

# Management Plan

## Vegetation

**Risk Statement: Low**

This document will be reviewed on a five yearly basis, unless a process change occurs earlier than this period.

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## Revision Summary

First Issue	Issue Date	Implementation Requirements	Approved By
1	Apr 10	Developed by GHD to meet requirements under Condition 13A(a), Schedule 3 of Project Approval (06-0026 Mod 1).	K Edwards

Version No.	Revision Date	Summary of Revision Details	Approved By
2	Mar 10	DECCW and DOP review undertaken and no comments to address.	K Edwards
3	Apr 14	Indicative Program of Works; Inserted new photographs and made textual changes in line with 2013 Estcourt Offset Monitoring Report.	A Youssef
4	26 Jun 18	Review undertaken by Nathan Jones – minor amendments	C Dingle
5	18 Feb 20	Updated to new DCS	M Row
6	Jun 20	Annual review	Environment & Farms Superintendent

Consultation Required	Hard Copy Locations
Not Applicable	Northparkes Website

Associated Documents to be Reviewed
Not Applicable

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## 1. OVERVIEW

### 1.1 Background

CMOC Mining Services Pty Limited (CMOC) is the manager of the Northparkes Joint Venture, an unincorporated joint venture between CMOC Mining Limited (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.

### 1.2 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.

### 1.3 Vegetation

The Vegetation Management Plan (VMP) outlines the restoration program for the Estcourt Tailings Storage Facility Offset (Estcourt offset) site, identified in the Biodiversity Offset Strategy (GHD 2009). The VMP includes details on plant species, planting techniques, revegetation methods and maintenance requirements for the two different zones found within the offset area.

This VMP has been developed in accordance with Condition 26, Schedule 3 of Development Consent (11\_0060) and prepared in consultation with the NSW Office of Environment and Heritage (OEH).

## 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.

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### 3. PURPOSE / OBJECTIVES

The objectives of the VMP are to:

- Conserve and improve biodiversity values of the offset site;
- Enhance connectivity with adjacent areas of vegetation;
- Manage the restoration process to ensure the retention of suitable habitat for those threatened and/or significant flora and fauna species present within the offset site and surrounds; and
- Identify opportunities for research and development projects in ecological restoration that assist in mine site rehabilitation.

### 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	– are responsible for identifying hazards with this document and initiating management of change to correct those deficiencies
Environment Team	– review this Management Plan (for effectiveness and its performance against its objective/s)
Project Manager / Supervisor	<ul style="list-style-type: none"> <li>– schedule works to ensure the restoration program and associated mitigation measures contained in this Plan are implemented</li> <li>– supervise all contractors undertaking works at the offset site on behalf of Northpakes</li> <li>– ensure all employees are provided with the appropriate training and awareness required to fulfil their obligations under this plan</li> <li>– maintain an accurate record of works undertaken (e.g. firebreak maintenance, site protection, weed control) in the offset site to fulfil reporting requirements and communicate this to the Environment and Community Superintendent</li> <li>– liaise with interested stakeholders in consultation with the Environment Superintendent where appropriate</li> </ul>
Environment Superintendent	<ul style="list-style-type: none"> <li>– ensure all works are conducted in compliance with this Plan and other regulatory requirements</li> <li>– provide technical advice and support to the Project Manager to ensure compliance with this Plan</li> <li>– compile information received from the Project Manager for the Annual Review</li> </ul>
PSE Manager	– ensure appropriate resources are provided to implement the management and mitigation measures outlined in this document and associated procedures
Managing Director	– must provide sufficient resources to comply with this document

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## 5. DEFINITIONS

**Table 2: Definitions**

Key Word	Definition
Bush regeneration	Refers to techniques used to assist and promote natural regeneration without utilising plant material propagated in nurseries
Establishment	Refers to the minimum 36-month maintenance program applied to revegetation work to ensure plant establishment
Final completion	Refers to the successful completion of the entire restoration program
Practical completion	Refers to the completion of installation of revegetation activities
Regeneration	Refers to natural regeneration of the vegetation community
Restoration	Refers to a combination of restoration activities and management techniques to restore native vegetation
Revegetation	Refers to the planting of tube stock or similar grown from local provenance seed to re-establish vegetation

## 6. MANAGING THE HAZARD

### 6.1 Site Location

The Management Plan applies to the Estcourt offset site identified in the Biodiversity Offset Strategy (GHD 2009). The offset site is comprised of 65.1 hectares of remnant vegetation and agricultural land in the northern portion of Lot 3, DP 830291 in the Parkes LGA. It is located approximately 2 km to the north east of the Northparkes site, situated within the Southwest Slopes Bioregion on the western slopes and plains of the Great Dividing Range. The property is owned by Northparkes and was previously managed under lease arrangements. Previous land uses include remnant vegetation and agriculture (cropping).

The offset site borders agricultural land with patchy remnant and planted native vegetation to the west and south, respectively, active mining lease to the southwest, and to the east is remnant native vegetation within the travelling stock route along Bogan Road.

The site location is shown in Figure 1 below.

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**Figure 1: Map showing the location of the woodland reference sites in relation to the escourt offset area**

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## 6.2 Climate

Meteorological data has been continuously recorded onsite at Northparkes since 2001. The region experiences a typical arid to semi-arid climate with hot, dry summers and cool winters.

Seasonal temperature fluctuations are typical for the region with the highest maximum daily temperatures recorded in the summer months (December, January and February) and the lowest maximum daily temperatures recorded in the winter months (June, July and August).

The average annual rainfall is 526mm, based on 114 years of data. The average monthly rainfall is relatively uniform throughout the year, varying between a low of 37.1mm in September and a high of 52.1mm in January (Bureau of Meteorology, 2014).

## 6.3 Topography

The topography of the Estcourt offset site is relatively flat with a slight rise in elevation occurring to the north-west corner of the site.

## 6.4 Geography and Soils

Northparkes operations are located within the Lachlan Fold Belt of Central Western NSW situated on Goonumbla Volcanics comprising volcanic and sedimentary Ordovician age deposits (Corkery and Co, 2006).

There is a correlation between the distribution of Inland Grey Box Woodland communities and soils of Tertiary and Quaternary alluvial origin, largely corresponding with the Red Brown Earths (OEH, previously DECCW, 2009).

## 6.5 Hydrology

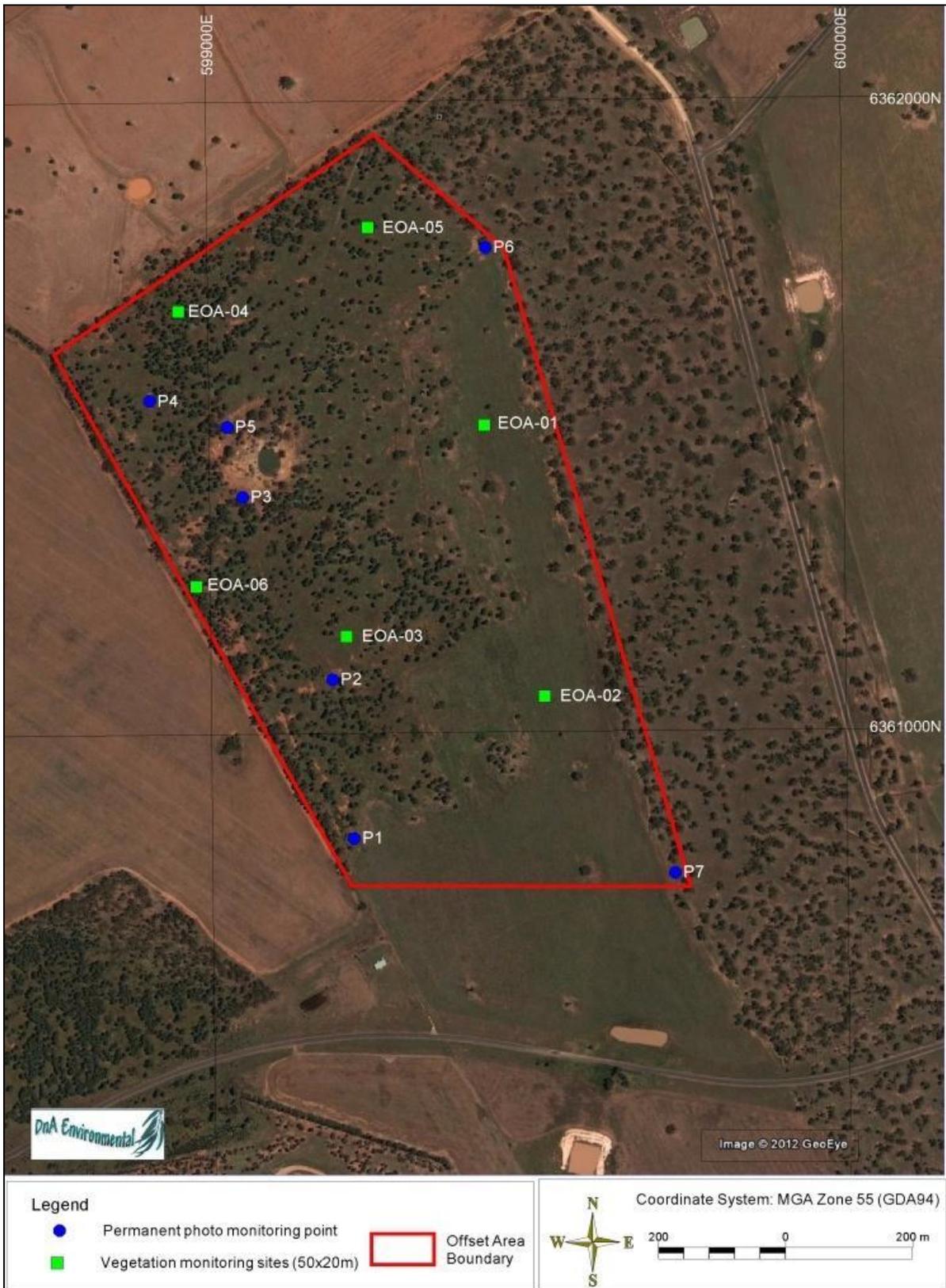
An ephemeral flood zone occurs along the south portion of the offset site and Adavale lane. The flood zone is generally a chain of intermittent ponds and a broad undefined creek bed, which receives overland flow only following significant rainfall events. The majority of the offset site occurs above this flood zone. An abandoned gravel pit in the north-west corner of the site is known to contain standing water.

## 6.6 Vegetation

Currently five community types or 'zones' exist within the offset site. Each community type currently has an established monitoring site. Two of the current monitoring sites occurring within the derived grassland area which have been replanted to re-establish the original grassy woodland community. Three sites occurred in the existing woodland areas (zone two), whereby one site is situated in a grassy clearing (sub-zone 2b) and has received supplementary planting with the remaining two sites situated within open woodland areas where natural regeneration will be anticipated, and some supplementary hand planting has been undertaken (GHD 2010).

The location of the revegetation monitoring sites in the Estcourt Offset site is shown in Figure 2.

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**Figure 2: Map showing locations of the vegetation monitoring sites and permanent photo points with the escort offset area**

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### 6.6.1 Native vegetation

The northwest portion of the site contains approximately 42.1 ha of native grassy woodland vegetation communities, made up of approximately 38.8 ha of Inland Grey Box – Poplar Box - White Cypress Pine Tall Woodland and 3.3 ha of Yellow Box Woodland. These communities are similar to those within the impact site for which the offset is required.

Inland Grey Box - Poplar Box - White Cypress Pine Tall Woodland occupies the majority of the offset site. Canopy species vary across the site, with areas dominated by Inland Grey Box (*Eucalyptus microcarpa*) and White Cypress Pine (*Callitris glaucophylla*) with scattered Bimble Box (*Eucalyptus populnea*). This community is in moderate to good condition across the site though shows signs of past clearing. The majority of canopy trees are mature regrowth (30-60cm DBH) with few pre-European age trees. The mid storey and shrub layers are virtually absent apart from occasional chenopod, *Acacia* species and White Cypress regrowth. The groundcover is patchy and comprises native tussock grasses (*Austrostipa* and *Austrodanthonia* spp.), native herbs including Kidney Weed (*Dichondra repens*) and various native daisies (*Vittadenia* spp. and *Calotis* spp.). Bare ground and leaf litter make up a large proportion of the ground cover.

Yellow Box Woodland features a canopy of Yellow Box (*Eucalyptus melliodora*) and occasional White Cypress Pine with a very sparse shrub layer and a grassy understorey. The canopy is dominated by mature regrowth trees (30cm – 80cm DBH) with a limited number of mature trees (>80cm DBH) and few saplings (<10cm DBH). There is a low, sparse layer of native shrubs including Ruby Saltbush (*Enchylaena tomentosa*). The ground cover is predominantly native, dominated by Speargrasses (*Austrostipa* spp.) along with the scrambler Amulla (*Eremophila debilis*) and herbs including Fuzzweed (*Vittadenia cuneata*).

This community occurs on the highest part of the site and surrounds an abandoned gravel pit. This area features good regeneration with Yellow Box seedlings and contains a dam/water hole within the old gravel pit area which contained a small number of native macrophytes.

Overall this northwest portion has experienced moderate disturbance by historical selective timber harvesting and ongoing grazing. The understorey is in relatively good condition, given grazing history, with good native plant species richness (20 - 28 native species per 20m by 20m vegetation survey quadrat). It is likely that a relatively diverse assemblage of native plants persists in the soil seed bank and, in the absence of grazing, the site exhibits a good capacity for regeneration. Both vegetation communities are consistent with the TSC Act listed EEC Inland Grey Box Woodland. The Yellow Box Woodland community on the site does not currently conform to the federally listed critically endangered community White Box – Yellow Box – Blakely's Red Gum grassy Woodland and Derived Grassland due to existing floristic composition and disturbance levels.

### 6.6.2 Cleared lands

The southeast portion of the site contains 23 ha of cropland with occasional paddock trees. This area would formerly have supported Inland Grey Box – Poplar Box - White Cypress Pine Tall Woodland but has been extensively cleared for agricultural purposes. The understorey has also been modified through ploughing and grazing. However, it does contain moderate native species richness (11 -12 native species per 20m by 20m vegetation survey quadrat), particularly in less heavily disturbed portions adjacent to remnant woodland. It is likely that a moderately diverse assemblage of native plants persists in the soil seed bank and that, in the absence of ploughing and grazing and through supplementary revegetation works, this area would exhibit some capacity for native regeneration.

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### 6.6.3 Exotic Weed Species

The northwest portion of the site contains low to moderate numbers of exotic weeds. This is in contrast with the remaining southeast portion which features a high infestation of exotic weeds and sown crops, including Oats (*Avena* spp.), Bathurst Burr (*Xanthium spinosum*), Saffron Thistle (*Carthamus lanatus*), Paddy Melon (*Cucumis myriocarpus*), Barley Grass (*Hordeum* sp.) and Pattersons Curse (*Echium plantagineum*).

### 6.7 Habitat Value of the Site

The areas of native grassy woodland are in moderate to good condition. They contain healthy, mature Eucalypt and White Cypress trees forming a canopy with a woodland or tall woodland structure, similar to undisturbed examples of these vegetation communities in some areas. Hollow-bearing trees, stags and moderate recruitment of juveniles and seedlings are present within these areas. A small stand of water within the old gravel pit may provide seasonal habitat for some species of amphibians as well as suitable water supply to other fauna species including microbats, reptiles and birds utilising the site. The old gravel pit area also provides a small area of rocky outcrop which could potentially support a number of native reptiles. A large raptor nest, most likely a wedgetail eagle, was present.

Small logs and fallen woody debris are in low to moderate abundance in the northwest portion and completely absent through the cleared lands in the southeast. No large logs were noted on the site.

Based on these structural attributes, the woodland communities in the northwest of the site would be expected to support a moderate diversity of native birds, reptiles, microbats and ground and arboreal mammals. The size and shape of the woodland also affords a low perimeter to interior area ratio which would increase its long term viability as habitat for native biota. The remainder of the site comprising of cropland with isolated remnant trees could support open country bird species and a limited suite of native reptiles and mammals.

Two threatened bird species are known to utilise the site (GHD, 2009); the Grey-crowned Babbler (*Pomastomus temporalis temporalis*) and the Superb Parrot (*Polytelis swainsonii*) (GHD 2009b). Both are listed as Vulnerable under the *Biodiversity Conservation Act 2016* (BC Act) with the Superb Parrot also listed as vulnerable under the federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). All native grassy woodland vegetation in the subject site would provide habitat for local populations of these, and other threatened woodland birds species.

The site has strong connectivity with a travelling stock route (TSR) to the east. The TSR is a very large patch of Inland Grey Box Woodland, Inland Grey Box – Poplar box – White Cypress Pine and Mixed Box Woodland (> 200 ha) in excellent condition, with intact understorey, small tree layers and many hollow-bearing trees. The TSR is a regionally significant wildlife corridor. The site is contiguous with this wildlife corridor and once fenced and managed for biodiversity conservation would increase its overall size and viability.

Photographs of the existing vegetation in the offset site are provided in the attachment.

### 6.8 Adjacent Land Use

The offset site is surrounded to the north, west and south by extensively cleared agricultural lands and mining operations with small patches of remnant vegetation and revegetated corridors occurring throughout the landscape. In the context of the Parkes LGA, the 42 ha patch of woodland within the northwest portion of the offset site is a relatively large and significant remnant stand. It has the ability to support local populations of a range of native birds, mammals and reptiles including less mobile and patch-size dependant species

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## 6.9 Information, Training and Instruction

Northparkes provides information, training and instruction on hazards through the following systems and processes:

### Information:

- general and area specific inductions (including site access authorisation)
- HSE monthly meetings
- contractor pre-shut meetings
- contractor group communications (including performance reviews)
- monthly bulletin
- serious case reviews
- risk exposure groups
- OEM publications
- safety alerts and bulletins (both internal and external)
- zero harm / SHIFT program

### Training:

- general and area specific inductions
- essentials program
- role specific training packages (e.g. electrical competency program)
- recruitment role criteria, i.e. qualifications (e.g. geotechnical engineering)
- statutory, i.e. high-risk work licence (sighted and copy retained)
- statutory, i.e. other qualification or licence (e.g. mine supervisor, Mining Engineering Manager, UHL / BEUL, driver's licence)

### Instruction (and supervision):

- work instructions (including procedures), single point lessons, level 1 risk assessments and level 2 risk assessments
- permit to work (supervision – contractor)
- work orders
- supervisor checks (PTHA)

Records relating to the provision of information, training and instruction are retained via:

- Northparkes training matrix (SAP / LMS), including refresher training
- e-filing – training for individual training records, on the job assessments
- document control system
- secure (backed up) departmental drives
- VOC / e-filing
- site access authorisation (SAM form etc, online induction)

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## 6.10 Monitoring and Reporting

In order to evaluate the success of the restoration program against agreed performance criteria, ongoing rehabilitation monitoring will be undertaken. The monitoring program will be carried out on an annual basis to assess:

- The physical stability of the landform of rehabilitated areas;
- The characteristics of the vegetation in rehabilitated areas;
- The establishment of self-sustaining ecosystems; and
- Success of fauna salvage and relocation efforts.

It is also important to keep an accurate photo-record of the progress of the restoration program by the use of an appropriate number of representative fixed photo-points across all restoration zones. Seven photo points have been set up on the site, as indicated in Figure 2. Photographs from annual monitoring events (2010-2013) are displayed in Appendix 1. Photos should be taken by digital camera and recorded by date and discrete photo-point number. Additional photo-point locations may be required prior to restoration works.

Monitoring the rehabilitated areas will ensure that any areas requiring remedial work are identified and maintenance procedures carried out where necessary.

It is anticipated that the frequency of monitoring will decrease as rehabilitation progresses and will cease when the VMP objectives and performance criteria have been achieved.

An initial report will be prepared at the Practical Completion stage to provide a baseline summary of offset vegetation condition for the remaining monitoring reports.

Northpakes will report results of the annual monitoring program outlined in this plan in the Annual Review.

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## 7. REFERENCE MATERIALS

**Table 3: Reference Materials**

Document Title	ID No.   Year
Rehabilitation Management Plan	PLN-0060
Auld, B.A. and Medd, R.W. (1987) <i>Illustrated Botanical Guide to the Weeds of Australia</i> , Department of Agriculture NSW, Inkata Press	1987
Beadle, N.C.W., Evans, O.D. and Carolin, R.C. (1991 ed), <i>Flora of the Sydney Region</i> , Reed Books, Terrey Hills, NSW	1991
Benson, D. and Howell, J. (1995) <i>Taken for Granted: The bushland of Sydney and its suburbs</i> , Kangaroo Press	1995
Benson, D., Benson J., McDougall, L. and Redpath, A. (1997) <i>Cunninghamia: Ecology of Sydney plant species</i> , Royal Botanic Gardens Sydney NSW	1997
Benson, J.S. (2008) <i>New South Wales Vegetation Classification and Assessment: Part 2 Plant communities in the NSW South-western Slopes Bioregion and update of NSW Western Plains plant communities. Version 2 of the NSWVCA database. Cunninghamia 10(4): 599-673</i>	2008
Buchannon, R. A. (1989) <i>Bush Regeneration: Recovering Australian Landscapes</i> . TAFE Learning Publications. NSW	1989
Costermans, L. (1992) <i>Native Trees and Shrubs of South Eastern Australia</i> . Weldon Publishing, NSW	1992
DEC (2006) <i>Reconstructed and Extant vegetation of Central West NSW</i> , DEC, Hurstville, NSW	2006
DECC (2007) <i>Threatened species assessment guidelines: The assessment of significance</i> , Department of Environment and Climate Change (NSW)	2007
Office of Environment and Heritage (OEH), <i>Principles for the use of biodiversity offsets in NSW</i> . < <a href="http://www.environment.nsw.gov.au/biodivoffsets/oehoffsetprincip.htm">http://www.environment.nsw.gov.au/biodivoffsets/oehoffsetprincip.htm</a> >; Last updated 6th August 2013	2013
DECCW (2009) <i>Vegetation Types Database</i> <a href="http://www.environment.nsw.gov.au/resources/nature/BioMetric_Vegetation_Type_CMA.xls">http://www.environment.nsw.gov.au/resources/nature/BioMetric_Vegetation_Type_CMA.xls</a>	2009
Department of Infrastructure, Planning and Natural Resources (DIPNR), <i>Guideline for the Preparation of Environmental Management Plans</i> , 2004	2004
GHD (2009), <i>Report for NPM Section 75W Modification: Ecological Impact Assessment</i> . Unpublished report by GHD for Northparkes Mine	2009
GHD (2009a) <i>Report for NPM Section 75W Biodiversity Offset Strategy</i> . Unpublished report by GHD for Northparkes Mine (Our reference: 21/17903/684)	2009
GHD (2009b) <i>Report Vegetation Mapping Project</i> . Unpublished report for Northparkes Mine	2009
Greening Australia NSW (Inc) (1999) <i>Management Principles to Guide the Restoration and Rehabilitation of Indigenous Vegetation</i>	1999
Greening Australia NSW (Inc), <i>Management Principles to Guide the Restoration and Rehabilitation of Indigenous Vegetation</i> , August 1999	1999
National Trust of Australia (NSW) (1999) <i>Bush Regeneration Handbook</i> . National Trust, Sydney, NSW	1999
New South Wales Government, <i>Noxious Weeds Act 1993</i>	1993
New South Wales Government, <i>Threatened Species Conservation Act 1995</i>	1995
Northparkes Mine (Our reference: 12857/72487)	N/A
Parkes Shire Council (1997) <i>Parkes Shire Council's Roadside Management Plan</i> , Parkes Shire Council, Parkes, NSW	1997
R.W. Corkery & Co (2006). <i>Environmental Assessment, North Mining Limited, Northparkes Mines – E48 Project</i> . Report No. 651/01. R.W. Corkery & Co. Pty. Limited report prepared for Northparkes Mine	2006

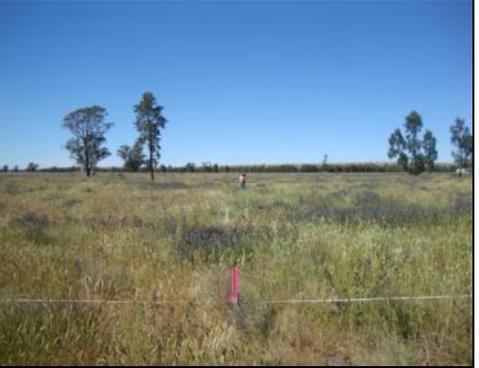
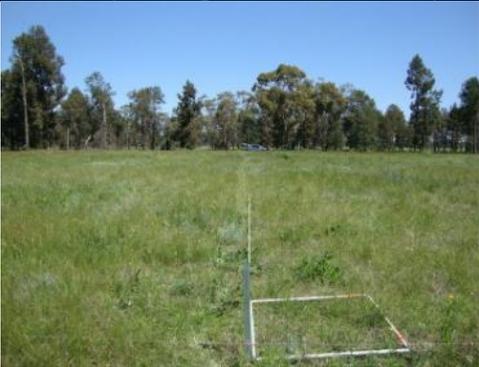
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## 8. ATTACHMENTS

### 8.1 Photographs

Site	Photo 2010	Photo 2011	Photo 2012	Photo 2013
EOA-01	<p>A derived grassland situated to the northeast of the Estcourt Offset Area. The site was an old cropping paddock that has not been recently grazed. In 2010 it contained a diverse understorey of native and introduced species including <i>Dichondra repens</i>, <i>Hordeum leporinum</i>, <i>Chloris truncata</i> and <i>Medicago polymorpha</i>. There was high floristic diversity (57 species) and native species (34) were more abundant than exotic species (23). There was good ground cover and cryptogams were moderately abundant. There were scattered occurrences of <i>Echium plantagineum</i>, <i>Arctotheca calendula</i>, <i>Centaurea melitensis</i> and <i>Sonchus oleraceus</i>. In 2011, there were increased levels of ground over, decreased abundance of cryptogams and increased diversity of exotic species. One <i>Callitris glaucophylla</i> seedling was found. In 2012 the site was similar to but drier than last year and seven <i>C. glaucophylla</i> seedlings were found. In 2013, annual species continued to be dominant. Eleven <i>C. glaucophylla</i> seedlings were recorded.</p>			
				
EOA-02	<p>A derived grassland situated to the southeast of the Estcourt Offset Area. The site was an old cropping paddock that had not been recently grazed. In 2010 it contained a diverse understorey of native and introduced species including <i>Dichondra repens</i>, <i>Eragrostis parviflora</i> and <i>Medicago polymorpha</i>. There was a relatively high floristic diversity (48 species) and native species (26) were more abundant than exotic species (22). There was generally good ground cover and cryptogams were moderately abundant in the southern end of the transect. There were scattered occurrences of <i>Carthamus lanatus</i>, <i>Echium plantagineum</i> and <i>Arctotheca calendula</i>. In 2011, it was similar to EOA-01 with increased levels of ground over, decreased abundance of cryptogams but maintained a high diversity of native and exotic species and weeds were less abundant. In 2012 the site was similar to but drier than last year and 24 <i>C. glaucophylla</i> seedlings were found. In 2013, annual species continued to be dominant and only 15 <i>C. glaucophylla</i> seedlings were recorded.</p>			

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Site	Photo 2010	Photo 2011	Photo 2012	Photo 2013
				
EOA-03	<p>An open grassy clearing situated in the centre of the southern woodland area on top of the hill. It was dominated by native grasses particularly <i>Austrostipa scabra subsp. falcata</i> and contained a very high diversity of native (43) and introduced species (18) including many Asteraceae and Poaceae species. There was good ground cover provided by perennial plants. There were sparse occurrences of <i>Carthamus lanatus</i>, <i>Echium plantagineum</i>, <i>Salvia verbenaca</i>, <i>Erodium cicutarium</i> and a variety of <i>Medicago</i> and <i>Trifolium</i> species. On the fringing woodland (photo point 2 GHD 2010), there was a diverse range of additional native species including <i>Arthropodium minus</i>, <i>Stackhousia monogyna</i>, <i>Pterostylis sp.</i>, <i>Bulbine bulbosa</i>, <i>Goodenia pinnatifida</i> and <i>Calotis cuneifolia</i> to name a few. In 2011 and 202 the site was very dry with macropod grazing maintaining low grass cover. There was a significant decline in floral diversity but the site retained good ground cover. In 2012 seven <i>C. glaucophylla</i> seedlings were found. In 2013 there continued be moderate abundance of native grasses and scattered <i>Xerochrysum bracteatum</i> and <i>Dichopogon stricta</i> but <i>Echium plantagineum</i> was also quite abundant. Twelve <i>C. glaucophylla</i> seedlings were recorded.</p>			
				

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Site	Photo 2010	Photo 2011	Photo 2012	Photo 2013
EOA-04	<p>Estcourt Offset Area 04 (EOA-04) was situated on the edge of a woodland stand to the west of the site which contained a moderate canopy of <i>Callitris glaucophylla</i> trees of varying health, including numerous dead stags. The vegetation transect extended into an area of open grassland, which contained a higher diversity of native ground cover species than beneath the tree canopies. The understorey was relatively weedy with <i>Lolium</i> and <i>Trifolium</i> species being very common, but it retained high native species diversity (51 species) and native perennial grasses were particularly dominant. There were no shrubs and no tree hollows were observed. The site had very high species diversity (71 species). In 2011 and 2012 the drier seasonal conditions has resulted in a reduction in floristic diversity. In 2011 four regenerating <i>Dodonaea viscosa</i> subsp <i>cuneata</i> were recorded. In 2012, there were 7 <i>Dodonaea</i> and two <i>Callitris</i> seedlings. In 2013 there continued to be good cover of native grasses but there were patches of <i>Echium plantagineum</i>. Only one seedling each of <i>Dodonaea</i> and <i>Callitris</i> were found this year.</p>			
				
EOA-05	<p>Estcourt Offset Area 05 (EOA-05) was situated to the north east of the site within a sparse woodland stand of <i>Callitris glaucophylla</i> trees, including two dead stags. There was no <i>C. glaucophylla</i> recruitment but the trees were flowering or contained fruit. The understorey was relatively weedy (23 exotic species) especially beneath the trees where there were remnant stockcamps, with <i>Lolium</i> and <i>Trifolium</i> species being very common, but it retained high native species diversity (49 species) and native perennial grasses were particularly dominant. There were no shrubs and one tree hollow was observed in one of the dead stags. The site had very high species diversity (72 species). In 2011, later monitoring and drier seasonal conditions has resulted in a reduction in floristic diversity. In 2012 the site was very dry with macropod grazing maintaining low grass cover. There was a significant decline in floral diversity but the site retained good ground cover. In 2012 11 <i>C. glaucophylla</i> seedlings were found. In 2013 there continued to be good cover of native grasses but there were patches of <i>Echium plantagineum</i>. Fourteen <i>C. glaucophylla</i> seedlings were recorded. An echidna had destroyed a large any nest.</p>			

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Site	Photo 2010	Photo 2011	Photo 2012	Photo 2013
				
EOA-06	<p>In 2013 this site was established after a grass fire in November 2013 which was initiated by harvesting machinery in adjacent cropland and burnt approximately 1ha within the EOA. The LFA transect = vegetation transect. there were log patches and fallen trees which had caught fire and continued to burn at high temperatures leaving scorched tree canopies and charred blackened coals and bare scorched earth in these immediate areas. Much of the remaining burnt area however appears to have recovered with a very high diversity of scattered native grasses and wild flowers, however total ground cover was patchy. Exotic species tended to dominate areas beneath tree canopies.</p>			
	NA	NA	NA	

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Photo Point	2010	2011	2012	2013
P1 599223 6360834				
P2 599191 6361085				
P3 599052 6361375				

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Photo Point	2010	2011	2012	2013
P4 598907 6361528				
P5 599028 6361486				
P6 599438 6361766				

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Photo Point	2010	2011	2012	2013
P7 599728 6360775				