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Great Eastern Highway Upgrade Project SLK 56.4-67.8 EPBC 2022/9151

Offset Site Revegetation Strategy

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Version Control

Revision	Date	Name	
A	Nov 2024	Principal Environment Officer	Author
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1 PURPOSE

Main Roads Western Australia (Main Roads) proposes to upgrade a section of Great Eastern Highway (GEH) between Straight Line Kilometre (SLK) 56.4 and 67.8 (the Proposed Action). The Proposed Action is located approximately 56 kilometres (km) east of Perth and 25 km west of Northam in Western Australia (WA).

The Proposed Action aims to improve the efficiency and safety of this section of the GEH by widening of the alignment, intersection improvements and additional overtaking lanes. The Proposed Action will also include drainage, kerbing and culvert upgrades and the installation of a safety barrier.

As the Proposed Action may have a significant impact on Matters of National Environmental Significance (MNES), Main Roads has prepared Preliminary Documentation to inform the assessment of the relevant impacts of the Proposed Action (Main Roads, 2024). This Preliminary Documentation was prepared in response to a request by the Department of Climate Change, Energy, the Environment and Water (DCCEEW, formerly the Department of Agriculture, Water and Environment [DAWE]) on 13 April 2022 and subsequent request in December 2022 and August 2024, for additional information to support assessment of impacts for the Proposed Action (EPBC 2022/9151) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

An Offset Strategy was submitted for approval under the EPBC Act and is intended to support the Preliminary Documentation for EPBC 2022/9151 Great Eastern Highway Upgrade Project and details how the significant residual impacts to Carnaby's Cockatoo, Forest Red-Tailed Black Cockatoo (FRTBC)and Baudin's Cockatoo will be offset.

This Offset Site Revegetation Strategy has been prepared in response to a request from DCCEEW in October 2024, to compliment information presented within the Offset Strategy.

2 SCOPE

To offset the significant residual impacts of the Proposed Action to the listed Black Cockatoo species, the Offset Strategy identifies proposed offset actions comprising land acquisition and the creation of fauna habitat via restoration, revegetation, rehabilitation and land management. The proposed environmental offset will be fully funded and implemented by Main Roads (with the assistance of external technical experts where appropriate), with the implementation of the environmental offsets to be reported within Annual Compliance Reports.

An overview of the offsets offered are detailed in Table 1.

Table 1 Overview of offset package under consideration

Offset type	Offset summary	Offset location	Existing tenure
Land acquisition and on ground management	Main Roads has acquired Lot 704 Great Eastern Highway A 29.1 ha portion of Lot 704 that comprises completely degraded paddock and isolated individual trees, will be revegetated as an offset. This Offset Revegetation Area will require on ground management to provide and maintain foraging habitat for Black Cockatoos. Potential breeding trees (trees with a Diameter Breast Height ['DBH Trees'] >300 mm) within the Offset Site (including the portion of Lot 704 which is not the subject of revegetation) will be maintained as part of the Offset package	Lot 704 Great Eastern Highway, Copley.	Purchased and owned by the Commissioner of Main Roads
Installation of watering station	Installation of a permanent elevated drinking water station to encourage breeding and roosting within local area.	Lot 704 Great Eastern Highway, Copley	Purchased and owned by the Commissioner of Main Roads

This document provides a Revegetation Strategy for the proposed Offset Site at Lot 704, and includes: an indicative planting plan, weed management actions, fire management and DBH Tree management. Completion criteria, targets and monitoring to achieve the offset strategy objectives are also included.

3 DESCRIPTION OF ENVIRONMENTAL OFFSET SITE

Main Roads has identified and purchased Lot 704 Great Eastern Highway, Copely ('Offset Site') which has a total area of 39.9 ha (Figure 1). The Offset Site is located immediately south of the Proposed Action area and abuts the Kwolyinine Nature Reserve to the west.

The Offset Site comprises agricultural land, which has historically been the subject of cropping activities, bisected by a vegetated broad drainage channel to form two distinct paddocks. It is proposed to revegetate 29.1 ha of the Offset Site (the 'Offset Revegetation Area') to the south of the drainage channel (Figure 1).

The Offset Site contains a significant number of remnant trees avoided by previous cropping activities.

A Black Cockatoo breeding habitat survey was undertaken across the Offset Site in October 2023 by Tony Kirkby. All trees within the Offset Site were assessed for size in relation to their suitability to provide a Black Cockatoo breeding hollow. Hollows with entrances suitable for Black Cockatoos were further inspected.

A total of 100 trees above the required DBH were surveyed within the Offset Site, details of which are presented in Table 2 and locations displayed in Figure 2.

Table 2 DBH Trees within the Offset Site

Species	DBH Range			Total Number of trees
	300/500 – 699 mm	≥700 to ≤999mm	≥1,000 mm	
Wandoo	25	12	7	44
Marri	7	6	15	28
Flooded Gum	8	8	3	19
Jarrah	-	2	6	8
Unidentified Dead Stag (Marri?)	-	-	1	1
Total	**40**	**28**	**32**	**100**

Of the 100 trees with a suitable DBH needed to form a nest hollow, five hollows were deemed possible Black Cockatoo breeding hollows when viewed from ground level. Based on additional investigations with a pole camera, and evidence of chewing at the entrance, two were considered to be likely / possible Black Cockatoo breeding hollows (Kirkby, 2023).

Although roosting is also not known to occur with the 100 large DBH trees within the Offset Site, it is considered that the large DBH trees are suitable as roosting trees given their large size. It is also noted that as the revegetation around the large paddock trees get older, more potential roosting trees will become established. It is expected that the planted trees will start reaching 8 m (minimum roost tree height) within 12 years.

To encourage roosting within and adjacent to the Offset Site, it is proposed to establish a permanent elevated drinking water station for Black Cockatoos, given the availability of drinking water is a key requirement for roosting sites.

This availability of year-round drinking water may also encourage roosting and breeding with the adjacent Kwolyinine Nature Reserve, noting that neither breeding nor roosting is known to occur within this reserve.

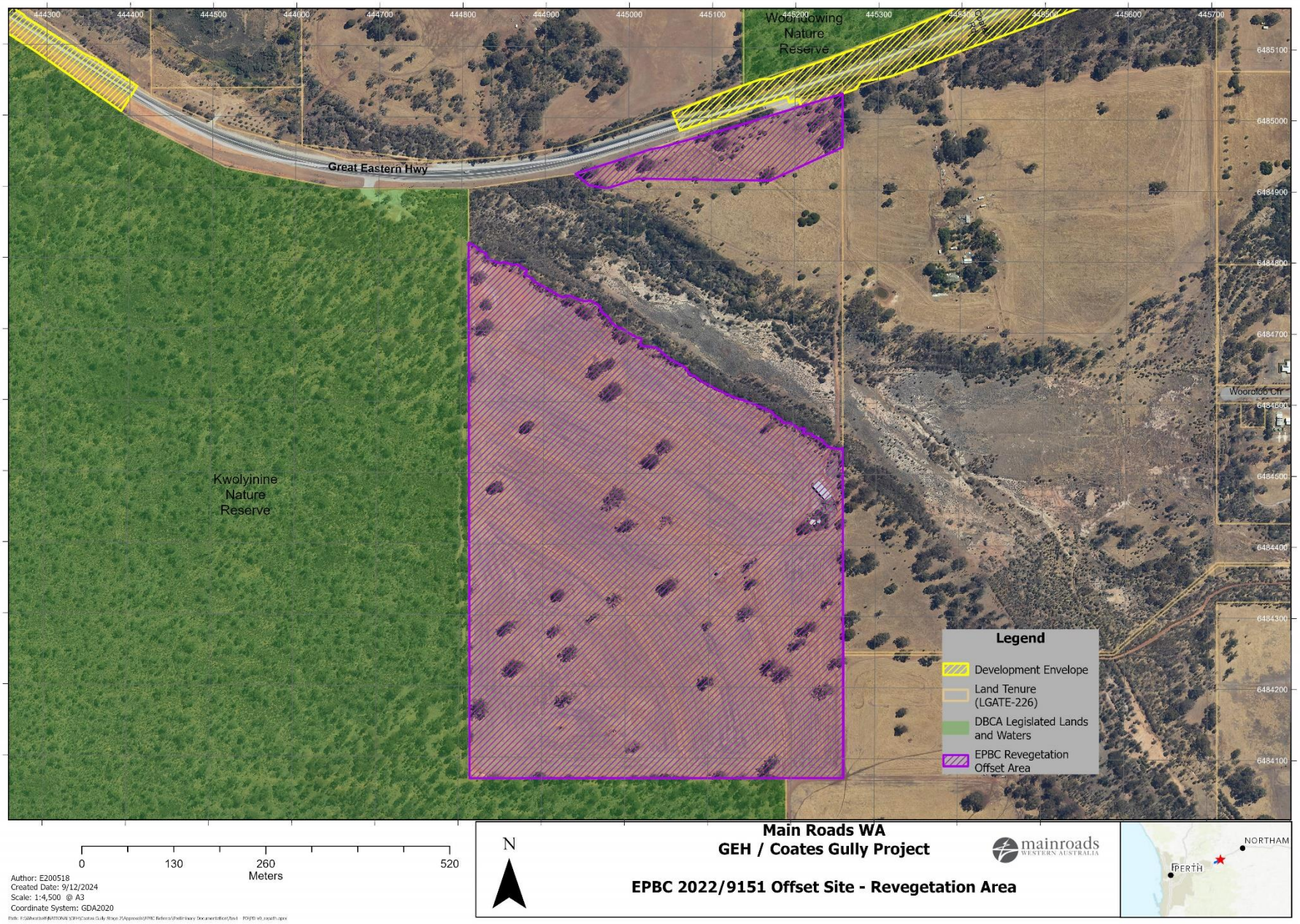

Figure 1 Lot 704 – Offset Site Rehabilitation Area

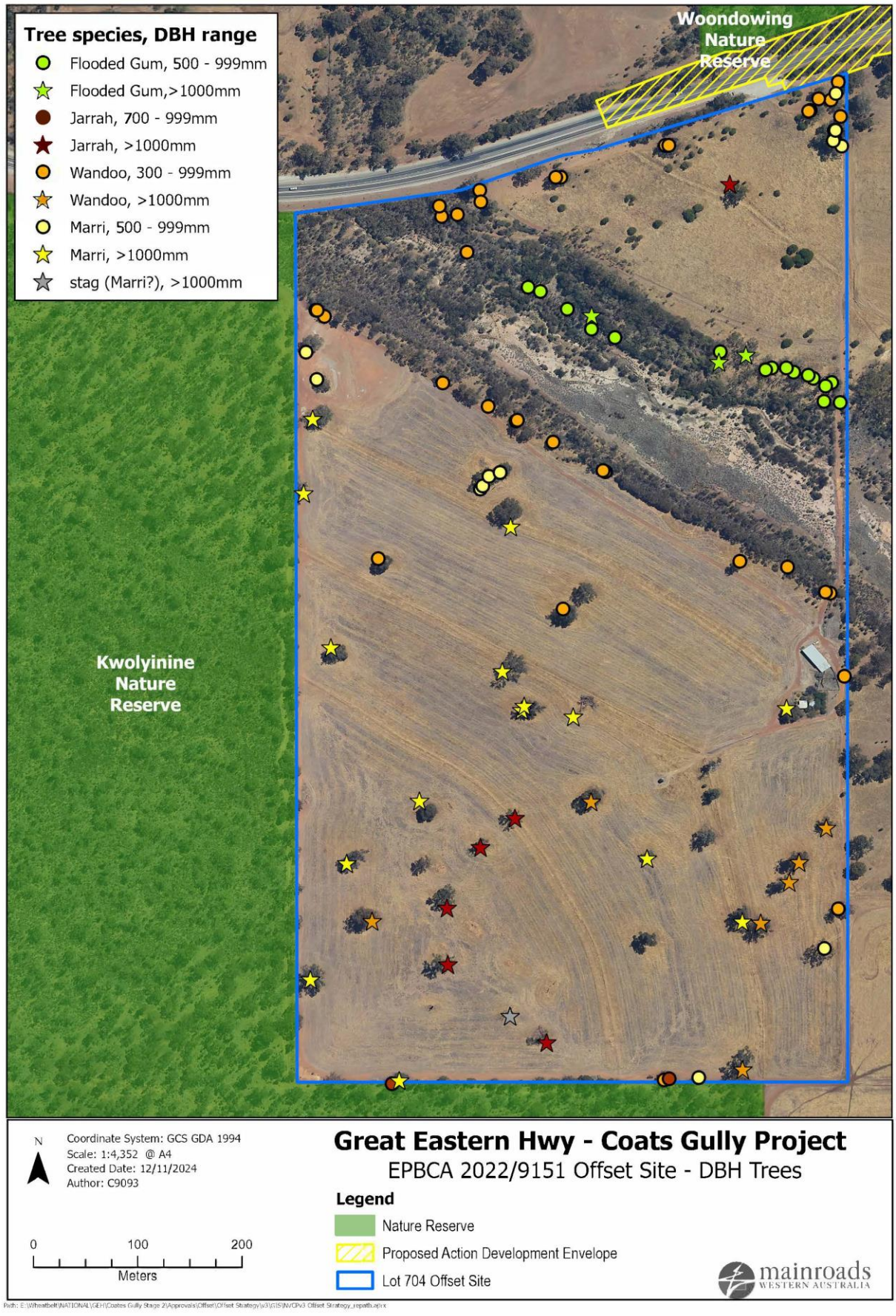

Figure 2 DBH Trees within the Offset Site

4 ACHIEVABLE ECOLOGICAL OBJECTIVES

For the Offset Site, Main Roads commits to achieving the following ecological objectives:

Creation, quality improvement and management of 29.1 ha of diverse High quality Black Cockatoo foraging habitat within 20 years from commencement of the offset, within which the habitat:

- consists of Eucalypt woodlands containing suitable foraging tree species for each of the three species of Black Cockatoos with >40 % projected foliage cover with food sources present at two strata
- establishes native vegetation species and associations that reflect the naturally occurring native vegetation in the local area
- establishes native vegetation assemblages appropriate to the local soil types and landscape position
- establishes food and habitat resources for other native fauna species, and to establish ecological linkage with neighbouring remnant vegetation.

This will be achieved through the active management of weeds, animal pests, pathogens, bushfires, surface water erosion and human activities as necessary to achieve the revegetation objectives and completion criteria.

The stated achievable ecological benefits are aligned with the objectives of the Black Cockatoo conservation advice and / or recovery plans (DPAW, 2013 & TSSC, 2018).

5 COMPLETION CRITERIA

The completion criteria for revegetation adhere to the SMART principles (Specific, Measurable, Achievable, Relevant and Timebound). They contain stated numerical targets, which reflect the ecological objectives and provide for quantitative assessment. Main Roads has extensive experience in conducting rehabilitation of black cockatoo habitat and the below criteria reflect achievable targets within a designated timeframe.

Main Roads is proposing to restore 29.1 ha of additional Black Cockatoo foraging habitat within the Offset Site. The Offset Revegetation Area within the Lot 704 Offset Site is displayed in Figure 1. Black Cockatoo foraging habitat within the Offset Site will also comprise potential future breeding habitat in addition to the existing potential breeding and roosting habitat (100 suitable DBH trees) within the Offset Site (Figure 2).

Given that all three species of Black Cockatoos are known to be present within the vicinity of the Offset Site, and the Offset Site is located adjacent to the Proposed Action area, it is highly likely the species will utilise the habitat once it is improved. Based on advice provided from Black Cockatoo subject matter experts, the Proposed Action is not located within known breeding area for Black Cockatoo species; however, Black Cockatoos are known to be transitory within the area. To further increase the value of Black Cockatoo habitat and potential for breeding activity within and adjacent to the Offset Site, an elevated drinking water station will be positioned within the Offset Site.

Specific, measurable, achievable, relevant and timebound completion criteria targets are outlined below:

Completion Criteria Targets

Within the Offset Revegetation Area, re-established native vegetation will, within 20 years:

- contain >40 % projected foliage cover of suitable Black Cockatoo foraging species to establish High quality foraging habitat
- contain >15 % overstorey canopy cover and >10 % mid-storey cover
- contain at least three overstorey and two mid-storey foraging species per 10 m x 10 m quadrat.

The completion criteria are outcome-focused, with the key outcome being the restoration of High quality Black Cockatoo foraging habitat appropriate to offsetting the loss of Moderate quality Black Cockatoo foraging habitat from the Proposed Action. Given that the desired outcome is the re-establishment of foraging habitat, criteria for weed cover or revegetation plant survival rate have not been included as completion criteria. Nevertheless, these aspects have been included as triggers for potential management actions as they can influence achievement of the stated completion criteria (see Section 7).

Based on the above, after 20 years, the 29.1 ha Revegetation Offset Area will contain more than 5,000 trees (at ~200 trees per hectare), of species including:

- *Corymbia calophylla*
- *Eucalyptus marginata*
- *Eucalyptus patens*
- *Eucalyptus rudis*
- *Eucalyptus wandoo.*

In addition to providing foraging habitat, all of the above species have the possibility of developing into large trees with the potential for hollow formation.

It is noted that the projected foliage cover target is higher than the sum of overstorey and mid-storey cover percentages. This allows for flexibility in the total amount of projected foliage cover for each strata. For example, if a quadrat has 80 % overstorey and 10 % mid-storey, it will meet the overall projected foliage cover target, as would a quadrat that has 15 % overstorey and 60 % mid-storey projected foliage cover.

6 METHOD OF ACHIEVEMENT OF ECOLOGICAL OBJECTIVES

To achieve the ecological objectives stated in Section 4, Main Roads proposes to undertake the following activities:

- removal of existing buildings and associated infrastructure from site
- installation and maintenance of fencing on the property boundary to prevent unauthorised property access
- selective weed control to improve vegetation condition and habitat quality
- fire management
- *phytophthora* dieback management
- revegetation activities:
    - earthworks (site preparation), including formation of access tracks and drainage structures
    - weed control for a period of approximately 18 months, commencing Spring 2024
    - planting via mechanised direct seeder (Winter 2026), requirement for supplementary infill or targeted plantings of certain species will be assessed following first summer
- installation of an elevated bird watering station within the property
- ongoing maintenance.

6.1 Fencing and access management

Vehicle access to the site will be restricted through the upkeep and maintenance of existing ring lock agricultural fencing. A single locked gate to allow for maintenance access via the adjacent DBCA reserve will be installed to restrict unauthorised access to the Offset Area..

6.2 Pest animal management

Based on monitoring results following two complete seasons, management options including seasonal shooting (kangaroo) and/or baiting (rabbits) will be considered where >30 % decline in overall plant survival is identified.

6.3 Selective weed control

The Offset Area has been managed as an agricultural cropping property for decades prior to Main Roads acquiring the site in 2023. Agricultural weeds (wild oats, annual grasses) that exist within the property will be controlled through chemical weed control comprising a minimum of one initial blanket herbicide spraying of bare paddock area/s in 2024, supplemented by spot spraying of Weeds of National Significance (WONS) and Declared weed species, will be undertaken should they emerge to ensure foraging habitat species are established. After the initial treatment, control of environmental weeds such as annual grasses will be undertaken where they are increasing in prevalence or are impacting revegetation / rehabilitation works or natural regeneration. Weed control will continue to be undertaken twice per year for years 1-3 post planting / seeding and annually thereafter as required to maintain percentage canopy of foraging value habitat. Weed cover is to be monitored until Black Cockatoo foraging species (see Appendix A for indicative list) become established (min. four years following planting), see Section 7.

In addition to weed treatment, during the on ground management phase, all vehicles and machinery will be required to undergo a soil and vegetation vehicle inspection prior to entering the offset site to ensure all vehicles entering the site are clean.

6.4 Phytophthora dieback

Phytophthora dieback is identified as a key threatening process due to causing decline in vegetation health that may lead to death of the vegetation. No Dieback has been identified to occur within approximately 7 km from the Offset Area (Glevan, 2021). Main Roads standard Phytophthora dieback management measures will be applied during the construction and maintenance of firebreaks and fences and weed control activities. Specific management practices will involve;

- all vehicles and machinery entering the Offset Area to undergo inspection prior to mobilisation to site and thorough clean down of any vegetation trapped on the undercarriage performed.
- restrict the entrance of vehicles and machinery into the offset area during wet conditions to reduce the risk of spread of the pathogen.

6.5 Fire

Bushfire poses a serious risk to biodiversity values. Firebreaks have been installed and will be maintained to the required standard (of width between 2 – 5 metres) to assist in the mitigation of unplanned fire. Access for fire fighters and firefighting equipment during emergencies will be maintained.

6.6 DBH Trees

As outlined within Section 3, within the Offset Site exists 100 DBH Trees. Location and species of these trees are displayed in Figure 2. Activities conducted at the Offset Site will be designed to avoid impacts to these trees including no clearing, avoidance of disturbance within the dripline for each tree to prevent root damage and no use of residual herbicides (such as Metasulfuron) within the drip line of the trees to eliminate risk of uptake harming tree health.

6.7 Revegetation

Vegetation surveys within adjacent nature reserves will be used to develop a site-specific revegetation design that reflects the vegetation-soil associations found within surrounding intact vegetation communities. The species list will include species that constitute foraging habitat as defined in DSEWPaC (2012) for all three species of Black Cockatoo. The species list will be developed based on site specific soil mapping and vegetation-soil associations found within surrounding intact vegetation communities. This approach has been adapted from comparable revegetation sites managed by Main Roads in developing a site specific restoration plan which demonstrates how information from soil mapping and vegetation surveys are combined to inform the species mixes to be used in the revegetation of the site. Figure 3 displays an example from an active Main Roads revegetation site where soil mapping has been utilised to determine seed mixes.

To revegetate the Revegetation Offset Area, seed from Black Cockatoo foraging species contained within adjacent nature reserve/s and as reported within the biological surveys, will be collected or sourced and provided to registered nurseries for propagation (refer species list provided in Appendix A).

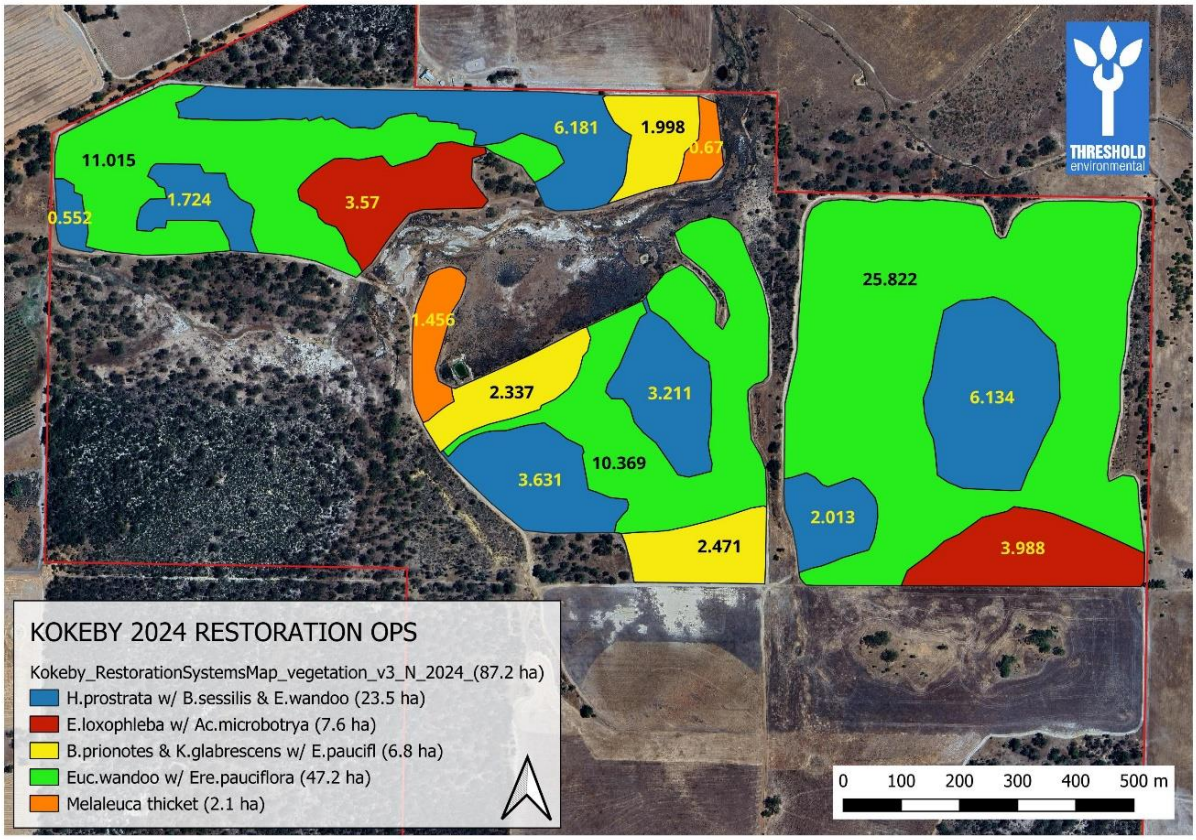

Figure 3 Differing seed mixes matched to the soil at an example Main Roads revegetation site. Blue – Gravels, Red – Granitic, Green – Duplex, Yellow & Orange – Very Light & Light Sands.

The proposed revegetation method will utilise direct seeding methods that have been used successfully in WA in the re-establishment of biodiverse native vegetation on cleared agricultural land. Initially the site will be prepared by removing remaining buildings and associated infrastructure, followed by weed control for a period of around 18 months prior to seeding. Direct seeding will be undertaken in the winter of 2026 using a mechanised direct seeder. Plate 1 displays an example of the seeding machinery proposed to be utilised. The seeder will scalp the surface soil and deposit the seed mix in a furrow behind the scalping blades. The method is well proven and has been shown to be reliable for the revegetation of former agricultural land which typically has significant weed seed remaining within in the topsoil. Deep ripping or fertilising is generally not required on soils that have been formerly used for cropping. Figure 4 displays recorded GPS tractor passes illustrating the appropriate seed mix delivery to each identified soil type at an example Main Roads rehabilitation site. Plate 2 displays an aerial overview of direct seeding tractor passes based on soil type at the same site. The different soil types and tractor passes are evident, the lighter areas are sandy soils and the darker areas are granitic or gravel soils.

The results of the direct seeding will be assessed at the end of the first summer (2027) following seeding. Dependent on the results, supplementary infill or targeted plantings of certain key species may be scheduled for the following year. This process will continue, with the monitoring results informing the need for additional plantings.

The vegetation coverage will include a variety of species within vegetation structural groups to contain at least three overstorey and two mid-storey foraging species that provide Black Cockatoo foraging habitat with a focus on the overstorey (>15 %) and mid-storey cover (>10 %). Plant density will vary across the site in response to local soil types, existing (remnant) vegetation density, and will aim to minimise bare ground and maximise the structural integrity and long-term viability of the established vegetation.

Plate 1 A CommVeg direct seeder in operation at example Main Roads revegetation site in the Wheatbelt region of Western Australia.

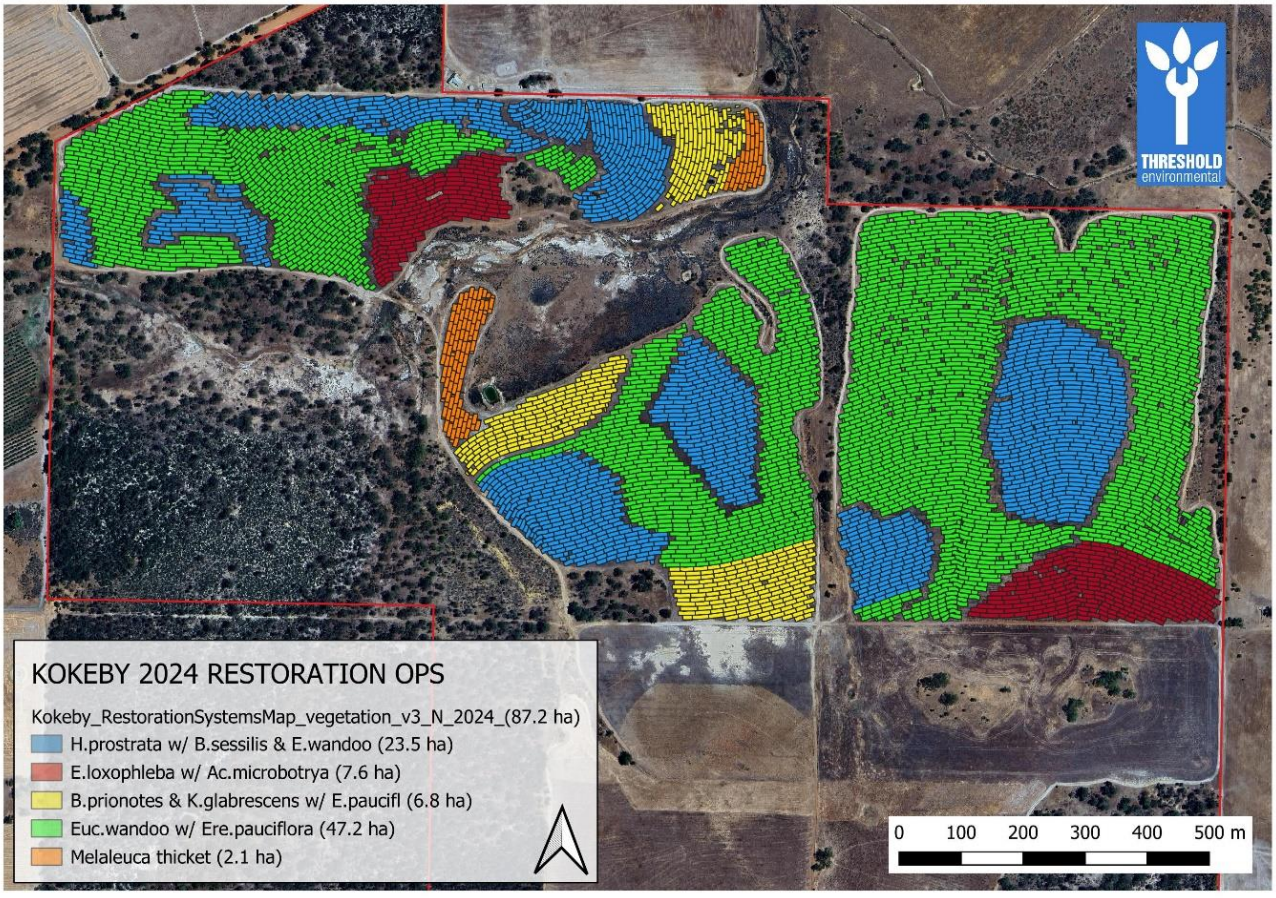

Figure 4 GPS recorded tractor passes showing the actual delivery of seed mixes to soil types in the field at an example Main Roads revegetation site.

Plate 2 Aerial view showing direct seeding tractor passes and the different soil types at an example Main Roads revegetation site.

7 REVEGETATION OFFSET AREA MONITORING

Twice-yearly monitoring will be conducted at the Revegetation Offset Area for an initial three-year period to enable early detection of changes that may impede realisation of the ecological benefits, and to enable measurement of progress towards and maintenance of the ecological benefits. Following the completion of initial weed control (two years), monitoring will be reduced to annual frequency unless site observations suggest increased monitoring is required.

The results of the direct seeding will be assessed at the end of the first summer (February 2027) following seeding. Dependent on the results, supplementary infill or targeted plantings of certain key species may be scheduled for the following year. This process will continue, with the monitoring results informing the need for additional plantings.

The monitoring program will be conducted as outlined in Table 3 with all correction actions being the responsibility of Main Roads, Director of Environment and Heritage.

Planting densities will be managed to achieve revegetation objectives within 20 years, to be determined by fine-scale (10 m x 10 m quadrats) and site-wide (transects and drone-based) methods (see Table 3).

Vegetation monitoring quadrats (10 m x 10 m quadrats) will provide data on species composition and structure. Additionally, 10 m- wide transects extending across the full width of the site will be used to ground-truth and calibrate drone data. The transects and drone information will be used to assess site-wide plant stem densities, canopy cover and vertical structure.

In order to accommodate a degree of spatial heterogeneity (and avoid an unnaturally uniform distribution) of stems in the re-established vegetation, the completion criteria will be applied to the site overall rather than at the individual quadrat level. Spatial heterogeneity will be achieved by a combination of using differing species mixes matched to soil and, depending on the results of direct seeding, targeted supplementary plantings of nursery-raised seedlings.

7.1 Reporting

The revegetation will be fully funded and implemented by Main Roads (with the assistance of external technical experts where appropriate), with the monitoring results reported within Annual Compliance Reports.

Table 3 Summary of Offset Site monitoring program

Aspect	Methodology	Methodology description	Timing and frequency	Trigger Value	Corrective Action
Fence condition and firebreaks	Field survey / visual inspection	• Vehicle and / or on foot inspection of fencing to determine effectiveness and identify any maintenance requirements	• Annually commencing spring 2025	• Fence strainers damaged, fence supports not effective, access gate damaged • Firebreaks not to specified standard / restrict access for emergency use	• Investigate cause and raise incident report • Implement corrective actions which may include: - Review practicality of fencing design and structure - Undertake repair / modification of fence as required - Review monitoring frequency and method - Review practicality of firebreak network - Undertake firebreak modification and maintenance as required • Monitor outcomes
Weed control	Field survey / visual inspection	• Vehicle/ on-foot inspection of weed coverage within bare paddock areas to determine effectiveness of initial herbicide application treatment methodologies (blanket spray) • Assessment of twelve 10 m x 10 m quadrats randomly placed across the planting area to record canopy % cover • Aerial drone survey – capture of aerial photography via drone	• Vehicle / on-foot inspection: Annually commencing spring 2025 • Initial blanket weed control (year 1), spring 2024 • Herbicide spot spray treatment, two per year min. for 4 years following revegetation planting	• Weed cover negatively impacting revegetation of black cockatoo foraging plant species, with <10 % projected foliage cover for foraging species at four years after commencement of revegetation • Weed cover negatively impacting revegetation of black cockatoo foraging plant species, with <12 % projected foliage cover for foraging species at six years after commencement of revegetation • At ten years after commencement of revegetation, review whether weed cover is likely to impact ability to achieve and maintain a >40 % projected foliage cover of foraging species for Black Cockatoo • WONS and Declared weed species observed	• Implement corrective actions which may include: - Spot spray of WONS, Declared weeds or weeds determined to be detrimentally affecting success of plantings. - Review and modify weed control program as required - Undertake targeted revegetation / infill planting - Improve personnel training and education - Review monitoring frequency and method • Monitor outcomes
Pest management	Field survey / visual inspection of fauna activity	• Vehicle / on-foot inspection to observe evidence of herbivory on seedlings across the planting area.	• Twice yearly, for a minimum of three years, commencing spring 2025	Within any monitoring period, within the planting area there is evidence of loss of individual plants or decline of plant health as a result of pest animal activity and there is >20 % impact to total planting area	• Kangaroo culling will be conducted if vegetation monitoring results are showing a decline or the trajectory indicates possible failure to attain the desired vegetation condition • Rabbit control will be considered where rabbit impacts are noted as having a detrimental impact to revegetation
Plant success	Field survey / visual inspection of survival of Black Cockatoo foraging flora species	• Vehicle / on-foot inspection of flora coverage across the site • Assessment of twelve 10 m x 10 m quadrats randomly placed across the planting area and site-wide (transects and drone-based) methods to record vegetation density and diversity	• Every three years, commencing summer 2027	At ten years after commencement of revegetation, averaged across 10 m x 10 m monitoring quadrats: • Plant survival is not occurring at a rate sufficient to achieve the stated ecological benefits within 20 years • Projected foliage cover of suitable foraging species for Black Cockatoos is <20 %, consisting of <10 % of overstorey and <5 % mid-storey • Fewer than five (5) native plant species are present • Less than 33 % of total planted tubestock remain	• Implement corrective actions which may include: - Review and modify as required pest animal control program - Review and modify as required weed control program - Undertake targeted infill planting as required - Review and modify as required fire management measures - Improve personnel training and education - Review monitoring frequency and method - Consider watering program where monitoring indicates plant success is affected by lack of rainfall • Monitor outcomes
Evidence of foraging	Field survey / visual inspection for foraging evidence	• Visual inspection via walking meander survey conducted by suitably experienced personnel	• Every three years, commencing 2032	Foraging not observed after year 12	
Canopy presence and vegetation cover and structure	Field survey / visual inspection Aerial drone survey	• Visual inspection – via walking meander survey by suitably experienced personnel (including weed presence) • Assessment of twelve 10 m x 10 m quadrats randomly placed across the planting area to record vegetation structure • Aerial drone survey – capture of aerial photography via drone	• Field survey / Visual inspection: Every three years, commencing 2025 • Drone survey: Every five years, commencing 2025 (baseline)	At year six after commencement of revegetation, averaged across 10 m x 10 m monitoring quadrats, the projected foliage cover of Black Cockatoo foraging species across overstorey and mid-storey is <12 %. At ten years after commencement of revegetation, averaged across 10 m x 10 m monitoring quadrats: • Plant survival is not occurring at a rate sufficient to achieve the stated ecological benefits within 20 years • Projected foliage cover of suitable foraging species for Black Cockatoos is <20 %, consisting of <10 % of overstorey and <5 % mid-storey • Fewer than five (5) native plant species are present • Less than 33 % of total planted tubestock remain	

8 RISK AND RISK MANAGEMENT

Risk analysis was undertaken to assess the risks to achieve the Offset completion criteria described in Section 5 posed by threats outlined in Section 6. Measures will be implemented to minimise the associated risks as described in Section 6 and Table 3 within Section 7.

The risk assessment adopts likelihood and consequence criteria and a risk matrix presented in Table 4, Table 5, and Table 6 below.

Table 7 presents the risk assessment results and references management measures to generate a residual risk outcome for each identified risk.

Management of the risks outlined in Table 7 will be the responsibility of Main Roads, Director of Environment and Heritage.

Table 4 Likelihood criteria

Likelihood	Criteria
Highly likely	Is expected to occur within one year of commencement of revegetation
Likely	Will probably occur within one year of commencement of revegetation
Possible	Might occur within three to five years of commencement of revegetation
Unlikely	Could occur within five to ten years of commencement of revegetation
Rare	May occur in exceptional circumstances

Table 5 Consequence criteria

Likelihood	Criteria
Minor	Minor environmental impact that can be reversed 5% total loss of established plants
Moderate	Isolated but substantial environmental impact that could be reversed with intensive efforts – 10 – 20 % total loss of established plants
High	Substantial environmental impact that could be reversed with intensive efforts 20-30 % total loss of established plants
Major	Major loss of environmental value and real danger of continuing 30-60 % loss of established plants
Critical	Severe widespread loss of environmental value and irrecoverable environmental damage >60 % loss of established plants

Table 6 Risk ranking matrix

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

Table 7 Risk assessment of the Threatening Processes on the Offset Area

Threatening Process	Potential Impact on the Offset Area	Inherent Risk Rating			Management Measures	Residual Risk Rating		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Grazing	• Loss of understory vegetation • Loss of native vegetation through feeding and trampling • Inhibit species recruitment • Reduce species richness and diversity • Alter species composition	Possible	Moderate	Med	Section 6.1 & 6.2 Table 3 Pest management & Fencing Corrective Actions	Unlikely	Moderate	Low
Clearing	• Loss of native vegetation • Loss of habitat for threatened Black • Cockatoo species	Rare	Major	Med	Section 6.1, Table 3 Fencing Corrective Actions	Rare	High	Low
Fire	• Loss of native vegetation • Loss of habitat for threatened Black • Cockatoo species • Loss of fauna	Possible	High	Med	Section 6.5, Table 3 Firebreak Corrective Actions	Rare	High	Low
Weed	• Alter species composition • Competition with native species for resources • Reduce species richness, diversity and percentage cover	Likely	Moderate	Med	Section 6.3, Table 3 Weed Control Corrective Actions	Unlikely	Moderate	Low
Dieback	• Decline of vegetation health that will lead to loss of breeding and foraging habitat for Black Cockatoos • Alter vegetation structure • Alter foliage cover • Loss of foraging resources	Unlikely	High	Med	Section 6.1 & 6.2 Table 3 Fencing Corrective Actions	Rare	High	Low
Climate change	• Decline of vegetation health that will lead to loss of breeding and foraging habitat for Black Cockatoos • Alter vegetation structure • Alter foliage cover	Unlikely	Moderate	Low	Table 3 Plant success Corrective Actions - consideration of additional watering as a corrective action where trigger levels are exceeded	Rare	Moderate	Low

9 REFERENCES

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10 APPENDICES

Appendix	Title
Appendix A	Revegetation species list – Black Cockatoo Foraging Habitat (Biologic 2021)

APPENDIX A: Revegetation species list – Black Cockatoo Foraging Habitat (Biologic 2021)

Species	BC Foraging Species	Canopy (Lower / Mid / Upper)
Allocasuarina fraseriana	x	Mid
Allocasuarina huegeliana	x	Mid
Allocasuarina humilis	x	Mid
Banksia dallanneyi	x	Mid
Banksia sessilis	x	Mid
Banksia squarrosa	x	Mid
Corymbia calophylla	x	Upper
Eucalyptus marginata	x	Upper
Eucalyptus patens	x	Upper
Eucalyptus rudis	x	Upper
Eucalyptus wandoo	x	Upper
Grevillea synapheae subsp. *synapheae*	x	Mid
Hakea ilicifolia	x	Mid
Hakea lissocarpha	x	Mid
Hakea prostrata	x	Mid
Hakea undulata	x	Mid
Xanthorrhoea preissii	x	Mid