have not been previously identified	The weed management program will be extended to include these areas
	Patches of perennial/annual grass weeds occurring in DNG regeneration or revegetation areas (see Section 9.7)	Spot spray or dig out small clumps. Investigate potential suitability of strategic conservation grazing periodically for weed suppression. Monitor and maintain weed control.

9.7 Regeneration of Derived Native Grasslands

Areas of DNG across the Kokoda Offset Site will be managed back to areas of Grey Box Grassy Woodland EEC or Dwyer's Red Gum – Grey Box – Mugga Ironbark – black Cypress Pine Forest, consistent with the surrounding remnant vegetation.

Grey Box grassy woodlands and derived native grasslands of south-eastern Australia occurs in two forms (SEWPaC, 2012). The most common form is as a grassy woodland comprising a tree layer and an understory that must have native grasses but has a varying proportion of shrubs and herbs (SEWPaC, 2012). The derived native grassland form can occur in patches where the tree canopy and mid layer have been almost entirely removed but the native ground later remains largely intact with high flora diversity (SEWPaC, 2012). Key features of grey box grassy woodland communities include the following:

- Woodland with >50% grey box in the overstorey;
- A shrub layer that is moderately dense to absent and includes species such as Dodonaea viscosa ssp. Spatulata
- A ground layer that includes grasses, flowering plants, chenopods, leaf litter and/ or soil crusts. Common species in this layer include Rhodanthe diffusa, Goodenia pinnatifida, Einadia nutans and Crytogram soil crusts.

An initial assessment of the recovery potential for the DNG areas of the Kokoda Offset Site identified six vegetation management areas which are shown on and summarised in Table 16.

Table 16: Preliminary vegetation management areas

Vegetation Management Area	Area (ha[1])
Grey Box Grassy Woodland - DNG: Active Revegetation Areas	36
Grey Box Grassy Woodland - DNG: Natural Regeneration Areas	38
Grey Box Grassy Woodland - DNG: Potential Recovery Areas	21
Dwyer's Red Gum - Grey Box - Mugga Ironbark - Black Cypress Pine Forest DNG: Natural Regeneration Areas	14
Dwyer's Red Gum - Grey Box - Mugga Ironbark - Black Cypress Pine Forest DNG: Active Revegetation Areas	1.00
Farm Track - Disturbed Land: Potential Recovery Areas	1.32
Total	111

1 = Rounding of totals applied (numbers less than 1 – 2 decimal places, numbers between 1 and 10 – 1 decimal place, and greater than 10 - no decimal places)
DNG = Derived Native Grassland

Three types of vegetation management areas were identified:

- Natural regeneration areas which contained existing signs of regeneration and are expected to regenerate naturally once stock is removed and weeds are controlled.
- Potential regeneration areas which contained limited existing signs of regeneration or occur close to a potential seed source and may regenerate naturally once stock have been removed and weeds are controlled. After 24 months of management the level of regeneration occurring in potential regeneration areas will be assessed and such areas will either be managed for continued natural regeneration or active revegetation will be undertaken.
- Active revegetation areas contained no signs of natural regeneration and had little potential to regenerate naturally. After 24 months of management the level of regeneration occurring in active regeneration areas will be assessed and those identified with poor or no regeneration potential will be identified for active revegetation measures. Planting of tree and shrub species will be undertaken in active revegetation areas with poor or no regeneration potential.

9.7.1 Monitoring of regeneration areas

Management actions

Following the removal of domestic stock, natural regeneration management areas will be allowed to regenerate naturally for a period of 24 months. Weed monitoring will be undertaken to ensure that weed species do not out-compete native species once the grazing pressure has been removed.

At 24 months detailed monitoring of the recovery of the natural regeneration management areas will be undertaken to precisely map the recovery potential of the DNG areas to inform further detailed management actions. Those areas with high recovery potential will be allowed to continue regenerating naturally and management of high recovery potential areas will be limited to weed and pest control measures.

The key actions proposed to facilitate natural regeneration of DNG areas are:

- Stock removal: the removal of all stock grazing activities from the Kokoda Offset Site is likely to be the most important step in encouraging native species to re-establish in areas of DNG.
- Weed monitoring: in years one to three monitoring will be important in identifying key areas for weed control to ensure that native species are given the best chance of regenerating naturally. Weed monitoring will be undertaken through biannual (twice yearly) inspections and annual ecological monitoring to ensure that weed species do not out compete native species once the grazing pressure has been removed.
- Weed control: The removal of stock is likely to initially cause an influx of introduced species to establish and this will need to be managed appropriately to allow native tree and shrub species to naturally regenerate. It may be necessary to initially liberate naturally regenerating native trees and shrubs from introduced or invasive plants that are smothering their growth until they are large enough to out-compete and shade-out the invasive species.
- Pest fauna management: introduced and native fauna species have potential to threaten natural regeneration through overgrazing of new plant growth and soil disturbance. More intensive pest management may be required in assisted natural regeneration areas until a stable and resilient ecosystem is established. If it becomes a major threat to the success of natural regeneration, consideration may need to be given to other controls such as erecting temporary fencing around selected regeneration areas
- Other techniques to be implemented to trial for the regeneration of DNG areas include the use of crash grazing, slashing or controlled burning.

Monitoring requirements

As described above, for the first two years, all areas of DNG will be managed through assisted natural regeneration. After two years, detailed monitoring of the recovery of the DNG areas will be undertaken to precisely map the recovery potential of the DNG areas to inform further detailed management actions (using the vegetation management areas delineated in and Figure 3 as a guide). Those areas with high recovery potential will continue regenerating naturally and management will be limited to weed and pest control measures. Areas with low to moderate recovery potential will be managed using active revegetation techniques. Preliminary estimates of recovery potential indicate 37 hectares are likely to require active revegetation management.

DNG areas with moderate recovery potential will be targeted for low intensity revegetation works. This may include supplementary planting of canopy species (using tubestock) to supplement naturally occurring eucalypt saplings and/or other species as per recommendations of a consultant botanist and consistent with key species of Grey Box Grassy Woodland EEC or the Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Forest.

DNG areas with low recovery potential will be targeted for moderate to high intensity revegetation works. This may include ripping of soil and planting of tubestock species as per recommendations of a consultant botanist and consistent with the key species of the Grey Box Grassy Woodland EEC or the Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Forest. Tubestock will be planted at an approximate density of 400 individuals per hectare.

The selection of plant species used in the revegetation strategy is vital to the process of creating a vegetation community that is consistent both structurally and floristically with the target community, particularly in areas where the Grey Box Grassy Woodland EEC is the target. Selection of plant species used in revegetation activities should draw on the floristic results of monitoring in good condition reference sites, in consultation with a qualified and experienced botanist.
The ecological monitoring program for the Kokoda Offset Site DNG regeneration/ revegetation areas will include a combination of condition assessments, floristic sampling, sapling survivorship counts and stratified quadrat sampling. Revegetation areas will be monitored by sapling survivorship counts of planted tubestock and condition assessments of surviving tubestock. Regeneration areas (DNG areas where grazing pressure from domestic stock has been removed) will be monitored via stratified and permanent quadrats. Floristic assessments will be undertaken using representative plots and standard botanical survey approaches (e.g. cover-abundance measures) to assess the floristic recovery of the DNG in comparison to the floristic composition of reference sites.

Stratified quadrats will be established in appropriate target communities within the Kokoda Offset Site to provide reference sites to which the success of regeneration/ revegetation works can be compared. In the event that regeneration/ revegetation sites fail to trend towards the ecological values of the reference sites, adaptive management will be undertaken and management actions will be modified or supplemented with new or additional techniques to promote the recovery of regeneration/ revegetation sites towards the values of reference sites.

Monitoring will include LFA techniques to assess the soil structure, stability and nutrient cycling within the DNG recovery areas. Landscape function analysis (LFA) is a standardised monitoring procedure that uses rapidly acquired field-assessed indicators to assess the biogeochemical functioning of landscapes (Tongway and Hindley 2004). LFA is based mainly on processes involved in surface hydrology, rainfall, infiltration, runoff, erosion, plant growth and nutrient cycling. The standard LFA methods as described by Tongway and Hindley (2004) will be followed for the survey.

The proposed annual monitoring surveys comprise:

- six permanent flora plots will be established in existing remnant target woodland communities (reference sites), comprising:
    - three in Grey Box Grassy Woodland EEC; and
    - three in Dwyer's Red Gum – Grey Box – Mugga Ironbark – black Cypress Pine Forest.

Data on floristics and structure, habitat features and ecological condition will be recorded;

- eleven plots in DNG regeneration/revegetation areas, comprising:
    - five in Grey Box Grassy woodland DNG (EEC) probable active rehabilitation areas;
    - three in Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine DNG probable active rehabilitation areas;
    - one in Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Forest low quality;
    - one in White Box Grassy Woodland CEEC; and
    - one in Grey Box – Ironbark woodland non EEC.

Data on floristics and structure, habitat features and ecological condition will be recorded;

- sapling survivorship counts of planted tubestock and condition assessments of surviving tubestock in regeneration and revegetation areas (to start in 2015);

- permanent photo point monitoring at each monitoring site;
- a replicable stem count assessment in suitable reference (remnant woodland in target communities) and regeneration (DNG) sites for use in developing completion criteria and tracking future progress (to start in 2015); and
- LFA monitoring surveys in DNG recovery areas and reference sites in remnant woodland in target communities. A minimum of 11 LFA sites will be undertaken.

Performance and completion criteria

Performance and completion criteria for active and natural regeneration management areas are provided in Table 17. Trigger points for adaptive management of the active and natural regeneration management area methods are provided Table 18.

For performance and completion criteria for stock exclusion, weed management and pest management that apply to the regeneration and revegetation of derived native grassland areas see Section 9.1.1 (exclusion of stock), Section 9.5 (pest management) and 9.6 (weed management).

Table 17: Regeneration of derived native grasslands performance and completion criteria

Action	Baseline Surveys year 1	Performance criteria year 2 onwards	Completion criteria
Annual ecological monitoring, including LFA	Baseline ecological monitoring was completed in 2014	Completed annually for the first 5 years then 3 yearly	Ongoing

Table 18: Natural regeneration trigger points for adaptive management

Action	Trigger Point for Adaptive Management	Adaptive Management
Monitoring of DNG recovery potential at 2 years	DNG areas identified with high recovery potential	Those areas with high recovery potential will be allowed to continue regenerating naturally and management will be limited to weed and pest control measures.
	DNG areas identified with moderate recovery potential	DNG areas with moderate recovery potential will be targeted for low intensity revegetation works. This may include supplementary planting of canopy species tubestock to supplement naturally occurring eucalypt saplings and/or other species as per recommendations of a consultant botanist and consistent with the key species of the final target community.
	DNG areas identified with low recovery potential	DNG areas with low recovery potential will be targeted for moderate to high intensity revegetation works. This may include ripping of soil and planting of tubestock species as per recommendations of a consultant botanist and consistent with the key species of final target community.
Annual LFA monitoring	LFA results show a decrease of greater than 25% in soil stability, infiltration or nutrient cycling in successive years	Review current soil management practices and initiate specific control measures.
	Soil stability, infiltration and/or nutrient cycling scores of 1 or more DNG treatment types are not trending towards the values of the relevant reference sites.	Review current soil management practices and initiate specific control measures.
Ecological monitoring of DNG areas	Less than 50% success of plantings in any management area after 1 year	Investigate potential climatic or environmental reasons that may have contributed to the low success rate. Where possible develop strategies to address the climatic or environmental drivers for poor survival rates. Review current planting management practices and initiate specific management measures.

Action	Trigger Point for Adaptive Management	Adaptive Management
		Following the above investigations and development of management strategies to maximise future survival rates, replace the lost plants.
	Vertebrate pest species identified as limiting regeneration potential through grazing	Identify species specific pest management controls and implement specific control measures. Refer to Section 9.5 above (pest management).
	Native vertebrate species limit regeneration through grazing	Identify species specific management controls and implement species specific control measures. Consider exclusion fencing and other plant protection measures if other controls are not identified.
	Low species diversity or species diversity not consistent with target community.	Investigate presence of weed species and undertake targeted weed control where necessary (see Section 9.6) Undertake active revegetation techniques including direct seeding or tubestock planting, following appropriate ground preparation such as weed control, ripping and/or auguring.
	Low or no tree cover appearing	Plant or direct seed trees at an appropriate density using minimal disturbance.
	Tree dieback (from insect pressure, herbicide drift, water stress)	Revegetate with dense shrubs to increase diversity and attract insectivorous birds. Avoid using defoliants near woodlands when windy.
	Dense stands of colonising tree or shrub species dominate regeneration or revegetation areas	• Assess whether thinning is necessary thin manually if appropriate. • Leave if patches are small and plants are native.

9.7.2 Habitat augmentation

Habitat augmentation may be required if the regeneration areas do not meet the habitat structure benchmarks of the reference woodlands at the appropriate maturity stage. If required, nest boxes can be added to trees once that have reached a sufficient size, to accommodate a suite of fauna species that occur in the reference woodlands.
No habitat features salvaged from the impact area will be moved to the offset site as there is a risk that unknown diseases or pathogens could be transferred the approximate 50 kilometres between the sites during that process. Any fallen timber located during the track maintenance works within the offset site will be moved into the DNG regeneration areas, where practical.

Monitoring requirements

If applicable, any habitat augmentation will be monitored for its effectiveness during the annual ecological monitoring program. In the event that nest boxes are installed, an annual monitoring program will be developed which will include monitoring of occupancy rate and box condition.

Performance and completion criteria

Performance and completion criteria and trigger points for adaptive management of any habitat augmentation will be developed if required.

9.8 Threatened Bird Species Monitoring

9.8.1 Monitoring requirements

Threatened bird monitoring will be undertaken at the Kokoda Offset Site, focussing on key threatened bird species. Two threatened fauna species were recorded in the project disturbance area, the grey-crowned babbler (*Pomatostomus temporalis temporalis*) and the superb parrot (*Polytelis swainsonii*). Specific assessments of the potential for the Kokoda Offset Site to offset potential impacts on the swift parrot and regent honeyeater were a focus of the Preliminary Documentation report for the Referral to the Commonwealth Department of the Environment. Annual monitoring surveys of the Kokoda Offset Site will also include surveys for the swift parrot (*Lathamus discolor*) and regent honeyeater (*Anthochaera phrygia*).

Threatened bird monitoring will comprise bird surveys of existing woodland and recovering DNG areas focusing on the presence of threatened. Threatened bird monitoring will cover both the existing remnant vegetation areas as well as the recovering DNG areas, once there has been reasonable growth of canopy species (new sites will therefore be added as regeneration/ revegetation areas progress). Monitoring should be undertaken during winter for the regent honeyeater and swift parrot (during periods when eucalypt trees are flowering) and during early spring for the superb parrot when it is most likely to be utilising the Kokoda Offset Site during local seasonal movements. Monitoring will be undertaken for the grey-crowned babbler during both winter and spring survey periods.

The proposed monitoring surveys will comprise:

- Plot-based diurnal spring woodland bird surveys. As a minimum, two x 20 minute bird surveys will be undertaken at six reference sites (in target woodland community remnants) and five DNG regeneration sites (consistent with flora monitoring sites where possible). Each survey will cover an approximate two hectare area around the flora monitoring plots. Spring woodland bird surveys will be undertaken in DNG regeneration sites during all growth stages as grey-crowned babblers may occur in both DNG and woodland areas, and superb parrots may forage in DNG areas.
- Plot-based diurnal winter bird surveys for the regent honeyeater and swift parrot. Winter bird surveys should be undertaken in areas of flowering eucalypts across the Kokoda Offset Site. Each year a minimum of six eucalypt flowering sites should be surveyed. If no flowering eucalypts are identified during the winter survey period, the winter bird surveys will be undertaken at the six flora reference sites (in target woodland community remnants). Two 20 minute bird surveys will be undertaken at each site and cover approximately a two hectare area around the flora monitoring plots. Once DNG regeneration areas provide a four metre high canopy, winter bird surveys will also be undertaken across each of the five DNG regeneration areas.;

Opportunistic observations of the four targeted threatened bird species will be recorded during all other monitoring survey activities.

9.8.2 Performance and completion criteria

Performance and completion criteria for threatened bird surveys are provided in Table 19. Trigger points for adaptive management of the threatened bird surveys are provided in Table 20.

Table 19: Threatened bird survey performance and completion criteria

Action	Baseline Surveys year 1	Performance criteria Year 2 onwards	Completion criteria
Annual winter and spring bird surveys	Completed	To be completed annually for the first 5 years then 3 yearly	Ongoing

Table 20: Threatened bird survey trigger points for adaptive management

Action	Trigger Point for Adaptive Management	Adaptive Management
Annual winter bird surveys	No flowering eucalypts are identified during winter months.	Consider undertaking additional winter bird surveys during May or October if a large proportion of the eucalypt trees present at the Kokoda Offset Site flower during May or October.

9.9 Seed Collection

The existing woodland vegetation of the Kokoda Offset Site provides a valuable source of native seed. If active revegetation activities are required, this seed resource will be utilised where practical. The use of local provenance seed can improve the success of revegetation, while also preserving the genetic integrity of the local vegetation.

Sustainable seed collection from the Kokoda Offset Site will also be considered for use in the rehabilitation of Northparkes Areas where suitable.

9.10 Appropriate Management of Adjacent Agricultural Land

There will be ongoing consultation with adjacent land owners and/or managers to ensure they are aware of the biodiversity conservation objectives of the Kokoda Offset Site.

9.11 Erosion and Sedimentation

Owing to a high vegetation cover across most of the Kokoda Offset Site, erosion is not currently a significant management issue. Inspections of any areas of erosion concerns should be included in routine biannual inspections, targeting riparian areas and sites with limited vegetation cover.

If an area of significant erosion concern is identified, appropriate short term erosion and sediment controls will be implemented and longer term stabilisation actions such as vegetation establishment will be investigated.

9.12 Salinity

Salinity has not been identified as an issue of concern within the Kokoda Offset Site to date. Given that the site has a high vegetation cover it is not likely to become a management issue. However, any evidence suggesting the land is affected by salinity should be documented and the appropriate management and remediation strategies implemented.

9.13 Bushfire Management

A Bush Fire Management Plan for the Kokoda Offset Site (BFMP) has been prepared (refer Appendix 4). The vegetation of the Kokoda Offset Site requires appropriate bushfire management to protect life and property while providing the necessary protection to the significant ecological features of the area.

The BFMP plans for the exclusion of fire from regeneration and revegetation areas, where possible. This allows young vegetation communities to mature to a stage where they are able to withstand bushfire and regenerate naturally following a fire event. This is nominally at least 15 years, but is dependent on the success of plant establishment and the vegetation community present. The Bushfire Management Plan also considers the locations of known records of threatened species and TECs. Fire should be excluded from these areas, where possible, so that planned burn frequency and intensity does not threaten the persistence of threatened species and TECs.

The use of low intensity controlled burns to facilitate natural regeneration from the soil seed bank may need to be considered later in the project if natural recruitment levels are not sufficient. If required, an appropriate strategy will be developed in close consultation with the Rural Fire Service.

9.14 Management of Cultural Heritage Values

The Kokoda Offset Site is not subject to an Aboriginal Cultural Heritage Management Plan, however there is potential that it may contain sites of Cultural Heritage Value. As such, appropriate consideration to Cultural Heritage values will be made in regards to activities undertaken within the Kokoda Offset Site.

10. ADAPTIVE MANAGEMENT

10.1 Adaptive Management Process

Adaptive management of the BOMP will be responsive to any new and relevant data that may arise through the monitoring described in Section 8, legislative change or any other studies completed at the site. This will enable a flexible approach to management commitments, allowing ongoing feedback and refinement of the BOMP. Adaptive management will be a key mechanism to address the risks to the successful implementation of the BOMP. Adaptive management steps include regular review of the BOMP, including adaptation of targets and performance indicators, recognising potential risks to the successful implementation of the BOMP and having a frame work in place for corrective actions.

10.2 Review of BOMP

The BOMP is to undergo an internal review and revision every three years to refine and make improvements to the management strategies and to assess their performance against preliminary performance indicators and completion criteria. The three year review will look for opportunities to improve the management strategies and further develop and forecast the longer term performance indicators and completion criteria.

Amendments to the BOMP in response to adaptive management and continual improvement requirements that are consistent with the conditions of approval do not need to be submitted to relevant authorities for approval.

10.3 Assess targets and performance indicators

The performance indicators and completion criteria outlined in Section 9 are preliminary and apply to the first three years of the BOMP implementation. Due to a delayed registration of the Voluntary Conservation Agreement, commencement of management actions began in June of 2018.

A three yearly reassessment of the BOMP will be undertaken in 2021, unless a process changes earlier than this date that requires consideration. This three yearly review will reassess the targets and performance indicators and will be:

- adapted and changed as targets are met and new challenges arise;
- will be assessed and redeveloped as appropriate in response to monitoring outcomes; and,
- will be assessed for the success of the management and improvement strategies.

Modifications to the targets and performance indicators will be recorded in a revised BOMP for the Kokoda Offset Site.

10.4 Potential risks and corrective actions

There are a number of potential risks, or situations where preliminary performance indicators and completion criteria might not be achieved. The key risk of the Kokoda BOMP not succeeding relates to the return of DNG communities to woodland communities, and to the management of threats such as weeds and pests. The use of reference sites will assist in identifying whether observations from monitoring are able to be addressed by modifying management actions, or if they are due to broader conditions that can't be controlled such as climatic and seasonal factors (e.g. drought).

A list of potential situations where biodiversity conservation objectives of this BOMP may not be met is provided in Table 21 along with potential corrective actions. This list is adapted from Rawlings *et al.* (2010).

Table 21: Risks and recommended corrective action measures[1]

Potential Risks	Recommended Corrective Actions
General Management Risks	
Unauthorised stock access	• identify access points and repair fences appropriately; and • communicate with adjacent landholders to emphasise that no stock are to have access to the Kokoda Offset Site.
Infestations of noxious and environmental weeds are increasing or new species detected.	• adapt weed management program and modify strategies accordingly.
Infestations of pest animals are increasing or new species detected.	• adapt pest management program and modify strategies accordingly.
Risk to Success of Regeneration/Revegetation of DNG Areas	
No regeneration of plants, or indicator species missing	• assess fencing and ensure there is no un-authorised stock access; • control exotic weeds and pest animals to reduce competition; and • if deemed necessary, instigate active regeneration techniques including direct seeding or tubestock planting, following appropriate ground preparation.
Low species diversity or species diversity not consistent with target community.	• targeted weed control; and • instigate active revegetation techniques including direct seeding or tubestock planting, following appropriate ground preparation such as weed control, ripping and auguring.
Low or no tree cover	• plant/ direct seed trees at appropriate rate using minimal disturbance.
Tree dieback (from insect pressure, herbicide drift, water stress)	• revegetate with dense shrubs to increase diversity and attract insectivorous birds; • avoid using defoliants near woodlands when windy; and • increase patch size through revegetation.
Patches of perennial/annual grass weeds occurring	• spot spray or dig out small clumps; • investigate suitability of strategic conservation grazing periodically for weed suppression and to stimulate native pasture; and • monitor and maintain control.
Dense stands of colonising tree or shrub species dominate regeneration or revegetation areas	• assess whether thinning is necessary; • leave if patches are small and plants are native; and • thin manually if appropriate.
Scarcity of key habitat features present in relation to reference sites	• add habitat features such as logs or branches; • control feral predators; • increase the number of vegetation layers in the patch; and • establish nest boxes for target species.

1 = Adapted from Rawlings *et al.* (2010)

11. REPORTING AND DOCUMENTATION REQUIREMENTS

11.1 Record Keeping

Northparkes will maintain accurate records substantiating all activities associated with measures taken to implement the BOMP. These records may be subject to audit by the Department or an independent auditor.

11.2 Annual Reporting

Condition 12 of the Commonwealth Project Approval states that:

> 'Within three months of every 12 month anniversary of the commencement of the action, the person taking the action must publish a 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 two business days of becoming aware of the non-compliance'.

Further to this, Condition 8 of the NSW Development Consent states that:

> 'the Proponent shall provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval'.

In accordance with these conditions, within 3 months of every 12 month anniversary of the commencement of the Project, Northparkes will prepare an Annual Review which will be published on their website. In relation to the BOMP, the Annual Review will contain the following information:

1. compliance with each of the conditions of approval;
2. description of implementation of the BOMP as specified in the conditions of approval;
3. rehabilitation and management activities undertaken within the reporting period, including estimated costs;
4. results of monitoring events for the reporting period; and
5. required amendments to the management or monitoring processes as identified by the adaptive management mechanism.

Utilising the adaptive management mechanism outlined in Section 10, the results of monitoring will be utilised to inform updates to the management actions to be undertaken in the Kokoda Offset Site.

11.3 Ecological Monitoring Reporting

An ecological monitoring report will be prepared on completion of each monitoring survey. The report will include:

- a detailed description of the monitoring methods employed;
- a discussion of the results;
- an assessment as to whether the preliminary performance indicators have been met, and how the project is tracking towards the completion criteria;
- a revision of the management and improvement strategies as appropriate; and
- a revision of the preliminary performance indicators and completion criteria (if required).

12. CONSERVATION BOND AND IMPLEMENTATION COSTS

A Conservation Bond for the Kokoda Offset Site is required by DPE in accordance with Condition 28. The purpose of this bond is to cover the cost of the management of land required to be set aside as an offset area, should the mine consent holder be unable or unwilling to continue management of the land. The Conservation Bond value is based on all the activities identified in the approved BOMP and is the full cost of implementing the biodiversity offset strategy. The Conservation Bond estimate has been prepared in accordance with relevant guidelines and accepted practice to inform this process.

13. BOMP CHECKLIST AND IMPLEMENTATION SCHEDULE

A checklist summarising the Kokoda Offset Site BOMP actions required, and their schedule for implementation for the first three years is provided in Table 22. This is a snapshot of the key actions required in the first three years of implementation of the BOMP. Reference to the relevant sections of this BOMP should be made for more detail of the actions required.

Table 22: Checklist and implementation schedule for the Kokoda offset site BOMP

Actions/Targets	Timeframe
Management and Improvement Actions	
Install necessary boundary fencing and signage for the Kokoda Offset Site.	Complete.
Remove stock grazing activities from the Kokoda Offset Site.	Complete Authorised strategic conservation grazing may be adopted for ecological restoration purposes
Establish an appropriate long-term conservation mechanism for the Kokoda Offset Site.	To be agreed upon before 12 June 2018.
Lodge a conservation bond.	Complete
Routine inspection and maintenance of tracks and fences by Northparkes environmental officers.	Biannual (twice yearly) inspections. Maintenance is required throughout the life of the BOMP.
Establish an effective annual weed and pest control programs.	To be established in Year 1. Annually review and revise.
Undertake weed and pest control activities.	Commencing Year 1, concentrate efforts in DNG areas in Years 1 – 3 to assist natural regeneration.
Establish woodland vegetation in areas of derived native grassland (DNG) through assisted natural regeneration.	Implement assisted natural regeneration activities (weed and pest control, stock removal etc.) in Years 1-5. Assess progress towards performance indicators and completion criteria during the Year 3 review of the BOMP (incorporating results of inspections and monitoring). Commence active revegetation methods after Year 2 if natural regeneration is not progressing appropriately.
Active revegetation activities	Will only commence if necessary after a minimum of 2 years trial with assisted natural regeneration. The need for active revegetation will be assessed at each 3 year revision of the BOMP.
Monitoring Actions	
Establish a suitable monitoring program to assess the success of ongoing management and improvement strategies	Complete
Ecological Monitoring	Commence surveys in autumn or spring in Year 1 (baseline survey), and undertaken annually for first 5 years. Winter migratory bird monitoring to commence in winter of Year 1 (baseline survey).
General inspections across the Kokoda Offset Site by Northparkes environmental officers.	Biannually from Year 1.
Reporting and Documentation Actions	
Accurate records are being maintained substantiating all activities and monitoring relating to implementation of the BOMP.	Ongoing from Year 1.
Collate data on actions implemented and results of inspections and monitoring into the Annual Review.	Annually from Year 1.

Actions/Targets	Timeframe
Ecological Monitoring Report	Following completion of each monitoring period, within 3 months of each monitoring survey event, commencing Year 1 (baseline survey).
Update BOMP, including a revision of management actions, performance indicators and completion criteria.	Every 3 years from commencement (earlier if deemed necessary).

14. REGULATORY REQUIREMENTS

The Kokoda BOMP addresses the relevant components of schedule 3 conditions 25-29 and schedule 6 condition 3 of the NSW Development Consent (DC11_0060), and conditions 4 – 9 of the Commonwealth Approval (EPBC 2013/6788) for the Northparkes Mines Step Change Project. The details of the NSW and Commonwealth conditions and reference to where they are addressed in this BOMP are provided in Table 23 and Table 24.

Table 23: NSW Development Consent Conditions

Requirement	
Schedule 3	
25. The Proponent shall actively manage and maintain the populations of Pine Donkey Orchid located to the north of the project area (near Adavale Lane) and near the E48 subsidence zone. *Note: The locations of the Pine Donkey Orchid populations are shown on the figure in Appendix 6 of Consent.*	
26. The Proponent shall implement the biodiversity offset strategies summarised in Table 7 below, shown conceptually in Figures 1, 2 and 3 of Appendix 7 and detailed in the table at Appendix 7, to the satisfaction of the Secretary.	
Limestone National Forest Offset	***Minimum Size hectares (ha)***
Revegetate land	45.1
Sub-Total	**45.1**
Estcourt Tailings Storage Facility Offset	
Vegetation Community:	
Yellow Box Tall Grassy Woodland	3.3
Inland Grey Box – White Cypress Pine Tall Woodland	38.8
Derived Tussock Grasslands	23
Sub-Total	**65.1**
Kokoda Biodiversity Offset	
Vegetation Community:	
Grey Box Grassy Woodland EEC	13
Grey Box Grassy Woodland DNG EEC	96
White Box Grassy Woodland EEC	2.2
Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Forest	150
Rocky Rise Shrubby Woodland	26
Grey Box – Ironbark Woodland	25
Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine DNG	15
Dwyer's Red Gum Creekline Woodland	9.4

Requirement	
Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Woodland Low Quality	8.6
Mugga Ironbark Woodland	1.9
Farm tracks and dams (disturbed lands)	2.5
Sub-Total	**350.0**

Notes:

- *The The Limestone National Forest Biodiversity Offset area is marked in blue and labelled "Addition To Limestone National Forest" in Figure 1 of Appendix 7 of the Consent.*
- *The Estcourt Tailings Storage Facility Biodiversity Offset area is marked with bold black line in Figure 2 of Appendix 7 of the Consent.*
- *The Kokoda Biodiversity Offset area is marked with red line in Figure 3 of Appendix 7 of the Consent.*

The Proponent shall ensure that the Kokoda Biodiversity Offset provides suitable habitat for all the threatened fauna species confirmed and identified as being present in the disturbance areas.

Note: The threatened fauna species confirmed and identified as being present in the disturbance areas are listed in Appendix 8 of the Consent.

27. By the 30 June 2015, unless the Secretary agrees otherwise, the Proponent shall make suitable arrangements to protect the Kokoda Biodiversity Offset in perpetuity in consultation with BCD and to the satisfaction of the Secretary.

28. By 30 June 2015, unless otherwise agreed by the Secretary, the Proponent shall lodge a Conservation Bond with the Department to ensure that the biodiversity offset strategies are implemented in accordance with the performance and completion criteria of the Biodiversity Management Plan (refer to Condition 29 below). The sum of the bond shall be determined by:

(a) calculating the full cost of implementing the biodiversity offset strategy (other than land acquisition costs); and

(b) employing a suitably qualified quantity surveyor to verify the calculated costs,

to the satisfaction of the Secretary.

If the biodiversity offset strategies are completed generally in accordance with the completion criteria in the Biodiversity Management Plan to the satisfaction of the Secretary, the Secretary will release the bond.

If the biodiversity offset strategies are not completed generally in accordance with the completion criteria in the Biodiversity Management Plan, the Secretary will call in all, or part of, the conservation bond, and arrange for the satisfactory completion of the relevant works.

-
- Notes:
  - *This condition does not apply to the Limestone National Forest Offset;*
  - *Existing bonds which have been paid for the Estcourt Tailings Storage Facility Biodiversity Offset remain current and are satisfactory to fulfil the requirements of this condition;*
  - *Alternative funding arrangements for long-term management of the Biodiversity Offsets, such as provision of capital and management funding as agreed by BCD as part of a Biobanking Agreement or transfer to conservation reserve estate can be used to reduce the liability of the conservation and biodiversity bond, and*
  - *The sum of the bond may be reviewed in conjunction with any revision to the Biodiversity Offsets.*

Requirement
29. The Proponent shall prepare and implement a Biodiversity Management Plan for the project to the satisfaction of the Secretary. This plan must: (a) be prepared in consultation with BCD, and submitted to the Secretary for approval prior to the commencement of any development on site; (b) describe the short, medium, and long term measures that would be implemented to: • manage the remnant vegetation and fauna habitat on the biodiversity offset sites; • restore the derived native grassland component of the Grey Box Grassy Woodland EEC community within the Kokoda Biodiversity Offset to woodland community; • implement the biodiversity offset strategies; and • integrate the implementation of the biodiversity offset strategies to the greatest extent practicable with the rehabilitation of the site (where relevant); (c) include detailed performance and completion criteria for evaluating the performance of the biodiversity offset strategies, and triggering remedial action (if necessary); (d) include a detailed description of the measures that would be implemented for: • enhancing the quality of existing vegetation and fauna habitat in the biodiversity offset areas, including the derived native grassland component of the Grey Box Grassy Woodland EEC community within the Kokoda Biodiversity Offset; • creating native vegetation and fauna habitat in the biodiversity offset areas and rehabilitation area through focusing on assisted natural regeneration, targeted vegetation establishment and the introduction of naturally scarce fauna habitat features (where necessary); • managing and maintaining the populations of Pine Donkey Orchid located to the north of the project area (near Adavale Lane) and near the E48 subsidence zone (refer to Appendix 6); • collecting and propagating seed; • managing any potential conflicts between the proposed enhancement works in the biodiversity offset areas and any Aboriginal heritage values (both cultural and archaeological) in these areas; • managing salinity; • controlling weeds and feral pests; • controlling erosion; • managing grazing and agriculture on site; • controlling access; and • bushfire management; (e) include a seasonally-based program to monitor and report on the effectiveness of these measures, and progress against the detailed performance and completion criteria; (f) identify the potential risks to the successful implementation of the biodiversity offsets, and include a description of the contingency measures that would be implemented to mitigate against these risks; and (g) include details of who would be responsible for monitoring, reviewing, and implementing the plan.
Schedule 6

Requirement
3. The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include: (a) detailed baseline data; (b) a description of: • the relevant statutory requirements (including any relevant approval, licence or lease conditions); • any relevant limits or performance measures/criteria; • the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures; (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria; (d) a program to monitor and report on the: • impacts and environmental performance of the project; • effectiveness of any management measures (see c above); (e) a contingency plan to manage any unpredicted impacts and their consequences; (f) a program to investigate and implement ways to improve the environmental performance of the project over time; (g) a protocol for managing and reporting any: • incidents; • complaints; • non-compliances with statutory requirements; and • exceedances of the impact assessment criteria and/or performance criteria; and (h) a protocol for periodic review of the plan.

Table 24: Commonwealth EPBC Act Approval Conditions

Requirement
4. To compensate for the loss of 46 hectares of GBGW and the related and additional loss of habitat for other matters of national environmental significance (Polytelis swainsonii; Lathamus discolour; Anthochaera phrygia) the person taking the action must secure the offset lands identified as the 'Kokoda Offset Site' in Section 2.3 of the Preliminary Documentation. These offset lands must be protected by a legal instrument under relevant legislation on the title prior to commencement of the action
5. The instrument referred to in Condition 4 must: (a) provide for the legal protection of the land for the duration of the impact (b) prevent any conflicting future development activities, including mining and mineral extraction; (c) c) ensure the active management of the land (in accordance with Condition 9).
6. The person taking the action must provide evidence to the Department of their compliance with Condition 4, along with offset attributes, shapefiles and textual descriptions and maps to clearly define the location and boundaries of the offset sites, prior to the commencement of the action.
7. In the event that Conditions 4 and 5 cannot be met, then the person taking the action must secure alternative offset lands to the satisfaction of the Department prior to the commencement of the action.
8. The area of land contained within the offset lands that are secured must include appropriate areas of offset lands (consistent with the Department's EPBC Act offsets policy) for each of the matters of national environmental significance that are impacted by the action, as per Section 2.4.2 and Appendix 6 of the Preliminary Documentation.

Requirement
9. The offset lands ('Kokoda Offset Site') identified in Condition 4 must be managed to improve and maintain the condition of the offset lands to the satisfaction of the Department to achieve the conservation objectives of the offset lands, including: (a) development of a suitable management plan for the offset lands which specifies conservation objectives and how they are to be achieved. The conservation objectives must be clearly set out, measurable and consistent with the conservation management intent described in Section 2.3 of the preliminary documentation. (b) implementation of all management actions and conservation measures identified in the Preliminary Documentation, including in Section 2.3 and Appendix 7, such as, weed management, pest management, stock exclusion and ecological monitoring; (c) active management of derived native grassland areas (GBGW) to allow regeneration and full recovery of these areas of GBGW ecological community over time; (d) allocation of appropriate funding to achieve the conservation objectives; (e) regular monitoring against conservation objectives and adaptive management as appropriate to achieve the conservation objectives.

14.1 Authority Consultation

Consultation with the relevant authorities including the NSW Office of Environment and Heritage (OEH) and the NSW Department of Planning and Environment (DPE) will occur throughout the implementation of this BOMP and throughout the ongoing management of the Kokoda Offset Site, as required.

Consultation with the Commonwealth Department of the Environment (DoE) has been undertaken as part of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) project approval process and will continue through the implementation of this BOMP, as required.

This BOMP was initially submitted to the Department of Planning and Environment (DPE) in November 2014. In September 2015, Northparkes received comments from the Department of Planning and Environment requesting Northparkes to amend additional information in this BOMP. Northparkes amended the BOMP and these comments are detailed in Section 16. Northparkes also received recommendations on the BOMP in December 2015 from OEH. These recommendations have been addressed in the current version of the BOMP and are detailed in the same section.

14.2 Impact Mitigation Strategies

Northparkes sought to avoid and minimise potential impacts on the ecological values of the proposed disturbance area throughout the Project planning process. This has included avoidance and minimisation of disturbance of key vegetation communities, particularly the White Box – Yellow Box – Blakely's Red Gum Woodland EEC and Grey Box Grassy Woodland EEC.

Key impact mitigation strategies in the Project Area include weed and feral animal control, general operation controls such as dust, noise, fugitive light and surface water, tree hollow replacement with nest boxes, salvage of ground habitat features (logs, boulders, etc.) for the creation of habitat features in nearby areas, a comprehensive tree felling procedure to limit impacts on hollow-dependent threatened species and the establishment of an annual ecological monitoring program.

These key impact mitigation strategies will be detailed in revision to relevant management strategies and plans. These revised strategies and plans includes the Flora and Fauna Management Plan (FFMP) and will be expanded to include areas to be impacted by the Project.

15. REFERENCE MATERIALS

Table 24: Reference Materials

Document Title	ID No. | Year
North Mining Limited, 2006. Management Plan – Site Wide – Land use. North Mining Limited.	2006
North Mining Limited, 2008. Management Plan – Site Wide – Flora and Fauna. North Mining Limited.	2010
Rawlings, K., Freudenberger, D. and Carr, D. (2010) *A Guide to Managing Box Gum Grassy Woodlands*, Department of the Environment, Water, Heritage and the Arts, Canberra	2010
Deparment of Sustainability, Environment, Water, Populations and Communities (SEWPaC) (2012). Grey Box (Eucalyptus macrocarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia: A guide to the identification, assessment and management of a nationally threatened ecological community. Commonwealth of Australia. Canberra.	2012
Tongway, D J and Hindley, N L 2004. *Landscape Function Analysis: Procedures for monitoring and assessing landscapes with special reference to mine sites and rangelands.* CSIRO Sustainable Ecosystems, Canberra.	2004
Umwelt (2013a) *Environmental Assessment Northparkes Step Change Project*. Prepared by Umwelt on behalf of Northparkes Mines.	2013
Umwelt (2013b) Northparkes Mines Step Change Project Preliminary Documentation EPBC Act Referral 2013/6788. Prepared by Umwelt on behalf of Northparkes Mines.	2013
Umwelt (2013c) Northparkes Mines Step Change Project Response to Submissions Addendum Report. Prepared by Umwelt on behalf of Northparkes Mines, November 2013.	2013

16. REGULATORY COMMENTS

Biodiversity Management Plan – Updates to BOMP based on Department of Planning and Environment comments received in September 2015.

DoP comment	Comments	Status
Still appears in draft from	Document reformatted to Northparkes style for consistency with of Management Plan. Draft removed.	Complete
Appendices 1 & 2 missing	Attached Limestone National Forest Offset Area Revegetation Plan (Appendix 1) and Vegetation Management Plan (for the Estcourt Offset area) (Appendix 2)	Complete
Figures 2.3 and 2.4 missing	Figures updated to reflect the table of contents	Complete
Section 6.3 requires updating	Section 6.3 has been updated. As we are currently only in the first year on the BOMPs implementation, no results can be reported at this stage.	Complete Section 6.3
Objectives to include mention of Donkey Orchid conservation and management.	All information relating to the management of the pine donkey orchid (PDO) has been moved to Appendix 3 – Species Management Plan for the Pine Donkey Orchid (SMP for the PDO). Northparkes was requested to draft a SMP for the PDO following the submission of the BOMP to provide additional information about this particular threatened species and its management. As such, having all the information regarding the PDO in the one place provides clarity and increases readability, so that the BOMP only applies to the Kokoda offset site and all information relating to the PDO is centralised in one location.	Complete Refer Species Management Plan (Appendix 3)
Table 1. To include consent conditions for Donkey Orchid	Consent conditions relating to PDO have been included with a cross reference to Appendix 3 (SMP for the PDO).	Complete

Biodiversity Offset Management Plan- Additionally changes made to BOMP based on recommendations from the Office of Environment & Heritage in December 2015.

OEH comment	Comments	Status
1.1 Update the preliminary long term biodiversity management targets (section 3) to state: (a) "Increase the overall native flora and fauna species diversity *compared to the baseline condition*" (or something similar) (b) "Improve the habitat values of the remnant woodland communities in the *Kokoda Offset Site compared to the baseline condition*" (or something similar).	Acknowledged, change made to BOMP in Section 7.0	Complete
2.1 Remove reference to the establishment of 300 metres of new fencing in section 3	Acknowledged, changes made to BOMP in Section 3 and Section 5.2 to reflect that establishment/maintenance of fencing will be conducted as required to exclude stock from the offset area. Section 5.2 states that no new fencing is required.	Complete
2.2 The in-perpetuity conservation mechanism has not yet been finalised. Amend the status to "ongoing" or another similar description within Table 5.4.	Acknowledged, change made to BOMP in Table 5.4.	Complete
2.3 Develop an ecological burn strategy for the Kokoda offset site.	A Bush Fire Management Plan has been developed for the Kokoda Offset Site and has been included in this document (refer Appendix 4). The ecological burn strategy is included in Section 5.	Complete

OEH comment	Comments	Status
2.4 Collect and document baseline information on feral fauna and kangaroo populations. 2.5 Implement targeted monitoring of feral fauna and kangaroo numbers.	Kangaroos and feral fauna species (including foxes, hares and rabbits) occur at Kokoda. However, the number of kangaroos and feral fauna are not considered to be at a level that is detrimental to the biodiversity conservation values at the offset site. Additionally, as Kokoda is located within a predominately agricultural landscape and the boundary fences at the offset site are not kangaroo or feral proof, movement of these species, in particular kangaroos, occurs freely across property boundaries and the broader landscape. Vegetation surveys, using a Landscape Function Analysis (LFA) methodology, were undertaken across the property in 2014 and 2015. Baseline surveys conducting in 2014 were undertaken prior to the purchase of the property, while low intensity sheep grazing was still being undertaken across the property. In 2015, LFA monitoring surveys were undertaken across the property, approximately 6 months after stock had been removed. As such, both of these assessments provide baseline information on the level of grazing impacts on ground cover across the property, both with low intensity livestock grazing and after livestock grazing was removed. As stock have been excluded from the property since early 2015, the majority of ongoing grazing at the property will be from kangaroos. As Kokoda contains several ground cover species of interest, including several (not listed) orchid species, low level grazing provides an important service in terms of regulating the density of the ground cover so small herbs and forbes are able to compete and persist. However, it is acknowledged that left unregulated, kangaroo numbers, in particular, could increase over time. As such, the baseline vegetation surveys undertaken in 2014 and 2015 will be used as surrogate indictor of grazing intensity at the property. If ongoing LFA surveys indicate that ground cover has declined to levels similar to the baseline vegetation surveys, adaptive management will be initiated and an investigation into kangaroo numbers will be commenced. Additionally, feral fauna will be monitored during biannual inspections. Where feral animals are recorded, pest management options will be discussed with the near neighbours and implemented as required. Northparkes is in regular communication with the near neighbours around Kokoda, and will continue to discuss and collaborate with these neighbours on issues including kangaroo and feral animal management for the offset site.	Complete

OEH comment	Comments	Status
2.6 Consider the potential for updating the weed management actions (Table 5.9) to have a goal to eradicate tree-of-heaven and blackberry.	Northparkes internal Weed Control Program for the Kokoda Offset Site includes provisions to spray and actively manage tree-of-heaven and blackberry at the Kokoda Offset Site. However, as Kokoda occurs within an agricultural landscape with different land management practices, even if these weed species are eradiated from the property, it will be extremely difficult to ensure that these species are not reintroduced.	Complete
2.7 Amend the current trigger points for weed control (Table 14 and 15) so that they are quantifiable.	Acknowledged, change made to BOMP in Table 9.6	Complete
2.8 Information regarding the benchmark woodland sites for the derived native grassland vegetation communities should be included.	Acknowledged, change made to BOMP. Refer to Figure 2.2 for benchmark woodland sites for the derived native grassland vegetation communities.	Complete
2.9 Overlay locations of the LFA monitoring sites and the ecological monitoring sites on the vegetation management zone diagram.	Acknowledged, change made to BOMP. Figure 2.2 updated with LFA monitoring sites.	Complete
2.10 Northparkes Mines should meet with OEH after the detailed monitoring of the derived native grasslands has been completed and before the next stage of revegetation commences.	Northparkes has open communication with the OEH. Northparkes has an annual meeting regarding environmental monitoring (Annual Review), which OEH is invited to attend. Additionally, OEH is welcome to contact Northparkes at any time to arrange a meeting.	Complete

Biodiversity Offset Management Plan- Additionally changes made to BOMP based on recommendations from the Office of Environment & Heritage in August 2016.

OEH comment	Comments	Status
Targeted baseline surveys and ongoing monitoring of feral pests and kangaroo populations	Northparkes and OEH staff met on 19th October 2016 to discuss outstanding comments on the BOMP. The changes included in version 3 of the BOMP were discussed and agreed upon during this meeting.	Complete
Trigger points for weed control and eradication goals for specific weed species	Northparkes and OEH staff met on 19th October 2016 to discuss outstanding comments on the BOMP. The changes included in version 3 of the BOMP were discussed and agreed upon during this meeting.	Complete

17. ATTACHMENTS

17.1 Appendix 1 Limestone National Forest Offset Area Revegetation Plan

17.2 Appendix 2 Vegetation Management Plan (for the Estcourt Offset area)

17.3 Appendix 3 Species Management Plan for the Pine Donkey Orchid

17.4 Appendix 4 Bush Fire Management Plan for the Kokoda Offset Site